

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SHENZHEN TUOZHU TECHNOLOGY CO. LTD.
Petitioner,

v.

STRATASYS, INC.
Patent Owner.

IPR2025-00257
Patent 9,592,660 B2

Before JACQUELINE WRIGHT BONILLA, *Deputy Chief Administrative Patent Judge*, MITCHELL G. WEATHERLY and LILAN REN, *Administrative Patent Judges*.

REN, *Administrative Patent Judge*.

DECISION
Granting Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

Shenzhen Tuozhu Technology Co., Ltd. (“Petitioner”) filed a Petition requesting *inter partes* review of claims 1–15 (“the challenged claims”) of U.S. Patent No. 9,592,660 B2 (Ex. 1001, “the ’660 patent”). Paper 2 (“Pet.”). Petitioner filed a declaration of Dr. Michael Hickner (Ex. 1003) in support of the Petition. Stratasys, Inc. (“Patent Owner”) filed a Preliminary Response. Paper 6 (“Prelim. Resp.”).

We have authority to determine whether to institute an *inter partes* review. *See* 35 U.S.C. § 314 (2024); 37 C.F.R. § 42.4(a) (2024). Institution of an *inter partes* review requires that “the information presented in the petition . . . and any response . . . shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” 35 U.S.C. § 314(a). For the reasons set forth below, we determine that there is a reasonable likelihood that Petitioner will prevail with respect to at least one challenged claim, and we institute an *inter partes* review.

II. BACKGROUND

A. *Real Parties in Interest*

Petitioner identifies itself as the real party in interest, and notes that Bambulab Limited, Shanghai Lunkuo Technology Co. Ltd., Tuozhu Technology Limited, and Bambulab USA Inc. are potential real parties in interest. Pet. 82. Patent Owner identifies itself and Stratasys Ltd. as the real parties in interest. Paper 4, 2 (Patent Owner Mandatory Notices).

B. *Related Matters*

Petitioner indicates that the ’660 patent is involved in *Stratasys, Inc. v. Shenzhen Tuozhu Technology Co. Ltd.*, No. 2:24-cv-00644 (E.D. Tex.) (“the litigation”). Pet. 83. Patent Owner indicates that the ’660 patent is also

involved in Civil Action No. 1:24-cv-01511, which is pending in the U.S. District Court for the Western District of Texas, Austin Division. Paper 4, 2. Patent Owner also states that the parties are involved in IPR2025-00321, IPR2025-00311, and IPR2025-00354. *Id.*

C. The '660 Patent

The '660 patent, titled “Heated Build Platform and System for Three Dimensional Printing Methods,” describes a 3D printing system including “a heated build platform, a thin removable plate secured on top of the build platform” as well as “a high temperature polymer coating applied over the removable plate . . . to maintain adhesion between [a] 3D object and printing surface.” Ex. 1001, codes (54), (57). The 3D printing process generally “involves a number of printed layers of a building material, which are extruded from an extruding head of a 3D printer and deposited over a build plate over which the 3D object is formed.” *Id.* at 1:21–24. “The build plate serves as a platform on which a 3D printed object is constructed” and such plate is heat controlled to “help[] in maintaining the temperature of the first layer and hence fusion of the subsequent layers over the first layer.” *Id.* at 1:24–30.

The '660 patent seeks to address various issues associated with using “polyimide tape as a substrate on the build plate for 3D part adherence.” *Id.* at 1:33–34. One of the “major issues . . . may be poor adhesion between the 3D object and the build platform.” *Id.* at 3:1–3. Moreover, “[a]pplying polyimide tape is a difficult process inevitably allowing for tiny debris or air to be trapped between the tape and metal surface,” which leads to an “uneven printing surface” when such “air gaps expand” upon heating. *Id.* at 1:51–54. “Even if a part is built on an area of polyimide tape without debris or air bubbles, the tape can be easily damaged upon removal of the part”

because “the bottom layer of tape can permanently adhere to the 3D part causing the tape to tear or bubbles to form between the tape and build plate” at elevated temperatures and/or upon cooling from such elevated temperatures. *Id.* at 1:57–62.

As a potential solution to these noted issues, the ’660 patent proposes build apparatus 100 illustrated in Figure 1 reproduced below:

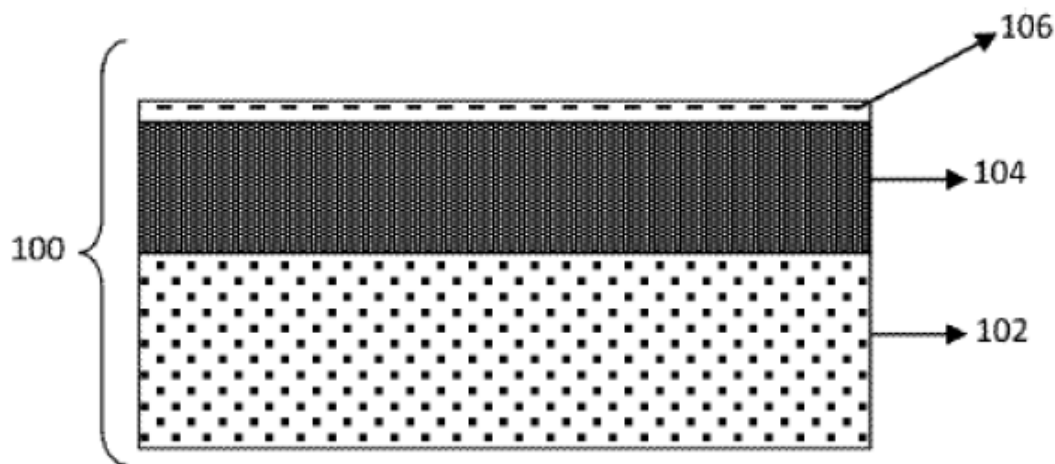


Figure 1 of the ’660 patent, above, “shows a build platform with a removable thermally conductive and coated plate for three dimensional printing methods, in accordance with an embodiment” of the ’660 patent. *Id.* at 3:14–16. As also shown in Figure 1, build apparatus 100 includes build platform 102, thermally conductive removable plate 104, and high temperature polymer coating 106. *Id.* at 3:17–20. In one embodiment, removable plate 104 is “secured over the build platform 102.” *Id.* at 3:55–56. “The advantage of having the removable plate 104 secured over the build platform 102 is easy removal of the built object upon completion” because “the removable plate 104 is thin and also there is a significant difference in thermal contraction between the removable plate and the 3D printed polymer object.” *Id.* at 5:13–18. The configuration also “avoids the general issue in

the current art, where the 3D object sticks to the heated build platform,” which would “requir[e] an additional step to dissolve or mechanically remove the support from the part.” *Id.* at 5:20–25.

The ’660 patent explains that “[i]t may be obvious to a person skilled in that art that there exists a variety of coating methods and types of high temperature polymer coatings that can be used to create a coated layer 106 over plate 104.” *Id.* at 4:35–38. “The surface of the removable plate 104 is coated with [a] thin layer of a high temperature polymer in order to impart better adherence properties both to the bottom layer of a 3D object and the plate 104 over the current methods of using polyimide plate.” *Id.* at 4:40–44. “In order to increase polymer adhesion to the plate surface 104 coated with the high temperature polymer 106, the surface of the high temperature polymer coating 106 may be roughened or treated.” *Id.* at 4:61–64. “The surface toughness of this coating 106 prevents damage from occurring during 3D object removal.” *Id.* at 4:49–51. “The flexibility of the removable plate 104 also reduces the possibility of damage to the coating 106 . . . during object removal since a blade or wedge is no longer needed to pry off the part.” *Id.* at 6:21–26.

