

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SHENZHEN TUOZHU TECHNOLOGY CO., LTD.,
Petitioner

v.

STRATASYS, INC.
Patent Owner.

IPR2025-00531
U.S. PATENT NO. 9,168,698

PATENT OWNER'S PRELIMINARY RESPONSE

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37 C.F.R. § 42.2431

37 C.F.R. § 42.10416

37 C.F.R. § 42.104(b)(5)16, 17

37 C.F.R. § 42.1071

37 C.F.R. § 42.108(c)8

EXHIBIT LIST

Exhibit No.	Description
2001	Docket Navigator – Judge Rodney Gilstrap Motion Success for Stay Pending IPR and Time to Milestones
2002	United States District Courts — Judicial Caseload Profiles for Eastern District of Texas (Sept. 30, 2024 and Dec. 31, 2024), available at https://www.uscourts.gov/data-news/reports/statistical-reports/federal-court-management-statistics
2003	Minute Entry for proceedings held before District Judge Gilstrap on Nov. 7, 2024, <i>Stratasys, Inc. v. Shenzhen Tuozhu Technology Co. Ltd.</i> , No. 2:24-cv-00644-JRG (E.D. Tex. Nov. 14, 2024)
2004	Discovery Order, <i>Stratasys, Inc. v. Shenzhen Tuozhu Technology Co. Ltd.</i> , No. 2:24-cv-00644-JRG, Dkt No. 35 (E.D. Tex. Dec. 2, 2024)
2005	Protective Order, <i>Stratasys, Inc. v. Shenzhen Tuozhu Technology Co. Ltd.</i> , No. 2:24-cv-00644-JRG, Dkt No. 36 (E.D. Tex. Dec. 3, 2024)
2006	e-Discovery Order, <i>Stratasys, Inc. v. Shenzhen Tuozhu Technology Co. Ltd.</i> , No. 2:24-cv-00644-JRG, Dkt No. 41 (E.D. Tex. Dec. 19, 2024)
2007	Invalidity and Ineligibility Contentions, <i>Stratasys, Inc. v. Shenzhen Tuozhu Technology Co. Ltd.</i> , No. 2:24-cv-00644-JRG, (E.D. Tex. Jan. 30, 2025)
2008	Transcript of Hearing on the Nomination of Howard Lutnick, of New York, to be Secretary of Commerce (Jan. 29, 2025)
2009	Order Denying Defendants' Motion to Dismiss for Failure to Join Indispensable Party, <i>Stratasys, Inc. v. Shenzhen Tuozhu Technology Co. Ltd.</i> , No. 2:24-cv-00644-JRG, Dkt. No. 53 (E.D. Tex. May 29, 2025)
2010	Plaintiff's Unopposed Motion to Consolidate Case No. 2:25-cv-00465-JRG with Case Nos. 2:24-cv-00644-JRG and 2:24-cv-00645-JRG, <i>Stratasys, Inc. v. Shenzhen Tuozhu Technology Co. Ltd.</i> , No. 2:24-cv-00644-JRG, Dkt. No. 54 (E.D. Tex. May 30, 2025)
2011	Lex Machina, Patent Litigation Report 2024 (Feb. 2024)
2012	U.S. District Court, Eastern District of Texas [Live] Calendar Events Set for 6/1/2026-8/1/2026

I. INTRODUCTION

Pursuant to 35 U.S.C. § 313 and 37 C.F.R. § 42.107, Stratasys, Inc. (“Stratasys” or “Patent Owner”) hereby submits this Preliminary Response to the Petition for *inter partes* review (“Petition” or “Pet.”) filed by Shenzhen Tuozhu Technology Co., Ltd. (“Petitioner”), challenging claims 1-15 (“challenged claims”) of U.S. Patent No. 9,168,698 (“the ’698 Patent”) (EX1001).

Petitioner alleges that the challenged claims are invalid based on four grounds (1A, 1B, 2A, 2B). Petitioner argues that independent claim 1 is obvious over U.S. Patent No. 6,986,739 (“*Warren*”) (EX1004) in Ground 1A and U.S. Patent No. 6,629,011 (“*Calderon*”) (EX1009) in view of *RepRap20208* (EX1010) in Ground 2A.

As explained below, Petitioner has failed to meet its burden of showing a reasonable likelihood that it would prevail with respect to any of the challenged claims because each of the asserted grounds has fatal defects.

The challenged claims of the ’698 Patent are directed to solutions that include identifying build instructions for fabricating an object, one or more sensors mechanically coupled to the fabrication tool that are configured to detect a current contact force between the fabrication tool and a separate structure, detecting the current contact force based on a sensor signal from the sensor(s), and creating a

control signal to control at least one component of the three-dimensional printer in response to the current contact force while depositing material during the build.

Petitioner proposes flawed motivations to combine for both grounds challenging independent claim 1. For Ground 1A, there is no motivation to combine differing embodiments of *Warren* in the manner that Petitioner proposes. And for Ground 2A, there is no motivation to combine *Calderon* with *RepRap20208*. Petitioner routinely ignores the disclosures of the references themselves and makes unsupported assertions contrary to the teachings of the references themselves. Further, Petitioner fails to satisfy the basic requirements of an IPR petition, providing a reference (*Warren*) that does not match its citations, and asserting *RepRap20208* as prior art without showing that it is a printed publication. Additionally, each of Grounds 1A and 2A fail to teach multiple elements of independent claim 1.

In summary, the Board should not institute IPR because each of Petitioner's grounds are deficient and thus Petitioner cannot satisfy its burden to prove unpatentability.

II. THE '698 PATENT AND THE CHALLENGED CLAIMS

A. Summary of the '698 Patent (EX1001)

The '698 Patent relates to "three-dimensional printers" that "can be used to fabricate various desired objects based on computer models of those objects."

EX1001 at 1:12-14. As the patent explains, “components of the three-dimensional printer may degrade with time.” *Id.* at 1:14-15. That is the components may “become dented, warped, misaligned, etc.” *Id.* at 1:15-16. “These errors may disadvantageously affect the ability of the three-dimensional printer to accurately fabricate objects.” *Id.* at 1:16-18. Thus, there is “a need for pressure-sensing extruders and methods for using same.” *Id.* at 1:18-19.

The '698 Patent explains that the three-dimensional printer includes an “extruder or other tool head” that may be instrumented to “detect contact force against the extruder, such as by a build platform or an object being fabricated” and “detect deflection forces and the like acting on the tool that might indicate an operating error.” *Id.* at 1:23-28. “The resulting feedback data” may be used “to control operation of the three-dimensional printer during fabrication or diagnostics.” *Id.* at 1:28-30.

Figure 6 of the '698 Patent shows a flowchart of a process for fabricating an object.