D. Illustrative Claim

Of the challenged claims, claim 1 is independent. Claim 1, reproduced below with bracketed reference numerals corresponding to those used by Petitioner, is illustrative of the claimed subject matter.

1. [1.pre] A build apparatus for printing a 3D object of thermoplastics employing additive manufacturing methods, the apparatus comprising:

[1.a] a build platform with a temperature control unit configured to control heating of the build platform;

[1.b] a thermally conductive plate disposed adjacent to the build platform; and

[1.c] a polymer coating attached to a surface of the thermally conductive plate

[1.c.i] which is capable of (i) facilitating adhesion to the 3D object during printing and

[1.c.ii] (ii) permitting removal of the 3D object once the 3D object has been formed and cooled without chemically or mechanically removing the polymer coating from 3D object and without damaging the polymer coating, the thermally conductive plate, or the 3D object,

[1.c.iii] wherein the polymer coating is not a polymer tape.

Ex. 1001, 6:32–47; *see* Pet. viii (providing Petitioner’s claim numbering).

E. Asserted Grounds of Unpatentability

Petitioner asserts the following grounds of unpatentability:

Claim(s) Challenged	35 U.S.C. § ¹	Reference(s)/Basis
1–13, 15	103	Cable, ² Naware ³
1, 2, 4, 6–12, 15	103	Cable, Kritchman ⁴

¹ The Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) (“AIA”), amended 35 U.S.C. §§ 102 and 103, effective March 16, 2013. Because the filing date of the application for the ’660 patent was after that date, we refer to the AIA versions of §§ 102 and 103.

² Cable, US 2016/0075091 A1, published Mar. 17, 2016, filed Sep. 16, 2014 (Ex. 1006). Petitioner contends that Cable is prior art to the ’660 patent under 35 U.S.C. § 102(a)(2). Pet. 2.

³ Naware, US 2016/0096326 A1, published Apr. 7, 2016, filed Nov. 21, 2014 (Ex. 1007). Petitioner contends that Naware is prior art to the ’660 patent under 35 U.S.C. § 102(a)(2). Pet. 2.

⁴ Kritchman et al., US 2006/0054039 A1, published Mar. 16, 2006, filed Dec. 3, 2003 (Ex. 1009). Petitioner contends that Kritchman is prior art to the ’660 patent under 35 U.S.C. § 102(a)(1). Pet. 2.

Claim(s) Challenged	35 U.S.C. § ¹	Reference(s)/Basis
7, 8, 14	103	Cable, Naware, Comb ⁵
7, 8, 14	103	Cable, Kritchman, Comb
1–3, 5–15	103	Comb, Tummala ⁶
1–15	103	Comb, Tummala, Kritchman

Pet. 1.

III. DISCRETIONARY DENIAL

Institution of *inter partes* review is discretionary. *See Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1367 (Fed. Cir. 2016) (“[T]he PTO is permitted, but never compelled, to institute an IPR [*inter partes* review] proceeding.”); 35 U.S.C. § 314(a).

Patent Owner argues that we should exercise our discretion to deny the Petition in view of the litigation in the Eastern District of Texas. Prelim. Resp. 11–25. We address this threshold issue before addressing the merits of Petitioner’s substantive arguments.

A. Discretionary Denial Under 35 U.S.C. § 314(a)

The Board has held that the advanced state of a parallel district court action is a factor that may weigh in favor of denying a petition under § 314(a). *See NHK Spring Co. v. Intri-Plex Techs., Inc.*, IPR2018-00752, Paper 8 at 20 (PTAB Sept. 12, 2018) (precedential); Patent Trial and Appeal Board Consolidated Trial Practice Guide (Nov. 2019), 58 & n.2, *available at* <https://www.uspto.gov/TrialPracticeGuideConsolidated>. We consider the

⁵ Comb, US 9,744,730 B2, issued Aug. 29, 2017, filed Nov. 22, 2013 (Ex. 1004). Petitioner contends that Comb is prior art to the ’660 patent under 35 U.S.C. § 102(a)(2). Pet. 2.

⁶ Tummala et al., US 2013/0310507 A1, published Nov. 21, 2013, filed May 17, 2013 (Ex. 1005). Petitioner contends that Tummala is prior art to the ’660 patent under 35 U.S.C. § 102(a)(1). Pet. 2.

following factors to assess “whether efficiency, fairness, and the merits support the exercise of authority to deny institution in view of an earlier trial date in the parallel proceeding”:

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.

Apple Inc. v. Fintiv, Inc., IPR2020-00019, Paper 11 at 5–6 (PTAB Mar. 20, 2020) (precedential) (“*Fintiv*”). In evaluating these factors, we “take[] a holistic view of whether efficiency and integrity of the system are best served by denying or instituting review.” *Id.* at 6.

Upon consideration of these factors and the clarifications, which are discussed below, we decline to exercise our discretion to deny the Petition.

1. Whether the Court Granted a Stay or Evidence Exists That One May Be Granted if a Proceeding is Instituted

According to the parties, the district court has not issued a stay in the litigation. Pet. 82; Prelim. Resp. 13–16. Petitioner argues that this factor is neutral. Pet. 82. Patent Owner, on the other hand, argues that this factor “weighs in favor of discretionary denial because a stay in the related proceeding has not been requested and the evidence indicates that the Court in the [litigation] will not grant a stay even if Petitioner were to request one.” Prelim. Resp. 16. Patent Owner argues that there are a variety of reasons

why the district court “is highly unlikely to grant a stay.” *Id.* at 14–16. For example, Patent Owner argues that the litigation “involves multiple patents besides the ’660 Patent, which are either challenged in separate IPRs with different filing dates or have not been challenged in IPR” and “Judge Gilstrap is highly unlikely to grant a stay in the particular Related Litigation due to facts specific to the case and parallel IPR proceedings.” *Id.* at 14–15 (citing Ex. 1024 at 29). Patent Owner also argues that “Petitioner has offered a very limited estoppel by stipulation that only covers ‘the same grounds of invalidity raised in th[e] petition’” and a stay is highly unlikely given such limited estoppel. *Id.* at 15 (quoting Ex. 1100).

As noted below, Petitioner provided an updated second “*Sotera*”-type stipulation on April 8, 2025, which states if institution occurs here, Petitioner will not pursue in district court any other ground that was raised or reasonably could have been raised in an IPR.⁷ A district court judge determines whether to grant a stay based on the facts of each specific case as presented in the briefs by the parties. As such, we would be speculating how a district judge will rule in view of the facts at issue and the updated stipulation. As a general matter, we decline to infer, based on actions taken in different cases with different facts, how a district court would rule should a stay be requested by the parties in a parallel case. *See Sand Revolution II LLC v. Cont’l Intermodal Grp. – Trucking LLC*, IPR2019-01393, Paper 24 at 7 (PTAB June 16, 2020) (informative) (“*Sand*”). Thus, this factor is neutral or, at most, only slightly favors discretionary denial. *Id.*

⁷ *Sotera Wireless, Inc. v. Masimo Corp.*, IPR2020-01019, Paper 12 (PTAB Dec. 1, 2020) (precedential as to § II.A) (“*Sotera*”).

2. *Proximity of the Court's Trial Date to the Board's Projected Statutory Deadline for a Final Written Decision*

Trial is currently set by the district court in the litigation for June 1, 2026. Ex. 3001; Prelim. Resp. 16. Patent Owner does not disagree with Petitioner that “any final written decision in this proceeding will issue in mid-June 2026.” Pet. 82; *see* Prelim. Resp. 16–19. Both parties agree that the currently-scheduled trial date is two to three weeks earlier than the projected statutory deadline of the final written decision in this proceeding. Pet. 82; Prelim. Resp. 16. Petitioner argues that this factor is neutral while Patent Owner argues that it should weigh in favor of discretionary denial. Pet. 82; Prelim. Resp. 16–19.

Patent Owner provides that the median time from filing to trial is 21.7 months for cases filed since January 2008 and “23.2 months for cases filed since January 2022.” Prelim. Resp. 17 (citing Ex. 2001, 3, 5, 7). Applying these median time-to-trial statistics, Patent Owner asserts that “trial would be expected between May 2026 and July 2026,” which is consistent with the currently-scheduled trial date of June 1, 2026. *Id.* at 17.

Patent Owner cites various PTAB decisions in which institution was denied in view of “even shorter periods between a trial and final written decision.” *Id.* at 18. For example, Patent Owner cites *EClinicalWorks, LLC v. Decapolis LLC*, 2022 WL 1150638, *4, IPR2022-00229 (PTAB Apr. 13, 2022), in which “the PTAB denied institution where trial would begin ‘roughly one to two months before any final decision.’” Prelim. Resp. 18.

The trial in the parallel proceeding is currently scheduled to begin the same week as the statutory deadline for a final written decision, but the most recent median time-to-trial statistics for Judge Gilstrap in the Eastern District of Texas indicate that the actual trial date will likely be in July 2026,

which is later than the statutory deadline to issue a final written decision in this proceeding of June 6, 2026. *See* Ex. 2001, 7 (median time from filing to trial of 23.2 months); Prelim. Resp. 17. Thus, we find this factor weighs neutral to slightly against discretionary denial.

3. Investment in the Parallel Proceeding by the Court and the Parties

Petitioner argues that this factor favors institution “because there has been little investment by the court and the Markman hearing is scheduled for December 3, 2025, well after institution.” Pet. 82.

Patent Owner argues that this factor favors discretionary denial because “the Court has held a scheduling conference with the parties (Ex. 2003) and entered numerous orders in the case, including a docket control order, discovery order, e-discovery order, and protective order.” Prelim. Resp. 19. Moreover, Patent Owner argues the parties have invested significant resources because they have

(a) negotiated and proposed numerous orders, including the aforementioned orders, (b) exchanged initial disclosures (EX1101 at 6); (c) exchanged additional disclosures (EX1001 at 6); and (d) exchanged infringement, invalidity, and subject-matter eligibility contentions totaling well over 2,000 pages (see EX1101 at 5–6). Fact discovery is well underway with the parties having exchanged over 100 document requests exchanged requests and responses to over 30 interrogatories, and produced documents exceeding 44,000 pages, and third-party discovery. In addition, the parties have briefed issues related to party joinder.

Prelim. Resp. 19–20.

Patent Owner additionally argues that there will be “further substantial investments” before the statutory deadline of a final written decision including source code reviews, amended infringement contentions, and conducting a jury trial. *Id.* at 20. Because the trial date is scheduled to

start before the statutory deadline for a final written decision, Patent Owner argues that “any final written decision would simply revisit the jury’s earlier findings regarding validity” and thus be duplicative. *Id.*

We are not persuaded by Patent Owner’s arguments. The statutory deadline for determining whether to institute an *inter partes* review is June 18, 2025—three months from the filing of the Preliminary Response on March, 18, 2024 (*see* 35 U.S.C. § 314(b)(1)), and none of the relevant deadlines for fact discovery or expert discovery, or the date of the scheduled *Markman* hearing, will have passed by that date. As the district court’s docket control order indicates, fact and expert discovery do not close until next year, and the *Markman* hearing is not scheduled until December 3, 2025, approximately six months after our deadline for this decision. *See* Ex. 1101. Nor has Patent Owner demonstrated that the district court has issued any orders specific to the ’660 patent, as opposed to general discovery and cases management orders. *Fintiv*, Paper 11 at 10 (“If, at the time of the institution decision, the district court has not issued orders related to the patent at issue in the petition, this fact weights against exercising discretion to deny institution under *NHK*.”). Accordingly, in view of the parties’ respective arguments, we find that factor 3 weighs against discretionary denial.

4. Overlapping Issues with the Parallel Proceeding

Under this factor, Petitioner provides a first stipulation dated December 9, 2024 stating: “If IPR is instituted based on this Petition, Shenzhen Tuozhou and the other defendants named in the related District Court Case No. 2:24-cv-00644 (E.D. Tex.) stipulate that, while such IPR is pending, they will not pursue in the 2:24-cv-00644 case, against the ’660 Patent, the same grounds of invalidity raised in this petition.” Ex. 1100.

Petitioner argues that this factor weighs against discretionary denial because “Petitioner has made a stipulation not to pursue the IPR grounds in District Court.” Pet. 82. That is, the district court in the litigation, by stipulation, will not have to determine whether the challenged claims of the ’600 patent would have been obvious in view of Cable, Naware, Comb, Tummala, and Kritchman, and the risk of inconsistent results is therefore reduced. *See Sand* at 12 (such stipulation “mitigates to some degree the concerns of duplicative efforts between the district court and the Board, as well as concerns for potentially conflicting decisions”).

Petitioner also followed up with an updated second stipulation on April 8, 2025 stating:

If IPR is instituted in IPR2025-00257, unless institution is later vacated, reversed or otherwise withdrawn by rehearing or Director Review, Shenzhen Tuozhu and the other defendants named in the related District Court Cases No. 2:24-cv-00644 (E.D. Tex.) and 1:24-cv-01511 (W.D. Tex.) stipulate that they will not pursue in the 2:24-cv-00644 case or the 1:24-cv-01511 case, against the ’660 Patent, the specific grounds asserted in IPR2025-00257 or any other ground that was raised or could have been reasonably raised in an IPR (i.e., any ground that could [have been] raised under §§ 102 or 103 on the basis of prior art patent[s] or printed publications).

Ex. 1102.

Patent Owner’s argument that this factor weighs in favor of discretionary denial because the stipulation is limited in nature is based on Petitioner’s first stipulation filed on December 9, 2024.⁸ Prelim. Resp. 21.

⁸ Patent Owner correctly points out the first December 9, 2024, stipulation here falls short of a *Sotera*-style stipulation. Prelim. Resp. 21. Unlike the updated second stipulation dated April 8, 2025, the first stipulation dated December 9, 2024 does not state “or any grounds that could have reasonably

Petitioner's updated second stipulation mitigates any concerns of duplicative efforts between the district court and the Board, as well as concerns of any potentially conflicting decisions. *See Sotera* at 19. We therefore find that this factor weighs against exercising discretion to deny institution. *See id.*

5. Whether Petitioner and the Defendant in the Parallel Proceeding are the Same Party

Whereas Petitioner does not address factor 5, Patent Owner argues that the parties to this proceeding are both in the related district court litigation. Pet. 82; Prelim. Resp. 22. While it is common in IPR proceedings for the petitioner and patent owner to also be parties in a related district court proceeding, this factor weighs slightly in favor of discretionary denial. *Sotera*, Paper 12 at 19.