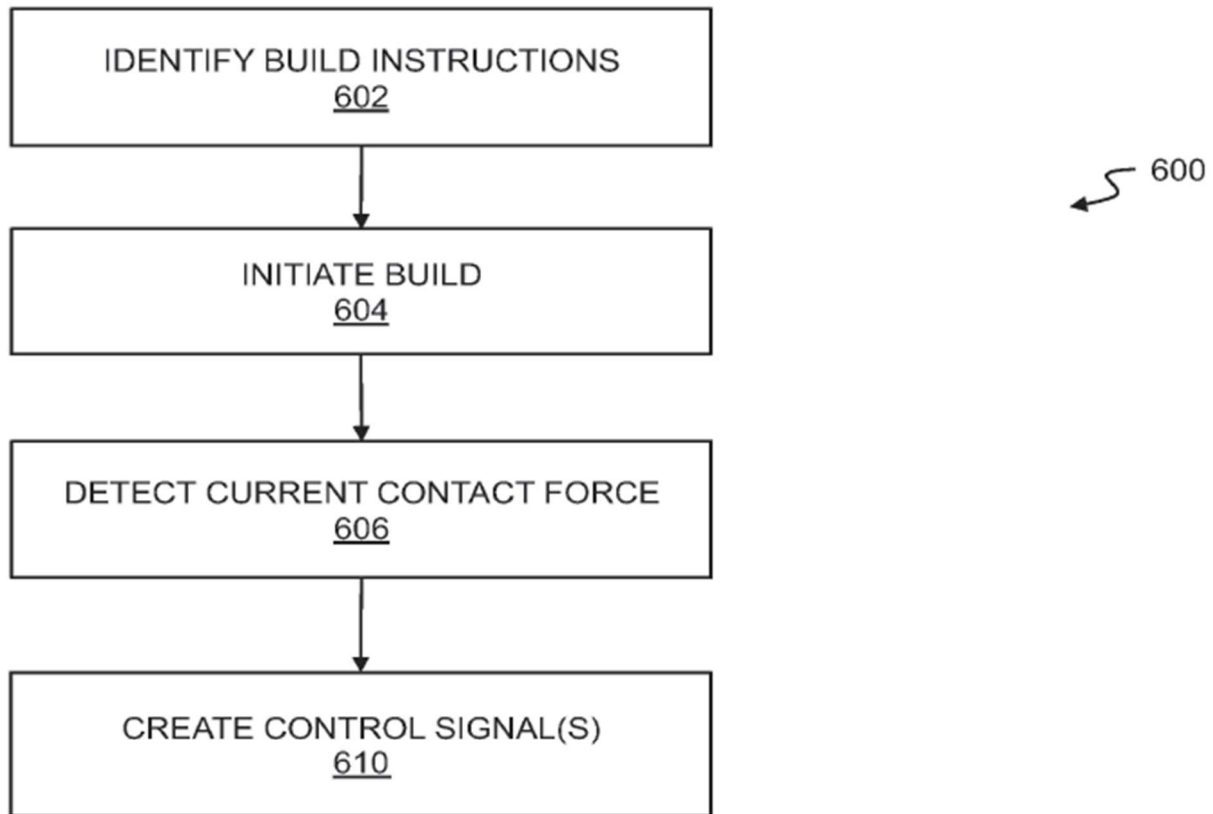


Fig. 6

Id. at Fig. 6. At step 602, the process starts by identifying build instructions for fabricating an object. *See id.* at 10:29-30. The instructions may be provided to a printer that can execute the instructions to fabricate the object. *See id.* at 10:35-37. At step 604, the process continues by initiating a build. *See id.* at 10:38-39. Thereafter, a current contact force is detected at step 606. *See id.* at 10:49-50. As the '698 Patent explains, one or more sensors “may be configured to detect a current contact force between the fabrication tool and the separate structure, and to provide corresponding data to a controller of the three-dimensional printer for use

during fabrication.” *Id.* at 10:44-48. The current contact force may be input to a control program executing on the controller or compared to other data, such as a previous contact force or an expected contact force, to determine an appropriate response. *See id.* at 10:50-55. Additionally, a deflection force on the fabrication tool may be measured to determine when adjustments might be made and when a process should be paused or terminated due to an inferred failure. *See id.* at 10:55-61.

The next step in the process creates a control signal in response to the current contact force. *See id.* at 10:62-63. The controller may generate the control signal to control a component of the three-dimensional printer during a build. *See id.* at 10:63-66; *see also id.* at 11:11-16. For example, the control signal may change the feed rate of build material extruded by an extruder via a drive system or other hardware to increase or decrease the current contact force. *See id.* at 10:66-11:4. As another example, the control signal may vary the distance between the extruder and a separate structure to maintain steady material deposition while adjusting to surface irregularities. *See id.* at 11:4-11. Other actions may be taken when the detected current contact force exceeds a threshold or deviates from an expected value by an amount, such as terminating a build when a fabrication error is indicated by the difference between the current contact force and expected contact force. *See id.* at 11:17-22.

The '698 Patent also discloses a method in Figure 4 to detect planarity and responsively make corrections. This leveling process may be performed concurrently with a fabrication process for an object. *See id.* at 11:34-38, Fig. 4; *see also id.* at 1:41-42, 9:24-10:19.

Numerous claims embody these solutions, including independent claim 1. For instance, claim 1 recites “initiating a build using a three-dimensional printer comprising a fabrication tool and one or more sensors mechanically coupled to the fabrication tool, the one or more sensors configured to detect a current contact force between the fabrication tool and a separate structure;” “detecting the current contact force based on a sensor signal from the one or more sensors; and” “creating a control signal to control at least one component of the three-dimensional printer in response to the current contact force while depositing material during the build.” *Id.* at 12:39-49.

As explained below, the asserted grounds fail to teach the elements of claim 1. Because claims 2-15, depend from claim 1, the asserted grounds also fail to teach the elements of dependent claims 2-15 for at least the same reasons.

B. Summary of Prosecution History of the '698 Patent (EX1002)

During prosecution, the applicant explained that unlike the cited art, the claimed method recites detecting the current contact force based on a sensor signal from one or more sensors and creating a control signal responsive to the current

contact force while depositing material during a build. *See* EX1002 at 32-33. The applicant explained that the examiner correctly noted that U.S. Patent No. 6,129,872 to Jang (“*Jang*”) did not disclose detecting a contact force between the fabrication tool and a separate structure. *Id.* at 32. The examiner had rejected the claims over *Jang* in view of U.S. Patent No. 7,625,198 to Lipson, et al. (“*Lipson*”). *See id.* at 42-44. But the applicant argued that *Lipson* fails to teach or suggest using a signal from the force sensor as feedback while depositing material during a build. *See id.* at 33. In response to the applicant’s arguments, the examiner allowed the claims explaining that the prior art fails to teach or suggest the claimed method. *See id.* at 20-27.

As explained below, the references asserted in the Petition suffer from similar deficiencies as the art cited during prosecution and the asserted grounds do not teach all elements of independent claim 1 of the ’698 Patent.

III. LEVEL OF ORDINARY SKILL

For the purpose of this Preliminary Response, a person of ordinary skill in the art (a “POSITA”) in relation to the subject matter of the ’698 Patent would have had a bachelor’s degree in Mechanical Engineering, Computer Engineering, Electrical Engineering, Chemical Engineering, Materials Science, or a comparable field and at least two years of experience related to 3D printing, with additional

experience potentially being a substitute for a formal degree or training (and vice versa).

As explained below, the Petition has failed to show that the claims of the '698 Patent are unpatentable irrespective of the level of skill of a skilled artisan.

IV. CLAIM CONSTRUCTION

For the purposes of this Preliminary Response, Patent Owner submits that the Board does not need to construe any claim terms in any particular way to conclude that the Petition is deficient and thus institution of review is not warranted. *See Wellman, Inc. v. Eastman Chem. Co.*, 642 F.3d 1355, 1361 (Fed. Cir. 2011) (“need only be construed ‘to the extent necessary to resolve the controversy’”).

V. APPLICABLE LEGAL STANDARDS

At a minimum, Petitioner must show there is a reasonable likelihood of prevailing with respect to at least one challenged claim. *See* 35 U.S.C. § 314(a); 37 C.F.R. § 42.108(c); Practice Guide at 3 (“The Board, acting on behalf of the Director, may institute a trial where the petitioner establishes that the standards for instituting the requested trial are met”)

Each of Petitioner's grounds relies on obviousness under 35 U.S.C. § 103. A claim cannot be considered obvious if even one element of the claim is absent from the prior art. *See CFMT, Inc. v. YieldUp Int'l Corp.*, 349 F.3d 1333, 1342 (Fed.

Cir. 2003) (“Obviousness requires a suggestion of all limitations in a claim.”) (citing *In re Royka*, 490 F.2d 981, 985 (C.C.P.A. 1974)); *In re Rijckaert*, 9 F.3d 1531, 1534 (Fed. Cir. 1993) (reversing obviousness rejection as not all claim elements were taught or suggested); *Garmin Int’l, Inc. v. Patent of Cuozzo Speed Techs. LLC*, IPR2012-00001, Paper 15 at 15 (PTAB Jan. 9, 2013) (denying institution of IPR in part as prior art did not disclose all claim limitations in obviousness challenge).

Obviousness is resolved based on several factual determinations including the scope and content of the prior art, any differences between the claimed subject matter and the prior art, and the level of ordinary skill in the art. *See Graham v. John Deere Co.*, 383 U.S. 1, 17-18 (1966). IPR petitions “must address the *Graham* factors.” *Eizo Corp. v. Barco N.V.*, IPR2014-00358, Paper 11 at 29-30 (PTAB July 23, 2014) (citing *Graham*, 383 U.S. at 17-18) (faulting Petitioner for its failure to identify differences between the claimed subject matter and the prior art and its conclusory assertions about the teachings of the prior art); *see also Moses Lake Indus., Inc. v. Enthone, Inc.*, IPR2014-00243, Paper 6 at 18 (PTAB June 18, 2014); *Moses Lake Indus., Inc. v. Enthone, Inc.*, IPR2014-00246, Paper 6 at 17 (PTAB June 18, 2014); *eBay, Inc. v. Paid, Inc.*, CBM2014-00125, Paper 15 at 21 (PTAB Sept. 30, 2014).

The conclusion of obviousness based on the combination of references must be supported by an explicit analysis of a reason to combine such references. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007). Mere conclusory statements are insufficient. Instead, “there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006); *see also LG Elecs., Inc. v. Cellular Commc'ns Equip. LLC*, IPR2016-00197, Paper 7 at 7-11 (PTAB Apr. 29, 2016) (petition's conclusion of obviousness lacked sufficient articulated reasons with rational underpinnings for modifying references to achieve specific elements of the claims).