6. Other Circumstances that Impact the Board's Exercise of Discretion, Including the Merits

Regarding factor 6, Petitioner asserts that it filed a motion to dismiss the district court litigation, which "further favors institution under Factor 6, because if granted there will be no potential overlap of issues between the IPR and parallel District Court action." Pet. 82. Patent Owner counters that the district court "has not ruled on the Motion to Dismiss, which is premised on the failure to join another party." Prelim. Resp. 23. Patent Owner argues that "speculation" with regard to such motion pending before the district court "should not receive any weight under factor 6." *Id.* at 23–24. Patent Owner also "seeks to preserve any argument under" possible future directives from the Commerce Secretary regarding disputes between "inventors in the United States" and "foreign entities, such as the Petitioner"

been raised before the PTAB," and therefore does not qualify as a *Sotera*-style stipulation. *Sotera*, Paper 12 at 13, 18–19.

before “the PTAB, a tribunal of the United States Patent and Trademark Office.” *Id.* at 24–25. We agree that it would be speculative at best to determine whether arguments about a motion not yet decided in district court might impact our analysis in relation to *Fintiv* factor 6 here.

Beyond that, neither party argues whether the merits of the case are in favor or against discretionary denial under factor 6. *See* Pet. 82; Prelim. Resp. 13–25. Thus, the parties’ arguments with regard to factor 6 do not persuade us as to whether factor 6 weighs for or against discretionary denial.

As discussed in more detail in our analysis below, however, we are persuaded based on the current preliminary record before us that Petitioner raises unpatentability challenges to claim 1 of the ’660 patent that are particularly strong in relation to at least one ground. We therefore find factor 6 weighs against discretionary denial. *Fintiv*, Paper 11 at 14–15 (“For example, if the merits of a ground raised in the petition seem particularly strong on the preliminary record, this fact has favored institution.”).

7. Summary of Fintiv Factors and Conclusion on Section 314(a)

In view of *Fintiv* factors 1–6, where factors 1 and 5 are slightly in favor of discretionary denial, factor 2 weighs slightly against discretionary denial, and factors 3, 4 and 6 (including particularly strong merits at this stage in relation to at least one ground) all weigh against discretionary denial. Taking “a holistic view of whether efficiency and integrity of the system are best served by denying or instituting review,” we conclude that the *Fintiv* factors weigh against discretionary denial. *Fintiv*, Paper 11 at 6. Accordingly, we do not discretionarily deny Petitioner’s request for *inter partes* review under *Fintiv*.

IV. ANALYSIS

A. Legal Standards

A patent claim is unpatentable under 35 U.S.C. § 103 if “the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains.” The question of obviousness is resolved based on underlying factual determinations, including (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) when presented, objective evidence of obviousness or nonobviousness, i.e., secondary considerations. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

The obviousness inquiry typically requires an analysis of “whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007) (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) (requiring “articulated reasoning with some rational underpinning to support the legal conclusion of obviousness”)). A patent claim “is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art.” *Id.* In particular, “[a]lthough the *KSR* test is flexible, the Board ‘must still be careful not to allow hindsight reconstruction of references . . . without any explanation as to *how* or *why* the references would be combined to produce the claimed invention.’” *Trivascular, Inc. v. Samuels*, 812 F.3d 1056, 1066 (Fed. Cir. 2016) (alteration in original) (quoting *Kinetic Concepts, Inc. v. Smith & Nephew, Inc.*, 688 F.3d 1342, 1368 (Fed. Cir. 2012) (emphases added)).

“In an [*inter partes* review], the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable.” *Harmonic Inc.*, 815 F.3d at 1363 (citing 35 U.S.C. § 312(a)(3)); *see also Intelligent Bio-Systems, Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1369 (Fed. Cir. 2016). Therefore, to prevail in an *inter partes* review, Petitioner must explain how the proposed combinations of prior art would have rendered the challenged claims unpatentable. At this preliminary stage, we determine whether the information presented in the Petition shows there is a reasonable likelihood that Petitioner would prevail in establishing that at least one of the challenged claims would have been obvious over the proposed combinations of prior art. *See* 35 U.S.C. § 314(a).

B. Level of Ordinary Skill in the Art

Determining whether an invention would have been obvious under 35 U.S.C. § 103 requires resolving the level of ordinary skill in the pertinent art at the relevant time. *Graham*, 383 U.S. at 17. The person of ordinary skill in the art is a hypothetical person who knows the relevant art. *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995). Factors in determining the level of ordinary skill in the art include the types of problems encountered in the art, the sophistication of the technology, and educational level of active workers in the field. *Id.* One or more factors may predominate. *Id.*

Petitioner contends that a person of ordinary skill in the art in the field in the relevant time frame would have had “a bachelor’s degree in Mechanical Engineering, Chemical Engineering, Materials Science, or a comparable field and at least two years of experience related to 3D printing” with additional experience potentially substituting “for a formal degree or formal training (and vice versa).” Pet. 7 (citing Ex. 1003 ¶¶ 28–30). With respect to the specific knowledge possessed by an ordinarily skilled artisan,

Petitioner, citing statements by Dr. Hickner, states that a person of ordinary skill in the art “would have possessed pertinent background knowledge and understanding of the technologies employed by the ’660 patent, including heated printbeds” as well as “coverings for printbeds that use polymer tape,” and “printbed coverings that use polymer coatings.” *Id.* (citing Ex. 1003 ¶¶ 31–39). Petitioner notes that “[t]hese technologies were developed and commercially adopted long before 2014,” i.e., well before the filing date of the ’660 patent in December 2014. *Id.*

Patent Owner “does not contest Petitioner’s description of a person of ordinary skill in the art (a ‘POSITA’) having a bachelor’s degree in Mechanical 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).” Prelim. Resp. 37. Patent Owner does not address the specific knowledge that Petitioner contends that ordinarily skilled artisan would possess. *Id.*

For purposes of this decision, we adopt Petitioner’s unopposed definition of the level of ordinary skill in the art as it appears consistent with the disclosures of the ’660 patent and the prior art of record. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001).

C. Claim Construction

In an *inter partes* review, we apply the same claim construction standard as would be used by a district court to construe a claim in a civil action involving the validity or infringement of a patent. 37 C.F.R. § 42.100(b). Under that standard, claim terms are given their ordinary and customary meaning, as would have been understood by a person of ordinary skill in the art at the time of the invention, in light of the language of the

claims, the specification, and the prosecution history of record. *Id.*; *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–19 (Fed. Cir. 2005) (en banc); *Thorner v. Sony Comput. Entm’t Am. LLC*, 669 F.3d 1362, 1365–66 (Fed. Cir. 2012). “The Board is required to construe ‘only those terms . . . that are in controversy, and only to the extent necessary to resolve the controversy.’” *Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019) (quoting *Vivid Techs., Inc. v. Am. Sci. Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

At this stage of the proceeding, neither party contends that any formal claim construction is necessary. *See* Pet. 7–8 (“The Board need not resolve any express constructions.”); Prelim. Resp. 37 (“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.”). After reviewing the parties’ respective arguments and the evidence currently before us, we agree that we do not need to expressly construe any term to resolve any controversy at this stage of the proceeding.

D. Alleged Obviousness Over Cable and Naware

Petitioner alleges claims 1–13 and 15 of the ’660 patent would have been obvious over Cable and Naware. Pet. 8–36. Patent Owner contends in response that “there is no express disclosure or teaching in Cable that the polymeric coating is not tape.” Prelim. Resp. 42 (emphasis omitted)⁹; *see also id.* at 42–45. At this preliminary stage, the parties dispute turns on

⁹ The Preliminary Response generally italicizes the names of the references. *See generally* Prelim. Resp. Unless otherwise noted, our quotations of the Preliminary Response do not reproduce such italicization of reference names.

arguments and evidence related to claim 1 only, the independent claim upon which claims 2–13 and 15 depend.

As explained in more detail below, having considered the arguments and evidence before us at this preliminary stage, we find that the current record establishes a reasonable likelihood that Petitioner would prevail on at least one claim, i.e., claim 1, in this asserted ground of unpatentability.

1. Cable

Like the '660 patent, Cable describes a manufacturing process to produce three-dimensional (3D) products, i.e., methods for “3D printing.” Ex. 1006 ¶ 1. Cable, titled “Additive Manufacturing Object Removal,” describes “an additive manufacturing process” to produce an object “by depositing a material layer-by-layer . . . onto a surface of a substrate.” Ex. 1006, codes (54), (57). “Removal of the object from the substrate (dislodging the object) may be accomplished without mechanically contacting the object with a device (e.g., a tool such as a chisel, blade, etc.) or chemically contacting the object (e.g., chemically dissolving material at an interface between the object and the substrate).” *Id.* ¶ 4; *see also id.* at code (57). “In an example, removal of the object from the substrate can be accomplished by flexing or bending the substrate, causing the object to dislodge, or ‘pop-off’ of the substrate.” *Id.* ¶ 20; *see also id.* at code (57), ¶ 52. The substrate “can include a coating of [a] polymeric material.” *Id.* ¶ 36. The material of such coating, along with other materials such as the material of the build material for the 3D object, “can be selected to promote good adhesion” between the substrate and the object during the formation of the object. *Id.* ¶ 61; *see also id.* ¶ 62.

2. *Naware*

Naware, titled “Selective Zone Temperature Control Build Plate,” describes “a three-dimensional printing process” involving a build plate with, among others, “temperature control modules.” Ex. 1007, code (57). The build plate may also include contact plate and insulating plate. *Id.* ¶ 31.

3. *Reasons to Combine & Reasonable Expectation of Success*

As explained in more detail in section 4. below, Petitioner contends that Cable teaches all limitations of claim 1, except one, i.e., [1.a] “a build platform with a temperature control unit configured to control heating of the build platform,” which Petitioner contends is taught in Naware. Pet. 14–26.

As discussed above, Cable and Naware both relate to methods and components for 3D printing. Petitioner argues that there are at least four reasons to combine Cable with Naware. Pet 12–15. First, Petitioner argues “a POSITA would have been prompted to pursue a combination with Naware based on Cable’s suggestions to do so.” *Id.* at 13. For example, “Cable teaches a build platform that can be heated ‘by any suitable heating element.’” *Id.* (citing Ex. 1006 ¶ 45). Naware, on the other hand, teaches “temperature control modules.” Ex. 1007, code (57); *see* Pet 13 (citing Ex. 1007 ¶¶ 32, 33). According to Petitioner, “Cable teaches a heated build platform and calls on the POSITA to implement this teaching via suitable solutions known in the art” which are provided by Naware. Pet 13. Petitioner also cites to various portions of the declaration by Dr. Hickner (Ex. 1003) as support. *Id.*

Second, Petitioner argues that the ’660 patent acknowledges “current 3D printing methods involve heated build plate[s]” and together with Naware’s “effective approach for this known solution,” a POSITA would

have found it obvious to combine the references. *Id.* (citing Ex. 1001, 1:31–33, 1:44–46 and various portions of Ex. 1003).

Third, Petitioner argues that a POSITA would recognize the benefits and advantages of Naware’s heated build plate would be applicable to Cable. Pet. 14. For example, “Naware’s design ‘solves the problems arising due to uncontrolled temperature distribution’ by providing multiple ‘embedded temperature control mechanisms inside the build plate. . . , which optimizes the temperature control of the part or article being built.’” *Id.* (alteration by Petitioner) (citing Ex. 1007 ¶¶ 25–27). “Naware’s design also ‘helps in controlling the adhesion, expansion and shrinkage, layer to layer bonding, [and] stress relaxation, etc. of the part or article being built or fabricated.’” *Id.* (alteration by Petitioner) (citing Ex. 1007 ¶ 25). Naware seeks to improve the same “Fused Deposition Modeling and Fused Filament Fabrication methods” as those in Cable. *Id.* (citing Ex. 1007 ¶ 26; Ex. 1006 ¶ 26). Petitioner concludes: “Given that Naware and Cable are dealing with similar types of the 3D printers and because Cable generally discloses the notion of a heated build platform, a POSITA would have been motivated to further optimize the heating mechanism, as taught by Naware, to achieve improved printing conditions and reduce part deformations.” *Id.* at 14–15 (citing Ex. 1003 ¶ 63).

Lastly, Petitioner argues that combining Cable with Naware “is merely substituting one known element (Cable’s broad teaching of a heated build plate) for another known in the field (Naware’s heated built plate design with temperature control modules) to obtain predictable results.” *Id.* at 15 (Ex. 1003 ¶ 64; *see also* Ex. 1003 ¶ 65).

Patent Owner does not contest Petitioner’s arguments with respect to these four reasons to combine Cable with Naware. *See generally* Prelim.

Resp.; *see also id.* at 41–45. Instead, as discussed in more detail below, Patent Owner argues that Cable does not teach one particular limitation recited in claim 1, i.e., “wherein the polymer coating is not a polymer tape.” *Id.* at 41–45.

Based on our review and consideration of the current record, we are persuaded that Petitioner has sufficiently shown for purposes of institution that a person of ordinary skill in the art would have been motivated to combine the teachings of Cable and Naware in the manner argued by Petitioner. For example, both references directly relate to 3D printing, and we are persuaded that Cable teaches “a heated build platform and calls on the POSITA to implement this teaching via suitable solutions known in the art.” Pet. 13 (noting that Cable teaches a build platform that can be heated “by any suitable heating elements” (citing 1006 ¶ 45)). The current record also indicates that Naware taught known options in this regard, e.g., where it describes a build plate to be used in a 3D printing process that includes contact plates and temperature control modules. *See, e.g.*, Ex. 1007, code (57).

Petitioner additionally argues that there is a reasonable expectation of success in combining Cable with Naware because “3D printers with temperature-controlled heated build plates were well-known technologies at the time of the ’660 patent in 2014, and these technologies had been successfully demonstrated in the real-world by then.” Pet. 15 (citing various portions of Ex. 1003).