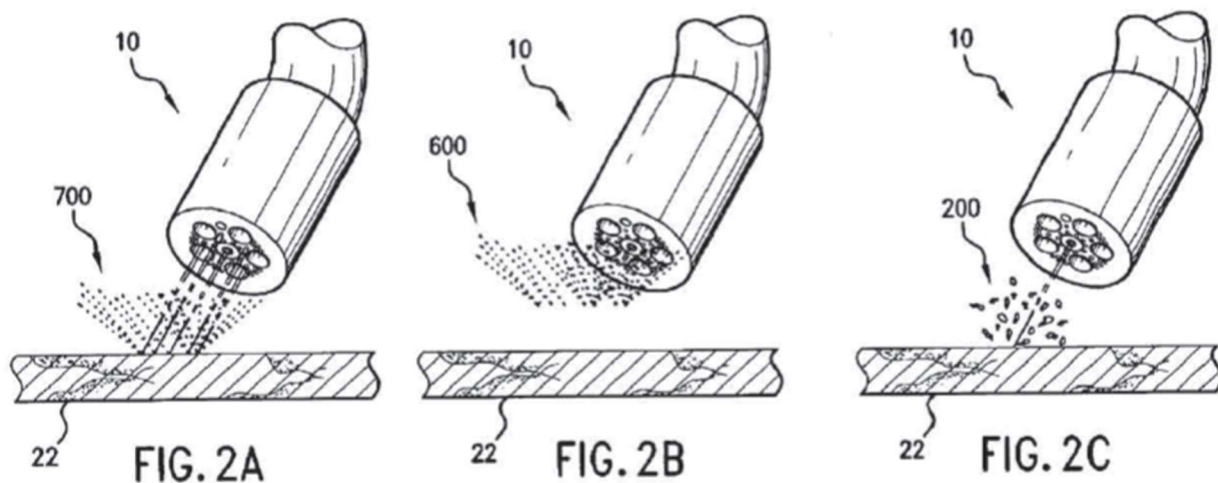
VI. THE PETITION DOES NOT SHOW THAT THE CHALLENGED CLAIMS ARE UNPATENTABLE UNDER GROUND 1A

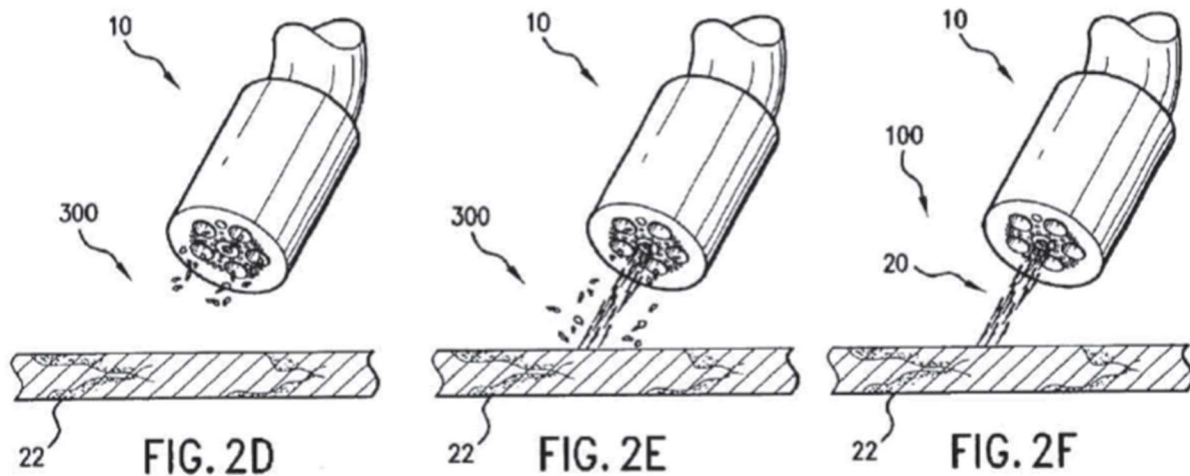
A. Overview of *Warren* (EX1004)

Warren discloses an architecture tool and methods of use, including depositing materials on a substrate, material destruction and removal, temperature control, imaging, detection, therapy and positional and locational control. EX1004 at Title, Abstract. *Warren* explains that his tool and methods use direct-write deposition technology (DWDT) to construct inorganic and/or organic materials for fine-pattern microdispensing and/or fine-focused laser-beam writing. *See id.* at 2:55-60, 2:39-42. The DWDT technology, as applied to biological, medical, bioengineering, and tissue-engineering, is referred to as a human architecture tool (HAT). *Id.* at 3:18-20.

As *Warren* explains there are four purported unique aspects to the HAT that uses DWDT technology. *See id.* at 7:61-63. First, the HAT permits navigation among internal cavities and structural elements (e.g., bones), as well as arteries and veins, with the body. *See id.* at 7:63-8:1. Second, it can add and/or subtract unwanted tissues and materials in a seamless and facile fashion. *See id.* at 8:18-20; *see also id.* at 8:20-30. Third, it combines fabrication and assembly processes to form, for example, 3D engineered tissue constructs (ETC). *See id.* at 8:31-37. Fourth, its processes can be performed outside of and within the body. *See id.* 8:40-41.

For example, Figures 2A through 2F show a series of perspective views using the invention *in vivo*.





Id. at Figs. 2A-2F. Figure 2A shows therapeutic emitter 700 (*id.* at 21:15-22:27), Figure 2B shows detector 600 for laser-induced florescence (LIF) (*id.* at 17:56-18:40, 16:63-55), Figure 2C shows material destroyer 200 to separate cells or tissue from their endogenous position in the body (*id.* at 23:3-24:45), Figures 2D and 2E show material remover 300 with suction channels (*id.* at 32:49-33:54), and Figure 2F shows a material dispenser 100 to deposit material on a substrate 22 (*id.* at 34:60-36:28).

Figure 18 of *Warren* shows an embodiment to control the position of dispenser 3700 relative substrate 3710.

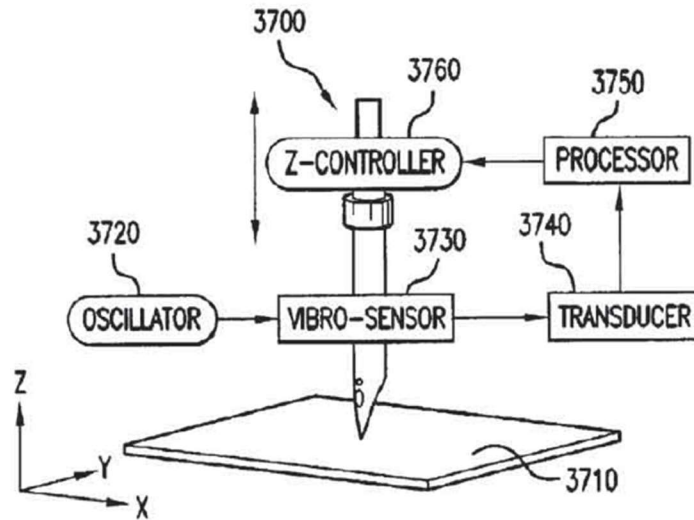


FIG. 18

Id. at Fig. 18, 46:26-34. Although the substrate is shown as flat, *Warren* explains that this is just for the ease of illustration as the dispenser follows irregular or curved surfaces. *Id.* at 46:29-34. Oscillator 3720 imparts vibration to dispenser 3700, and vibration sensor 3730 and transducer 3740 sense the amplitude and frequency of vibration. *See id.* at 47:20-24.

Warren shows one implementation of a capillary vibro-sensor dispensing unit in Figure 19.