Patent Owner does not contest Petitioner’s arguments with respect to a reasonable expectation of success in combining Cable with Naware. *See generally* Prelim. Resp. Based on our review and consideration of the current record, we are persuaded that Petitioner has sufficiently shown for

purposes of institution that there is a reasonable expectation in combining the teachings of Cable and Naware in the manner argued by Petitioner.

4. Analysis of Independent Claim 1

a. Preamble [1.pre]: “A build apparatus for printing a 3D object of thermoplastics employing additive manufacturing methods, the apparatus comprising:”

Petitioner argues that the combined teachings of Cable and Naware render claim element 1.pre obvious. Pet. 16. In support of this contention, Petitioner quotes Cable’s teaching of a manufacturing process using 3D model data and “a substrate that ‘can be positioned on a platform . . . as a “working surface” for building the object’ via an extrusion-based ‘printing’ process.” *Id.* (alteration by Petitioner; emphasis omitted) (citing Ex. 1006 ¶¶ 4, 27, 31, 34, 41).

Patent Owner does not contest Petitioner’s position that Cable teaches the preamble recitation as part of its 3D printing processes and apparatus. *See generally* Prelim. Resp. Based on our review and consideration of the current record, we determine that Petitioner has sufficiently shown that Cable (including in combination with Naware) teaches the preamble of claim 1, to the extent it is limiting, for purposes of institution.

b. [1.a]: “a build platform with a temperature control unit configured to control heating of the build platform;”

As noted above, Petitioner argues that Cable teaches all limitations of claim 1 except claim element 1.a, which Petitioner contends is taught in Naware. Pet. 14–26; *id.* at 17–19. Specifically, Petitioner argues Cable describes a platform that “can be heated . . . by any suitable heating elements, such as electrical elements . . . or any other suitable heating element.” *Id.* at 17 (alterations by Petitioner) (quoting Ex. 1006 ¶ 45)

(emphasis omitted). Petitioner argues Naware describes temperature control modules with “the ability to control the temperature thereof and consequently, control the temperature of its respective modular element.” *Id.* at 19 (quoting Ex. 1007 ¶ 32) (emphasis omitted). Patent Owner does not contest Petitioner’s arguments with respect to claim element 1.a. *See generally* Prelim. Resp.

Based on our review and consideration of the current record, we are persuaded that Petitioner sufficiently shows that Naware teaches this claim element. In addition, we are sufficiently persuaded, based on the cited teachings in Cable (of the use of “suitable heating elements” (Ex. 1006 ¶ 45)), that a person of ordinary skill in the art would have used the temperature control modules of Naware to control heating of the build platform described in Cable. Thus, Petitioner has sufficiently shown that the combination of these two references teaches this limitation for purposes of institution.

c. [1.b]: “a thermally conductive plate disposed adjacent to the build platform; and”

Petitioner contends that claim element 1.b is rendered obvious by the combined teachings of Cable and Naware. Pet. 20–21. Petitioner argues that Cable teaches a thermally conductive flexible substrate positioned on a platform. *Id.* at 20 (citing Ex. 1006, Figure 1, ¶¶ 31, 34, 35, 45, 57, 61, 71, 77). Petitioner presents annotated Figure 1 of Cable (Pet. 21) reproduced below:

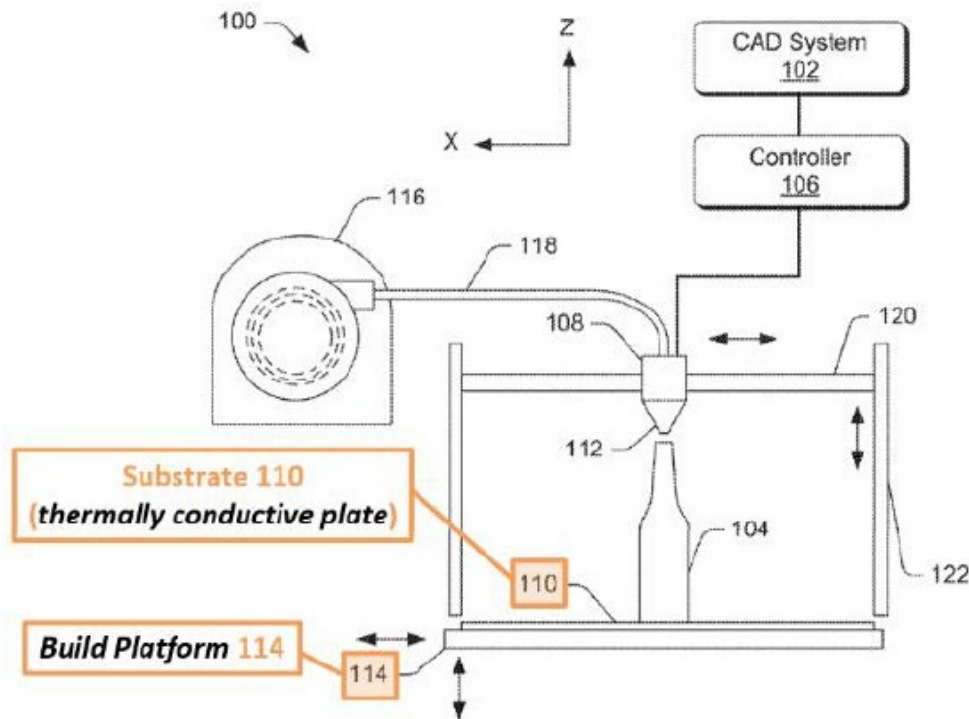


Figure 1 of Cable as annotated by Petitioner

Patent Owner does not contest Petitioner's arguments with respect to claim element 1.b. *See generally* Prelim. Resp. Based on our review and consideration of the current record, we determine that Petitioner has sufficiently shown that Cable (including in combination with Naware) teaches this limitation for purposes of institution.

d. [1.c]: “a polymer coating attached to a surface of the thermally conductive plate”

Petitioner argues that claim element 1.c is rendered obvious by the combined teachings of Cable and Naware. Pet. 21–22. Specifically, Petitioner argues that Cable teaches a substrate that “can include a coating of the polymeric material.” *Id.* (quoting Ex. 1006 ¶ 36) (emphasis omitted). Petitioner further argues that the substrate in Cable may be “manufactured by coating a main portion or body . . . with a first material (e.g., a thermoplastic polymer) to form [a] top layer.” *Id.* at 21 (alterations by

Petitioner; emphasis omitted) (citing Ex. 1006 ¶ 61). Petitioner also contends that “Cable’s instruction to construct the top layer during the substrate manufacturing process to create a preformed and reusable component” indicated to a person of ordinary skill in the art that Cable’s polymer coating was permanently attached to a surface of the substrate (plate). *Id.* at 22 (citing Ex. 1003 ¶¶ 83– 85).

Although Patent Owner asserts that the combination of Cable and Naware does not teach claim element 1.c, Patent Owner’s arguments are solely directed to claim element 1.c.iii, i.e., whether Cable and Naware teach or suggest a “polymer coating [that] is not a polymer tape.” *See* Prelim. Resp. 41–45. We address this specific argument in more detail below.