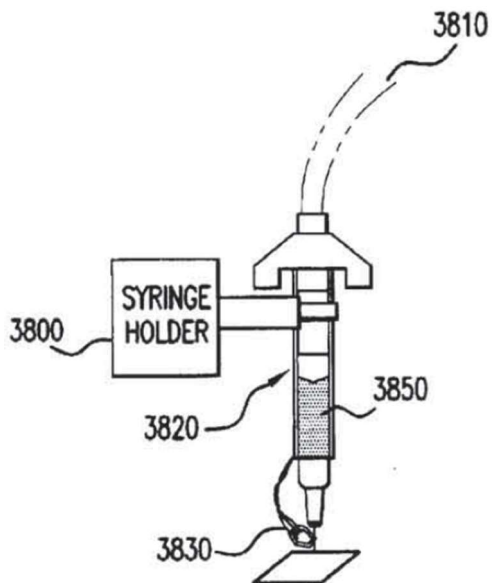
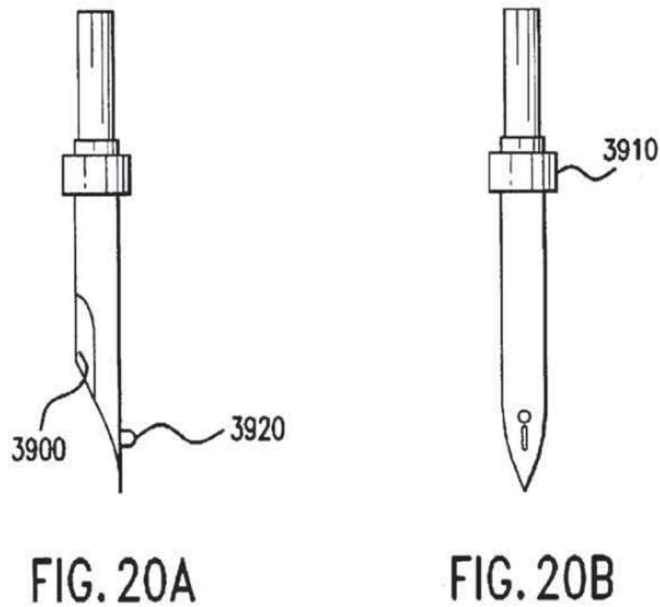


FIG. 19

See id. at 46:40-47:2, Fig. 19. As shown, the capillary dispensing unit is held by syringe holder 3800 and the system includes a piezomembrane 3830 that may be implemented with an electroceramic sensor and include a vibration actuator and vibration transducer. *See id.*

Alternatively, a quill-pen may be used in which a cell suspension or slurry functions as ink. An implementation of a quill-pen is shown in Figures 20A and 20B.



See id. at 47:3-13, Figs. 20A-20B; *see also id.* at 40:55-67. Vibration at a low frequency facilitates dispensing without agglomeration (e.g., clogging) and/or sticking. *See id.* at 47:3-13. As shown, the system includes a vibration transducer 3920. *See id.*

Warren also discloses a table-top tool can include three capillary-dispensers and another type of dispenser called a through-nozzle dispenser. *See id.* at 44:23-27, Figs. 23A-23C.

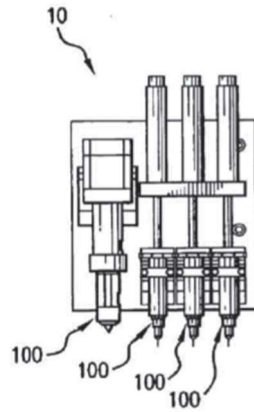


FIG. 23A

The through-nozzle dispenser is used to fill larger areas. *See id.* at 44:27-30, 44:34-46. By contrast, the capillary dispensers are used to dispense solutions and/or cell suspensions to achieve smaller details than those possible with the through-nozzle dispenser, to provide high-detail and high-precision dispensing. *See id.* at 44:30-32, 44:47-51.

A. The Petition Fails to Satisfy the Requirements of an IPR Petition

As a threshold issue, the Petition must identify “the evidence that supports the grounds for the challenge to each claim” and include “copies of patents and printed publications that the petitioner relies upon in support of the petition.” 35 U.S.C. § 312(a)(3)(A); *see also* 37 C.F.R. § 42.104 (specifying content of the petition). In particular, the Petition must provide a statement of the precise relief requested including by “identifying specific portions of the evidence that support the challenge.” 37 C.F.R. § 42.104(b)(5). The Board “may exclude or give no

weight to the evidence where a party has failed . . . to identify specific portions of the evidence that support the challenge.” *Id.*

Similarly, Petitioner is expected to review the documents it provides with its Petition. “At the very least, the responsibilities of Petitioner’s counsel include reviewing documents uploaded during this proceeding and, if necessary, notifying the Board of a mistake, inconsistency, or error in a timely manner.” *Conmed Corp. v. Bonutti Skeletal Innov. LLC*, IPR2013-00624, Paper 18 at 8 (PTAB Feb. 21, 2014); *see also Nuna Baby Essentials, Inc. v. Britax Child Safety, Inc.*, IPR2018-01683, Paper 11 at 6 (PTAB Dec. 18, 2018) (“There is no evidence concerning whether counsel for Petitioner checked” its filings.).

With respect to *Warren*, Petitioner has failed to satisfy the threshold requirements of *inter partes* review by failing to identify specific portions of Exhibit 1004 (*Warren*), U.S. Patent No. 6,986,739. Each of the citations to *Warren* in the Petition include paragraph numbers despite the provided exhibit, a U.S. patent, lacking paragraph numbers. *See, e.g.*, Pet. at 6 (citing EX1004, [0010-0011]); *see generally* EX1004. Thus, Petitioner has failed to satisfy the basic requirements of a petition for *inter partes* review. *See* 35 U.S.C. § 312(a)(3)(A); 37 C.F.R. § 42.104(b)(5).

As a result of Petitioner’s failure, Patent Owner has been forced to search for text quoted in its Petition within the 74 pages of *Warren* to formulate its

arguments. Petitioner's failure is prejudicial to Patent Owner and thus Petitioner's request to institute review should be denied for failing to satisfy the basic requirements of requesting *inter partes* review.

Further, at no point has Petitioner sought to substantiate or correct its failure. *See Conmed Corp.*, IPR2013-00624, Paper 18 at 8; *Nuna Baby Essentials, Inc.*, IPR2018-01683, Paper 11 at 6.

B. There Is No Motivation to Combine Different Embodiments of *Warren*

Petitioner asserts a motivation to combine different embodiments of *Warren*. *See Pet.* at 13-16. Specifically, Petitioner asserts that “a POSITA would have found it obvious to use the vibrating force sensor concepts with Warren's through-nozzle dispenser” and a “POSITA would have been motivated to apply Warren's through-nozzle dispenser” as “dispenser 3700 in Warren's vibrating force sensor configuration.” *Pet.* at 13. However, as explained below, none of Petitioner's reasons or rationales for the combination is sufficient.

First, there is no express motivation or invitation in *Warren* to make the combination, as Petitioner purports. *See Pet.* at 13-14. *Warren* merely states that its dispenser 3700 is not limited to the specific implementations corresponding to

Figures 19, 20A, and 20B. *See* EX1004, 47:14-19¹. In fact, Figure 18 illustrates dispenser 3700 as another implementation of a quill-pen dispenser that is different from the one shown in Figures 20A and 20B. *See id.* at Fig. 18. There is no statement explaining any other particular implementation for dispenser 3700, much less to implement dispenser 3700 as a through-nozzle dispenser as Petitioner desires. *See id.* at 47:14-19.

Second, there is no motivation to use a through-nozzle design for the dispenser to enable precise control. *See* Pet. at 14. Petitioner fails to acknowledge that a capillary dispenser already provides for high-precision and that Warren teaches switching from the through-nozzle dispenser to a capillary dispenser when smaller, high-detail, high-precision dispensing is required. Namely, *Warren* teaches that a through-nozzle design is used for less detailed dispensing to fill larger areas, whereas capillary dispensers are used for high-detail and high-precision dispensing to achieve smaller details. *See* EX1004 at 44:27-32, 44:34-51. Similar to capillary dispensers, *Warren* teaches that sensoric quill-pen designs enable precise control “to sense and maintain optimum contact.” *See id.* at 40:63-

¹ Patent Owner has provided citations to the columns and line numbers in the exhibit for *Warren* (EX1004) based on its limited ability to perform searches for quotes from Warren in the Petition.

65. Thus, there is no motivation to use a through-nozzle design for the dispenser instead of a quill-pen or capillary dispenser to enable precise control.

Third, there is no motivation to modify *Warren's* capillary dispenser or quill-pen designs to use a linear actuator. *See* Pet. at 14-15. Again, there is no express suggestion in *Warren* to add such a feature. Petitioner argues that a "POSITA would have recognized Warren's express suggestion to add features from its through-nozzle design (such as linear actuator 144) to Warren's dispenser system 3700" because the reference explains that its 'DWDT/HAT technology has a plurality of aspects that, in some embodiments, combine to make a tool capable of producing a modeled structure through 3D direct construction of various materials into complex shapes.'" Pet. at 15 (citing non-existent [0093] of Warren) (emphasis added by Petitioner). But *Warren's* description of using multiple "aspects" that "combine" to make a tool with certain capabilities refers to a combination tool that has the capabilities associated, for example, with Figures 2A to 2F. *See* EX1004, 15:38, Figs. 2A-2F; *supra* § VI.A (discussing Figs. 2A-2F). The combination tool does not add features from one design to another. Rather, it integrates many different designs (i.e., aspects) into one tool. *See id.* at 15:40-54 ("[T]he DWDT/HAT includes a material dispenser 100 . . . ; a material destroyer 200 . . . ; a material remover 300 . . . ; temperature controllers 400 . . . ; vision and

imaging devices 500 . . . ; detection devices 600 . . . ; therapeutic emitters 700 . . . ; location control devices 800 . . . ; and stabilization devices 900.”).

Moreover, Petitioner ignores *Warren's* teachings and relies on impermissible hindsight. There is no need for a linear actuator to open and close a valve in *Warren's* capillary designs or quill-pen designs. The linear actuator in *Warren's* through-nozzle designs enables control of the rate and degree that the valve opens and closes for dispensing material. *See* 36:33-34, 36:62-64. Whereas the through-nozzle designs use the linear actuator to control the dispensing of material, *Warren* teaches that other features in his capillary dispensers and quill-pen dispensers achieve control of the material flowing out the dispenser. For example, *Warren* teaches that the flow of material from his capillary dispenser is “primarily controlled by capillary surface tension when the tip almost touches the substrate surface” and that a positive pressure is applied to the feed channels. *Id.* at 44:55:57; *see also id.* at 44:50-62. As another example, *Warren* teaches that his quill-pen dispensers enable precise control “to sense and maintain optimum contact” and are vibrated to facilitate dispensing of the ink, thus overcoming issues regarding agglomeration and/or sticking. *Id.* at 40:63-65, 47:3-13.

Fourth, there is no motivation to provide *Warren's* through-nozzle dispenser with vibrating force sensor capabilities. *See* Pet. at 15-16. As an initial matter, this rationale asserts the opposite of Petitioner's combination, which applies *Warren's*

through-nozzle dispenser as dispenser 3700 in *Warren's* vibrating force sensor configuration. *See* Pet. at 13. Moreover, there is no motivation to make this modification to facilitate control over the deposition geometry or to avoid damage (*see* Pet. at 15-16) because the through-nozzle dispenser already includes a mechanism for such control. *Warren* explains that, through precision control of a valve and piston opening, the material flow is “smooth, seamless, and very reproducible.” EX1004 at 38:37-39. And, control of the valve in the through-nozzle dispenser is synchronized with the xyz motion of the dispenser. *See id.* at 36:66-67; *see also id.* at 35:61-65 (synchronizing control device 800 with the actuator), 35:51-55 (“In yet another embodiment, the control device further comprises a linear location controller adapted to selectively position the tip orifice within the z dimension (i.e., a line) that is substantially perpendicular to that xy plane.”). Indeed, there is no explanation of how through-nozzle dispensers could work with vibration sensing capabilities. The vibration function moves the dispenser vertically in an amplitude at a resonance frequency. *See, e.g., id.* at 45:63-46:10, 47:22-24, 47:38-41. However, the valve in through-nozzle dispensers opens and closes in the same direction and there is no teaching in *Warren* of how the valve could operate with a vibration (e.g., at a given amplitude and resonance frequency) or how the vibration sensing capabilities, which sense changes in the

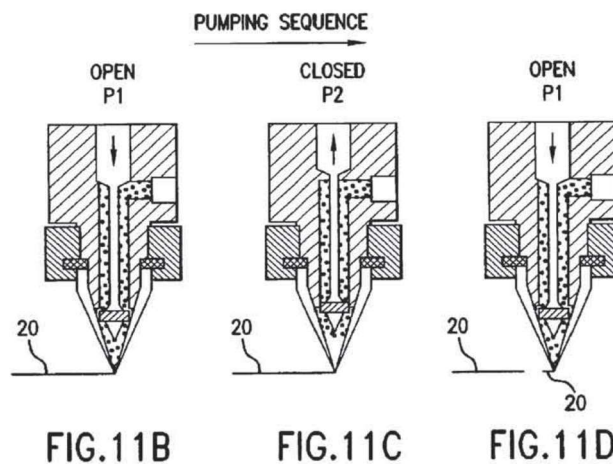
amplitudes of vibrations, could work with a valve that moves in the same direction as the vibrations. *See, e.g., id.* at 35:33-35, 36:33-34, 36:54-61, Figs. 11A-11D.

Unlike *Warren*'s through-nozzle dispenser, *Warren* discloses other dispensers that have specific need for vibration control. For example, a capillary dispenser is "controlled by capillary surface tension when the tip almost touches the substrate surface" which may be curved. *Id.* at 44:55-57; *see also id.* at 46:53-57. Thus, precise control of the tip is required. As another example, certain quill-pens require a "sensoric" feature to "sense and maintain optimum contact with the deposition target." *Id.* at 40:63-65. Thus, the dispensers in *Warren* that need vibrating sensor capabilities, such as the capillary dispenser and sensoric quill-pen use the functionality to maintain optimum contact to prevent crashes and to control the flow of material, such as less-viscous fluids that must be dispensed close to the surface or those that function as "ink" *See id.* at 36:53-57, 44:37-41, 47:3-13. On the other hand, the through-nozzle dispenser includes a large conical nozzle that dispenses more-viscous materials over a large areas and thus precise control of the nozzle is not required. *See id.* at 44:28-30, 44:34-36

Further, there is no motivation based on overcoming issues regarding agglomeration and/or sticking, which is related to implementations of a quill-pen that use ink and thus not related to a through-nozzle dispenser which does not use

ink. *See* Pet. at 15-16; *see also* EX1004, 47:5-8, 52:41-46. There is no rationale for why solutions for dispensing ink would apply to a through-nozzle dispenser.

Similarly, Petitioner's assertion that *Warren's* teachings across different embodiments are complimentary is also flawed. *See* Pet. at 16. As explained above, there is no explanation in *Warren* of how the valves of through-nozzle dispensers could work with vibration sensing capabilities or how the vibrating sensing capabilities could work with the valves of through-nozzle dispensers. *See e.g., id.* at 45:63-46:10, 47:22-24, 47:38-41, 35:33-35, 36:33-34, 36:54-61, Figs. 11A-11D. The fundamental aspects of the two solutions conflict. The valves of through-nozzle dispensers are controlled in the vertical direction by opening and closing the valve to dispense material. This is shown below in Figures 11B-D.



Id. at Figs. 11B-11D. The vibration sensing capabilities in *Warren* also rely on motion in the vertical direction in the form of a vibration that is imparted with an amplitude. *See id.* at 45:63-46:10, 47:22-24, 47:38-41, Fig. 21. When the dispenser

touches the substrate, the amplitude of the vibration changes to indicate contact. *See id.* But there is no teaching in *Warren* of how to distinguish between changes in amplitude caused by the vibration from other sources. *See id.* Thus, if *Warren's* through-nozzle dispensers could be combined with vibration sensing capabilities, there is no indication of whether *Warren's* vibration sensing capability could be able to determine if a change in amplitude of the vibration is caused by moving the dispenser to touch the substrate or by operation of the valve in the same direction to dispense material. Thus, there is no motivation to combine these disparate embodiments of *Warren* with different requirements, solutions, and uses.

C. Ground 1A Does Not Render Claim 1 Unpatentable

Petitioner fails to show how *Warren* in Ground 1A teaches all elements of claim 1. For instance, the Petition fails to show that the reference teaches claim elements 1[b] (“initiating a build using a three-dimensional printer comprising a fabrication tool and one or more sensors mechanically coupled to the fabrication tool, the one or more sensors configured to detect a current contact force between the fabrication tool and a separate structure;”) and 1[c] (“detecting the current contact force based on a sensor signal from the one or more sensors; and”).

Namely, *Warren* does not teach one or more sensors configured to detect a current contact force. Petitioner concedes that *Warren* detects a change in amplitude of vibration and not a current contact force, but asserts that “a POSITA

would have understood or found it obvious that the contact force can be readily calculated from the detected 'change in the amplitude.'" See Pet. at 20; see also EX1004 at 45:67-46:3, 49:39-40, 49:51-52. *Warren* does not explain how to detect the contact force from a change in amplitude as Petitioner argues. It only says that the force is generally proportional to the change in amplitude, which according to Figure 21 of *Warren* has arbitrary units and varies widely over a frequency range that also has arbitrary units.