Based on our review and consideration of the current record, we determine that Petitioner has sufficiently shown that the cited portions of Cable noted above (alone or in combination with Naware) teach this limitation for purposes of institution.

e. [1.c.i]: “which is capable of (i) facilitating adhesion to the 3D object during printing and”

Petitioner argues that claim element 1.c.i is rendered obvious by the combined teachings of Cable and Naware. Pet. 23. For example, Cable describes that the material of the coating for the substrate can be selected to promote good adhesion between the substrate and the object during the formation of the object. Ex. 1006 ¶¶ 61, 62 (cited in Pet. 23).

Patent Owner does not contest Petitioner’s arguments with respect to claim element 1.c.i. *See generally* Prelim. Resp. Based on our review and consideration of the current record, we determine that Petitioner has sufficiently shown that the cited portions of Cable (alone or in combination with Naware) teach this limitation for purposes of institution.

f. [1.c.ii]: “(ii) permitting removal of the 3D object once the 3D object has been formed and cooled without chemically or mechanically removing the polymer coating from 3D object and without damaging the polymer coating, the thermally conductive plate, or the 3D object;”

Petitioner argues that claim element 1.c.ii is rendered obvious by the combined teachings of Cable and Naware. Pet. 23–25. Cable teaches that while “a sufficient adhesion is achieved between the object and the substrate during formation of the object on a substrate, . . . the completed objects are able to be removed from the substrate without external physical contact on the object” (Ex. 1006 ¶ 23 (cited in Pet. 23)) and/or without “chemically contacting the object.” Ex. 1006 ¶ 52 (cited in Pet. 23). Petitioner argues “Cable teaches that using a flexible polymer-coated substrate allows the part to simply ‘pop off.’” Pet. 24 (citing Ex. 1006 ¶ 67). According to Petitioner, “[t]his approach results in ‘no damage to the object and to the substrate,’ such that the substrate with the polymeric coating ‘can be reused.’” *Id.* (citing Ex. 1006 ¶ 52; Ex. 1003 ¶¶ 91, 92) (emphasis omitted).

Patent Owner does not contest Petitioner’s arguments with respect to claim element 1.c.ii. *See generally* Prelim. Resp. Based on our review and consideration of the current record, we determine that Petitioner has sufficiently shown that the cited portions of Cable (alone or in combination with Naware) teach this limitation for purposes of institution.

g. [1.c.iii]: “wherein the polymer coating is not a polymer tape”

Whether Cable (and therefore Cable in combination with Naware) teaches an apparatus for 3D printing where “the polymer coating is not a polymer tape” is the primary point of dispute between the parties regarding this ground at this preliminary stage. *See, e.g.,* Prelim. Resp. 40–45.

Petitioner contends that a skilled artisan would have understood Cable's coating to teach or suggest a structure that is not polymeric tape. *Id.* at 25 (citing Ex. 1003 ¶¶ 37–39, 44, 93–95). Petitioner argues that Cable never mentions using a “polymeric tape” and further distinguishes “coating” from other “materials applied to the surface of the substrate” such as “painter's tape.” *Id.* at 25–26 (citing Ex. 1006 ¶ 2). Petitioner argues that “Cable makes clear that the layers of the substrate—including the top layer of polymer coating—can have ‘any suitable laminar arrangement.’” *Id.* at 26 (citing Ex. 1006 ¶ 78). Petitioner argues that the '660 patent acknowledges: “[i]t may be obvious to a person skilled in the art that there exists a variety of coating methods and types of high temperature polymer coatings.” Ex. 1001, 4:35–37 (cited in Pet. 26).

Patent Owner, on the other hand, argues that “there is no express disclosure or teaching in Cable that the polymeric coating is not tape” and such “silence in a reference cannot support a finding of unpatentability.” Prelim. Resp. 42. Patent Owner argues that Cable is also “silent as to how the substrate is made with a polymer coating” and therefore “insufficient to support Petitioner's obviousness theory.” *Id.*

Patent Owner also argues that Petitioner engaged in impermissible hindsight in the obviousness analysis. *Id.* at 43. “Namely, the Petition's claim that ‘the difficulties/drawbacks of polymer tapes like Kapton tape were well documented’ largely relies on the disclosure of the '660 patent itself” without other “corroborating evidence.” *Id.* (citing Pet. 26). Patent Owner argues that Cable and the '660 patent seek to solve different problems. According to Patent Owner, whereas Cable “requires the substrate to ‘flex or bend resiliently for enabling removal of the object’ and the top layer to be a material ‘to create optimal adhesion characteristics at the

interface’ between the first layer of the build material and the surface of the substrate,” the ’660 patent seeks to address issues such as using tape under high temperature and the “uneven printing surface” that can result from using the tape on the surface. *Id.* at 44 (quoting Ex. 1006 ¶ 78; Ex. 1001, 1:51–67). Patent Owner lastly argues that Petitioner improperly “resort[ed] to common sense or a POSITA’s knowledge” in the obviousness analysis. *Id.* at 45. According to Patent Owner, “[r]elying on the knowledge of a POSITA or common sense to supply this claim element would be improper where it is admittedly missing from Cable in the asserted combination.” *Id.*

Having considered the parties’ respective arguments and the cited evidence, we are persuaded that Petitioner has sufficiently shown for purposes of institution that Cable teaches or suggests claim element 1.c.iii (“wherein the polymeric coating is not a polymer tape”). Whereas neither Cable nor the ’660 patent uses the specific term “not a polymer tape,” both describe a polymer “coating” applied to a support apparatus for 3D printing processes. Ex. 1001, code (57) (“The apparatus comprises a heated build platform, a thin removable plate secured on top of the build platform, a high temperature polymer coating applied over the removable plate, and surface treatment of high temperature polymer coating to maintain adhesion between 3D object and printing surface.”); Ex. 1006 ¶¶ 26, 31, 36 (disclosing “a 3D printing system” 100 having substrate 110 which “can include a coating of the polymeric material”).

Dr. Hickner testifies that one of ordinary skill in the art would have understood that a “coating” is not a “tape,” which includes a material sheet with pre-applied adhesive. Ex. 1003 ¶¶ 38, 93–94. Moreover, similar to the ’660 patent disclosing a “polymeric coating” to potentially improve upon the prior art polyimide tape in a 3D printing process (Ex. 1001, 5:61–66), Cable

describes a coating as an improvement over “painter’s tape” and other materials previously “applied to the surface of the substrate” in a 3D printing process. Ex. 1006 ¶ 2.

In addition, contrary to Patent Owner’s argument, the ’660 patent is not limited to addressing issues related to an uneven surface. *See* Prelim. Resp. 44. Evidence before us indicates that the substrate in Cable may “flex or bend resiliently for enabling removal of the object” as Patent Owner acknowledges (Prelim. Resp. 44), and that the ’660 patent similarly teaches that “[t]he flexibility of the removable plate 104 also reduces the possibility of damage to the coating 106 . . . during object removal since a blade or wedge is no longer needed to pry off the part.” Ex. 1001, 6:21–26.

We find that Patent Owner’s remaining arguments disagreeing with Petitioner’s evidence and Dr. Hickner’s testimony are not supported by the preliminary record currently before us. We determine that Petitioner’s argument and cited evidence sufficiently establish at this time that Cable (alone or in combination with Naware) describe an apparatus with a polymer coating that is not a polymer tape, as required by claim 1.

h. Conclusion Regarding Independent Claim 1 (Cable & Naware)

We determine that Petitioner establishes at this time that Cable teaches or suggests all limitations recited in claim 1, except one taught by Naware, i.e., “a build platform with a temperature control unit configured to control heating of the build platform.” Petitioner also sufficiently establishes, and Patent Owner does not contest at this time, that one of skill in the art would have been motivated to use the temperature control modules of Naware to control heating of the build platform described in Cable.