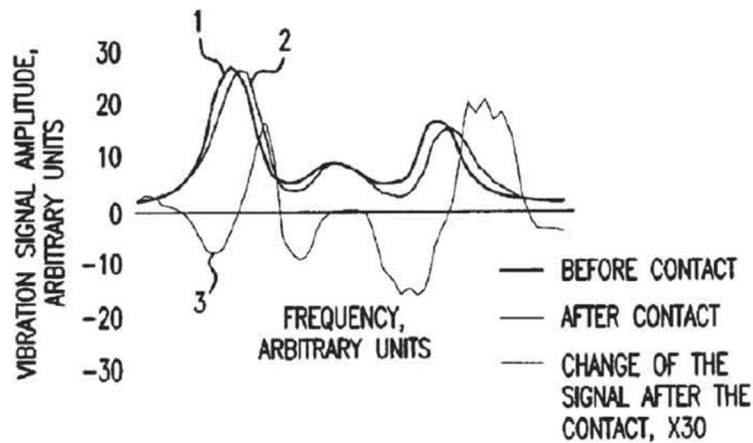


FIG. 21

See EX1004 at Fig. 21, 48:28-39, 47:50-54 ("The transducer 3740 senses and transfers the changed vibration signal to an amplifier (not shown), which then creates a feedback signal that is generally proportional to the intensity of the physical contact of the dispenser 3700 with the substrate 3710."), 49:43-45("At step 4106, a determination is made whether the contact force is that which is desired, based on the detected change in amplitude."), 50:1-6.

Further, even if the contact force could have been detected, as Petitioner asserts, there is no explanation how or why a skilled artisan would have done so. *See Belden Inc. v. Berk-Tek LLC*, 805 F.3d 1064, 1073 (Fed. Cir. 2015) (“[O]bviousness concerns whether a skilled artisan not only could have made but would have been motivated to make the combinations or modifications of prior art to arrive at the claimed invention.”).

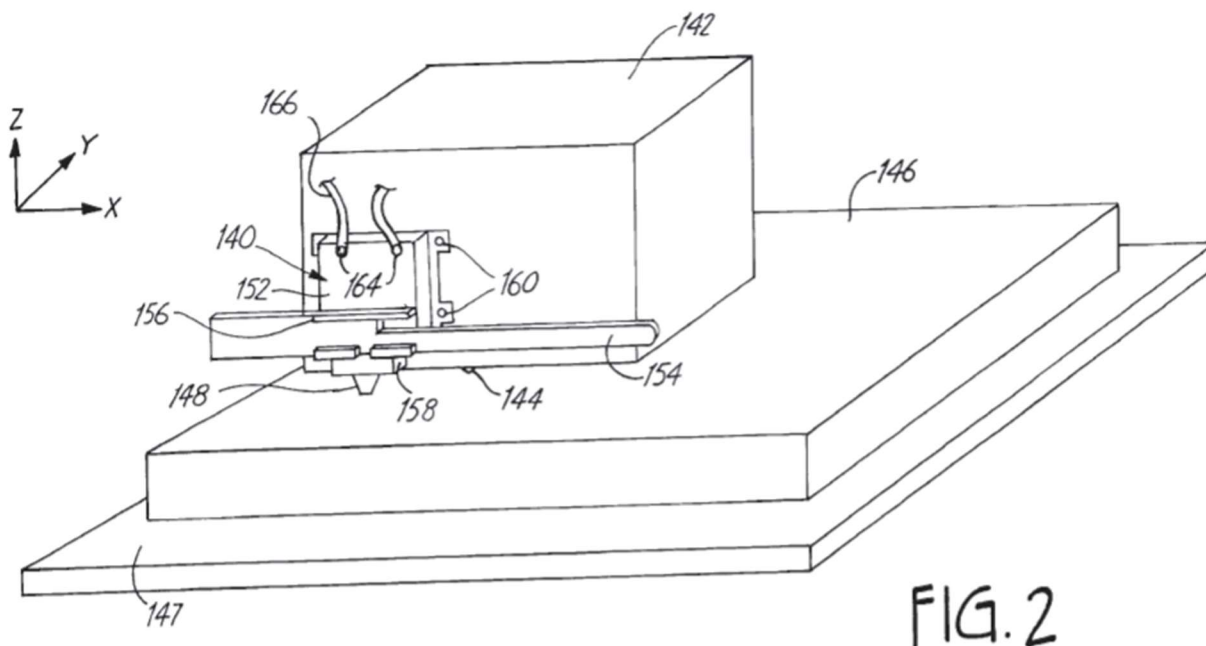
In addition, there is no support for detecting a force between both dispensers and a separate structure. Indeed, Petitioner's expert only asserts that a force is detected between “either capillary vibro-sensor dispensing unit or the through-nozzle dispenser” and a separate structure and thus concedes that there is no force detected by both dispensers and a separate structure. *See* EX1003, ¶82; *see also* EX1004 at 45:53-58 (describing a system for controlling the position of one or more elements of the depositing system where there is a force between a dispensing tip and substrate).

VII. THE PETITION DOES NOT SHOW THAT THE CHALLENGED CLAIMS ARE UNPATENTABLE UNDER GROUND 2A

A. Overview of *Calderon*

Calderon discloses a method for a three-dimensional modeling machine. EX1009 at Title. Without operator intervention, *Calderon* senses the top surface of a substrate or other object at a variety of locations and records the Z-axis positions. *See id.* at Abstract.

Much of *Calderon* focuses on using a plunger to find z-axis positions. As shown below in Figure 2, plunger 148 is in its actuated position, protruding from the bottom of housing 152.



Id. at Fig. 2, 5:48-49. When the platform 147 is raised upward, the top surface of substrate 146 contacts plunger 148 and drives it up into housing 152. *See id.* at 5:55-58. A sensor senses when the plunger has traveled upward by a predetermined distance and provides a signal indicating detection of the plunger. *See id.* at 5:58-61.

In an alternative embodiment, instead of the plunger, *Calderon* teaches that the tip of the nozzle and servo drive motors are used to detect contact with the substrate by monitoring a change in the servo drive current. *See id.* at 9:63-10:8. *Calderon* explains that this alternative embodiment beneficially detects contact

“without need for any special purpose sensing means.” *See id.* at 10:7-8. *Calderon* also explains that its autoinitialization method can also be used to ensure that the building envelope is clear or to detect partially built models. *See id.* at 10:26-31; *see also id.* at 10:50-64.

B. Overview of *RepRap20208*

RepRap2028 appears to be a printout dated December 31, 2024 from a “General” forum that is entitled “Genetic Algorithms.” EX1010 at 1.

C. *RepRap20208* is not a printed publication

Petitioner has failed to show that one of the references in Ground 2A, *RepRap20208*, is a printed publication. Petitioner asserts that the reference “is an online discussion thread” that was purportedly published around January 2009 on a website repprap.org, where forum discussion threads were purportedly accessible from the front page, ordered by subject matter and keyword searchable. *See Pet.* at 2. However, Petitioner fails to address why *RepRap2028*, specifically, was accessible to the public before the challenged patent, much less by January 2009.

As an initial matter, the Petition does not explain at all why *RepRap2028* was publicly available. To the extent Petitioner relies on arguments in a declaration that it has cited, the PTAB’s “rules prohibit parties’ incorporation of arguments by reference.” *See Decision Denying Petitioner’s Request on Rehearing of Final Written Decision, Medivis, Inc. v. Novarad Corp.*, IPR2023-00042, Paper 37 at 10

(PTAB Apr. 23, 2024); *see also* 37 C.F.R. § 42.6(a)(3) (“Arguments must not be incorporated by reference from one document into another document.”). In *Medivis*, the petitioner included wholesale citations to two declarations without any discussion that the Board found to constitute “improper incorporations by reference.” *See* IPR2023-00042, Paper 37 at 10. The Board in *Medivis* recognized that “incorporation ‘by reference amounts to a self-help increase in the [brief’s] length.’” *Id.* (quoting *DeSilva v. DiLeonardi*, 181 F.3d 865, 866–67 (7th Cir. 1999)). As the Federal Circuit has repeatedly recognized, “incorporating argument by reference ‘cannot be used to exceed word count’” because “[i]t is ‘fundamentally unfair to allow a party to use incorporation to exceed word count.’” *Medivis*, IPR2023-00042, Paper 37 at 11 (quoting *Promptu Sys. Corp. v. Comcast Cable Comm’s, LLC*, 92 F.4th 1384, 1385 (Fed. Cir. 2024) (quoting *Microsoft Corp. v. DataTern, Inc.*, 755 F.3d 899, 910 (Fed. Cir. 2014)). On this basis, the Board in *Medivis* concluded that the petitioner improperly attempted to incorporate by reference testimonial evidence from a declaration. *See id.*

Similar to the petitioner in *Medivis*, Petitioner has improperly attempted to incorporate by reference a declaration regarding whether the reference is a printed publication, without including Petitioner’s arguments in the Petition. *See* Pet. at 2 (citing EX1014, 1-44). Such wholesale incorporation by reference violates the PTAB’s rules and amounts to an improper increase in the length of the Petition,

which is just under the word-count limit under 37 C.F.R. § 42.24. *See* Pet. at 79 (certification). Petitioner should not be permitted to incorporate its arguments regarding publication and public accessibility by reference to a declaration. And because the Petition has failed to show a reasonable likelihood that *RepRap2028* is a printed publication, Grounds 2A and 2B cannot show that the challenged claims of the '698 Patent are unpatentable.

Further, it is improper for Petitioner to ask the Board to “piece together” potential arguments that Petitioner might have been made based on the declaration. *See TCL Commc'n Tech. Holdings Ltd. v. DataQuill Ltd.*, IPR2020-00746, Paper 21 at 22 (Sept. 18, 2020) (denying institution and explaining that it is “Petitioner’s responsibility to cite specific evidence to support its arguments, not the Board’s responsibility to piece together evidence or speculate as to Petitioner’s position”).

Even if the Board were to consider the arguments in the declaration and try to “piece together” Petitioner’s position, there is no evidence of which subject matter or keywords would have been used to find *RepRap20208* with reasonable diligence. *See* Pet. at 2 (“ordered by subject matter and keyword searchable”); *see also Blue Calypso, LLC v. Groupon, Inc.*, 815 F.3d 1331, 1350–51 (Fed. Cir. 2016) (agreeing with Board that petitioner “failed to carry its burden of proving public accessibility” of an asserted reference as it must provide “a sufficiently definite roadmap” leading to the reference); *see also MHL Custom, Inc. v. Waydoo USA,*

Inc., No. CV 21-0091-RGA, 2023 WL 5748755, at *4 (D. Del. Sept. 6, 2023) (explaining that indexing / technical accessibility, by itself, is “not sufficient to prove public accessibility”) (citing *Acceleration Bay, LLC v. Activision Blizzard Inc.*, 908 F.3d 765, 774 (Fed. Cir. 2018)). The citations to Exhibit 1013 and the front page of Exhibit 1001 are only general references unrelated to the particular subject matter of the reference. *See* Pet. at 2. For example, Exhibit 1013 references a RepRap 3D printer and a RepRap wiki, but there is no mention of a RepRap forum. *See* EX1013 at 14-16. Similarly, Exhibit 1013 contains a link to another RepRap forum, but not the specific reference asserted in this IPR. *See* EX1001.

The declaration (EX1014) is also deficient. There is no description of what subject matter members of the interested public would look for. Indeed, *RepRap20208* suggests that it is located in the “General” forum, which plainly indicates no particular subject matter could have been used to find the reference. *See* EX1010 at 1 (“Home > General > Topic”). Also, the title of *RepRap20208* (i.e., “Genetic Algorithms”) fails to indicate how the reference has anything to do with “how to improve control of the RepRap 3D printer” as Petitioner asserts. *See* EX1010 at 1; Pet. at 46. Thus, Petitioner has failed to provide “enough details from which [the Board] can determine that an interested party is reasonably certain to arrive at the [reference].” Decision Denying Institution of Inter Partes Review,

Guardian Alliance Techs., Inc. v. Tyler Miller, IPR2020-00031, Paper 23 at *15 (PTAB Mar. 26, 2020).

D. There Is No Motivation to Combine *Calderon* and *RepRap20208* (Ground 2A)

Petitioner asserts that a “POSITA would have been motivated to apply one or more strain gauges from RepRap20208 to Calderon’s three-dimensional printer so that the printer of the [] Combination is equipped with one or more strain gauges located on the extruder mount ... to sense a contact force between nozzle 132, and substrate 128.” Pet. at 49; *see also id.* at 58-56.

However, *Calderon* already has his own technique for auto-initialization and collision detection to determine contact between a nozzle and the substrate by “monitoring a change in the servo drive current.” EX1009 at 10:5-8; *see also id.* at 9:63-10:5, 10:26-47. According to *Calderon*, his solution has a distinct advantage over discouraged solutions that need “special purpose sensing means.” *Id.* at 10:7-8; *see also id.* at 9:63-10:5, 10:26-47. *Calderon* also teaches that his solution has collision detection to detect objects in the build envelope. *See id.* at 10:26-30. As *Calderon* explains, his collision detection is important when the model is being built “in a location remote from the user.” *Id.* at 10:29-31. Accordingly, his solution “feels for the presence or absence” of an object employing his sensing techniques to “stop[] the build and alert the user to clear the build envelope.” *Id.* at

10:41-45. *Calderon* also teaches that his solution can “feel for features of the model using [his] sensing techniques” to detect “partially built models.” *See id.* at 10:57-64.

Petitioner fails to adequately address these teachings in *Calderon* and instead presents multiple, deficient rationales that ignore *Calderon's* teachings:

- “benefits of collision detection” (Pet. 51);
- “real-time collision detection” (Pet. 51-52);
- “slop/backlash” (Pet. 52-53);
- “force of resistance to movement” (Pet. 53-54);
- “prevent damage[e to] the substrate” (Pet. 54-55); and
- “strain gauges were commonly used” (Pet. 55-56).

In doing so, however, Petitioner misinterprets and ignores the teachings of *Calderon* and *RepRap20208* and relies on impermissible hindsight based on unsupported statements by its expert. *See, e.g.*, Pet. at 53-54 (citing to EX1003 at ¶170 six times for the same argument without any other support). *RepRap20208* does not “complement[]” *Calderon's* disclosure, as Petitioner insists. *See* Pet. at 48-49. Petitioner proposes the opposite of what *Calderon* expressly teaches by arguing for a combination that uses special purpose sensing means in the form of strain gauges as a substitute for *Calderon's* solution that monitors changes in the servo drive current (*see* Pet. at 50 (adding special purpose sensing means “on the

extruder mount”)) and that detects objects in the build envelope providing collision detection (*see* Pet. at 49, 51-52). Indeed, *Calderon* teaches that “the machine stops the build and alerts the user to clear the build envelope.” *See* EX1009 at 10:43-45. Thus, there is no motivation to look to *RepRap20208* to have the “machine shut down,” as Petitioner proposes (*see* Pet. at 51-52), because *Calderon* already teaches his own solution to stop the machine. *See also* Pet. at 55-56 (attempting to replace *Calderon*'s solution with strain gauges contrary to *Calderon*'s teachings).

Similarly, Petitioner's assertion that *Calderon*'s solution that monitors the current of the servo drive motors would have “slop/backlash” is deficient. *See* Pet. 52-53 (citing to *RepRap20208* (EX1010), 20 and EX1003, ¶¶168-69). Page 20 of *RepRap20208* only mentions “backlash” and not “slop” and fails to indicate that the concern about backlash “before the sensor registers” relates to *Calderon*'s solution of constantly monitoring the current of the servo drive motors for a change. *See* EX1010, 20; *see also* EX1009, 10:5-8. In fact, the surrounding context in *RepRap20208* indicates that it is referring to some other sensor unrelated to *Calderon*'s solution. *See id.* at 19 (“That IESP-12 force sensor is priced right at \$7, but I'm a little skittish about the ‘estimate’ language in the datasheet.”), 20 (“measuring contact force for a stencil cutting blade or drawing pen to get more uses out of the bot”), 20 (“if you've got it truly not touching the sensor (as that datasheet recommends [sic]), then you've got a certain amount of backlash to take

up before the sensor registers”), 20 (“A cheap bump sensor is described on instructables”).

Petitioner's assertion that *RepRap20208* would measure force from a location closer to the nozzle to address slop/backlash is also deficient. *See* Pet. at 52. Petitioner incorrectly assumes that *Calderon*'s drive current motors are only used for x-y axis translator 118. *See* Pet. at 52 (“Calderon's arm, x-y axis translator”). Petitioner fails to address how a strain gauge would be closer to the point of contact with platform 134 than the z-axis translator, which directly drives modeling platform 134. *See* EX1009 at Fig. 1.

Petitioner's next assertion that a strain gauge would provide “more accurate,” “consistent” force measurement is guided by impermissible hindsight. Pet. at 53-54 (discussing “force of resistance to movement”) (citing EX1003, ¶170). There is no support for Petitioner's assertion except for Petitioner's expert, who merely repeats the arguments in the Petition. EX1003, ¶170. Although the expert provides a citation to *Calderon* (EX1009 at 9:63-10:23), there is no supporting disclosure regarding any problems with constantly monitoring the servo drive current for a change.

Similarly, Petitioner's assertion that a strain gauge would support different substrates without damage is fundamentally flawed. *See* Pet. at 54-55. In fact, neither *Calderon* nor *RepRap20208* mention the term “damage” or “damaging.”

There is no teaching that a strain gauge provides any benefit over *Calderon's* solution of monitoring for changes in the servo drive current to prevent damage substrate 128. Further, *Calderon* discloses that the extrusion nozzle should be below the top surface of some substrates, such as a foam substrate, which indicates that damage to the foam substrate is necessary to use it for extrusion, with layers “buried in the foam.” See EX1009 at 2:44-50. Thus, modifying *Calderon* to prevent damage to its substrate is contrary to *Calderon's* express teachings.

For these reasons, Petitioner has failed to show a motivation to combine *Calderon* and *RepRap20208*.

E. Ground 2A Does Not Render Claim 1 Unpatentable

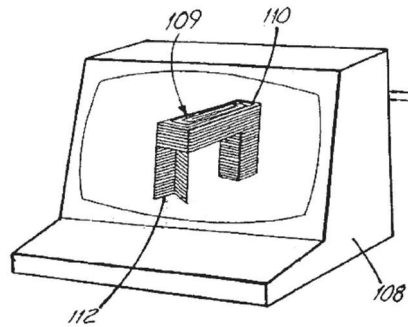
Petitioner fails to show how the *Calderon–RepRap20208* combination in Ground 2A teaches all elements of claim 1. As explained below, the combination does not teach claim elements 1[a], 1[b], 1[c], and 1[d].

1. The *Calderon* and *RepRap20208* combination does not teach claim element 1[a]

The *Calderon–RepRap20208* combination in Ground 2A does not teach claim element 1[a] (“identifying build instructions for fabricating an object”). Petitioner argues that *Calderon* teaches “identifying build instructions” by pointing to “a file describing the geometry of a part 109 to be created” that includes “volume elements 110.” Pet. at 57. Petitioner also argues that *Calderon* refers to

the file as “design data provided from a computer aided design (CAD) system” where “[a] mathematical description of a physical part to be created is split into (usually) planar layers.” Pet. at 58.

However, Petitioner fails to explain why the file in *Calderon* has build instructions for fabricating the object. As shown in the excerpt of Figure 1 in *Calderon* below, the file and elements in the figure represent the model of the object and not build instructions for fabricating the object.



See EX1009 at Fig. 1 (excerpt). Similarly, Petitioner fails to explain why the “design data” provided from the CAD system are build instructions as opposed to a model of the object itself and why depositing “extruded material” in areas “defined from the CAD model” teaches build instructions for fabricating an object. See Pet. at 58 (citing EX1003, ¶¶178-180 (parroting Petitioner’s assertions without any explanation)). Because Petitioner has failed to identify what are the build instructions are purportedly identified and explain its mapping for claim element 1[a], Ground 2A does not teach the claim element.

2. The *Calderon* and *RepRap20208* combination does not teach claim elements 1[b] and 1[c]

Petitioner also fails to show that the combination teaches claim elements 1[b] (“initiating a build using a three-dimensional printer comprising a fabrication tool and one or more sensors mechanically coupled to the fabrication tool, the one or more sensors configured to detect a current contact force between the fabrication tool and a separate structure;”) and 1[c] (“detecting the current contact force based on a sensor signal from the one or more sensors; and”). For claim element 1[b], Petitioner argues that the strain gauge(s) of the combination operate to detect the contact force between the fabrication tool and a separate structure (substrate 128 or model 136). *See* Pet. at 58-61. And for claim element 1[c], Petitioner argues it would have been obvious to provide a constant measurement of the force on the head to detect the current contact force. *See id.* at 61-62. In support of its assertions for detecting a current contact force, Petitioner cites to several pages of the *RepRap20208* reference. *See* Pet. at 61-62 (citing EX1010, 13, 19-20; EX1009, Fig. 1); *supra* § VII.C.

However, there is no teaching of detecting a current contact force. Page 13 of *RepRap20208* does not mention a “force.” *See* EX1010, 13. Rather, it merely discloses using a strain gauge on the extruder mount. *See id.* (“A strain gauge on the extruder mount would do that as well, and it could do a few other things as well, like finding the bed height automatically.”). Page 19 mentions a “force

sensor” but teaches away from using it because it “doesn’t sound like it works well over long periods of time under force.” *See id.* at 19. Similarly, page 20 describes “measuring contact force for a stencil cutting blade or drawing pen” but the next post teaches away from that solution due to “backlash” and uncertainty as to “exactly when the head touches.” *See id.* at 20. It also describes a constant measurement of the force on the head, including its weight, but it does not mention a contact force. *See id.* (“a constant measurement of the force on the head (including it’s weight)”). Whether considered individually or collectively, these disclosures in *RepRap20208* fail to teach detecting a current contact force.

Petitioner’s citations to *Calderon* do not address the deficiencies with *RepRap20208*’s teachings. For example, Figure 1 of *Calderon* is simply a schematic of a generic system. *See* EX1009, 3:66-67, 4:34-52, FIG. 1. Thus, the combination fails to teach detecting a current contact force.

Moreover, as explained above, there is no motivation to combine *Calderon* with *RepRap20208*. *Supra* § VII.D. Thus, a POSITA would not be motivated to replace *Calderon*’s monitoring of servo drive current to detect contact with a strain gauge from *RepRap20208*. *See, e.g.,* Pet. at 60.

3. The *Calderon* and *RepRap20208* combination does not teach claim element 1[d]

In addition to the combination's deficiencies for claim elements 1[a], 1[b], and 1[c], Petitioner also fails to show that the combination teaches claim element 1[d] ("creating a control signal to control at least one component of the three-dimensional printer in response to the current contact force while depositing material during the build."). Petitioner asserts that it would have been obvious to create a control signal in response to the current contact force while depositing material during the build because collision detection matters when the extrusion head is being moved and there is no reason to turn off collision detection. *See* Pet. at 62-63.

As explained above, there is no motivation to combine *Calderon* and *RepRap20208*. *Supra* § VII.D. Among many other reasons, there is no motivation to look to *RepRap20208* for Petitioner's coined "real-time collision detection" as *Calderon* already has his own solution for collision detection. *See* EX1009, at 10:26-64 (discussed in §VII.D).

Moreover, Petitioner's conclusions are not supported by any evidence. *See id.* (citing EX1003, ¶¶189-91). For example, Paragraph 190 of the declaration of Petitioner's expert merely cites to other sections of the declaration that simply provide an overview of *Calderon* (§VII.C), an overview of *Eshed* (a reference not part of the combination; §VII.D), and the flawed assertions on combining

Calderon with *RepRap20208* (§X.A). None of these sections explain why a control signal would be created in response to the current contact force.

VIII. ADDITIONAL COMMENTS

With respect to any arguments in the Petition that are not specifically addressed herein, Patent Owner does not concede the legitimacy of such arguments in the Petition and any underlying contentions in the Petition. If *inter partes* review is instituted, Patent Owner expressly reserves the right to rebut any such arguments and any such contentions at a later point, including in a Patent Owner Response. Patent Owner is not limited to the arguments presented here in this Preliminary Response and expressly reserves the right to raise further arguments, including claim construction arguments, not presented herein.

IX. CONCLUSION

For the foregoing reasons, Patent Owner respectfully requests that the Board decline to institute *inter partes* review of the '698 Patent.

Respectfully submitted,

Dated: July 7, 2025

/s/Brian W. Oaks

Brian W. Oaks (Reg. No. 44,981)
MCDERMOTT WILL & EMERY LLP
300 Colorado Street, Suite 2200
Austin, TX 78701
TEL: 512-726-2574
EMAIL: boaks@mwe.com

Attorney for Patent Owner

CERTIFICATE OF COMPLIANCE

Pursuant to 37 C.F.R. § 42.24(d), I certify that this Preliminary Response complies with the type-volume limits of 37 C.F.R. § 42.24(b)(1) because it contains 8,257 words, excluding the parts that are exempted by 37 C.F.R. § 42.24(a), according to the word processing system used in preparation of this Request.

Dated: July 7, 2025

/s/ Brian W. Oaks

Brian W. Oaks (Reg. No. 44,981)
MCDERMOTT WILL & EMERY LLP
300 Colorado Street, Suite 2200
Austin, TX 78701
TEL: 512-726-2574
EMAIL: boaks@mwe.com

Attorney for Patent Owner

CERTIFICATE OF SERVICE

Pursuant to 37 CFR § 42.6(e)(4), the undersigned certifies that on July 7, 2025, a complete copy of the foregoing Patent Owner's Preliminary Response was served on Lead and Back-up Counsel for Petitioner at the service address provided in Petitioner's Mandatory Notices:

Email: IPR56224-0008IP1@fr.com

Dated: July 7, 2025

/s/ Brian W. Oaks _____

Brian W. Oaks (Reg. No. 44,981)
MCDERMOTT WILL & EMERY LLP
300 Colorado Street, Suite 2200
Austin, TX 78701
TEL: 512-726-2574
EMAIL: boaks@mwe.com

Attorney for Patent Owner