For these reasons and others set forth above, we determine that at least this ground, based on the record before us now, is particularly strong as it relates to claim 1. We find that Petitioner sufficiently demonstrates at this stage of the proceeding that the combination of Cable and Naware teaches each of the limitations of claim 1 and that the information presented in the Petition demonstrates a reasonable likelihood that claim 1 is unpatentable under 35 U.S.C. § 103 over that combination.

E. Alleged Obviousness Over Comb and Tummala

Petitioner alleges claims 1–3 and 5–15 of the ’660 patent would have been obvious over Comb and Tummala. Pet. 46–69. Patent Owner contends in response that the combination does not teach or suggest claim elements 1.c.i. and 1.c.ii., as recited in claim 1. Prelim. Resp. 46–57. Thus, the dispute between the parties regarding this ground revolves around claim 1 only, and we therefore limit our analysis to that claim for now.

Having considered the arguments and evidence before us, we find, for the reasons explained below, that the record establishes a reasonable likelihood that Petitioner would prevail on at least one claim, i.e., claim 1, in this asserted ground of unpatentability.

1. Comb

Comb, titled “Magnetic Platen Assembly for Additive Manufacturing System,” “is directed to an additive manufacturing system for printing a 3D part.” Ex. 1004, code (54), 1:65–66. Comb describes “a platen assembly” including “build substrates, which function as receiving surfaces for the printed layers.” *Id.* at 3:43, 3:53–33. Such “build substrate is typically a plastic component, such as an injection-molded tray or a thin plastic film, with surface energies and/or surface roughness tailored to achieve good adhesion with the first printed layer.” *Id.* at 3:62–65. Good adhesion,

however, may “present an issue with removal of the printed 3D part and support structure from the build substrate” and therefore “the build substrate is preferably flexible enough to allow a user to peel the build substrate from the base of the printed 3D part/support structure.” *Id.* at 4:1–7.

An exemplary embodiment in Comb describes a platen assembly having “heatable” “[p]laten plate 52” as well as “heating element 56” for heating the platen. *Id.* at 7:29, 8:4–6. The platen assembly also includes, among other components, “build sheet 36” which “is an example of a replaceable and interchangeable build sheet.” *Id.* at 7:1–3. “The platen assembly is configured to magnetically couple a build sheet to the top surface of the platen plate due to the one or more generated magnetic fields, where the magnetically-coupled build sheet is configured to receive the printed layers from the printing mechanism.” *Id.* at 2:8–13.

“In a preferred embodiment, build sheet 36 is a multiple-layer sheet having a top film 36a laminated on or otherwise adhered to a metallic base sheet 36b.” *Id.* at 8:20–23. “Top film 36a may be derived from one or more polymeric coatings, tapes, or other lamina, which may be adhered to base sheet 36b.” *Id.* at 8:27–29. “[T]op film 36a may optionally be surface treated or otherwise conditioned to increase its adhesive properties (e.g., texturing).” *Id.* at 8:46–48. “[T]he thin, flexible nature of build sheet 36 allows 3D part 38 and support structure 40 to be removed by flexing build sheet 36.” *Id.* at 12:49–51.

2. Tummala

Tummala, titled “Adhesive for 3D Printing,” describes “use of an adhesive . . . [which] permits print materials and/or printed parts to be removed or peeled from the print pad easily, without breaking, and/or without the use of tools.” Ex. 1005, code (54), ¶ 50. The adhesive may

include “a first polymeric component comprising a poly(vinyl alcohol) and a second polymeric component.” *Id.*, code (57). The adhesive in the form of “a viscous gel” is “applied to a print pad prior to the beginning of the printing process.” *Id.* ¶¶ 23, 53.

3. Reasons to Combine & Reasonable Expectation of Success

As discussed above, both Comb and Tummala relate to the subject matter of 3D printing, where Combs describes a manufacturing system for printing a 3D part and Tummala describes adhesives for use with a 3D printer that allow for removal of a printed 3D part.

Petitioner argues that there are various reasons to combine Comb with Tummala. Pet 49–53. Petitioner argues “Comb broadly teaches a polymer applied as a coating, tape, or other lamina, and Tummala provides the complimentary teaching of similar polymers applied by coating in a form other than tape” such as “a ‘gel.’” Pet 49. Petitioner argues that “a POSITA would have found it obvious to apply Tummala’s polymer as a gel in place of Comb’s material.” *Id.* at 49–50.

Petitioner argues that “a POSITA would have appreciated that applying a coating to a build substrate surface in a manner other than tape, as taught by Tummala . . . may be significantly easier and more manufacturable on a large scale than applying multiple strips of tape, an approach known to cause user frustration.” *Id.* at 51 (citing Ex. 1005 ¶¶ 45, 52; Ex. 1003 ¶¶ 41, 42, 167). Petitioner argues that Comb distinguishes “coatings” from other materials such as “tape, or other lamina” and therefore “a POSITA would have understood Comb contemplated polymeric coatings beyond tape” such as the gel taught in Tummala. *Id.* at 50–51 (citing Ex. 1004, 8:27–42, 8:43–50; Ex. 1003 ¶¶ 44, 164).

Petitioner argues that Tummala teaches various advantages of its adhesive including heat tolerance, favorable bonding properties and ease of post-printing separation. *Id.* at 52 (citing Ex. 1005 ¶¶ 3–6, 7, 8; Ex. 1003 ¶ 168), 52–53 (citing Ex. 1005 ¶¶ 23, 46, 49–51, 60; Ex. 1003 ¶¶ 171, 172). “The POSITA would have viewed the advantages espoused by Tummala as complementary to Comb’s stated desire to remove the printed 3D part ‘cleanly’ in a manner where the buildsheet ‘retains its integrity’ and ‘may be reused’ . . . making the Comb-Tummala combination a . . . collaborative pairing of known elements.” *Id.* at 52 (citing Ex. 1004, 13:6–16; Ex. 1003 ¶¶ 169, 170). Petitioner argues that combining Comb with Tummala is no more than a combination of familiar elements according to their respective known functions and the combination “would not have disturbed the other aspects of Comb’s system, and it would have produced substantially similar functionality to what Comb described.” *Id.* at 53 (citing Ex. 1003 ¶ 173).

Patent Owner does not contest Petitioner’s arguments with respect to these reasons to combine the teachings of Comb with Tummala, but rather argues that the references, even if combined, do not teach or suggest certain limitations recited in claim 1. *See generally* Prelim. Resp.; *see also id.* at 49–57 (arguing that the combination does not teach or suggest claim elements 1.c.ii and 1.c.iii). Based on our review and consideration of the current record, we are persuaded that Petitioner has sufficiently shown for purposes of institution that a person of ordinary skill in the art would have been motivated to combine the teachings of Comb and Tummala.

Petitioner additionally argues that there is a reasonable expectation of success in combining Comb with Tummala because both “[p]olymer materials and methods of applying them to items like Comb’s build plate”

and “3D printers with polymer-coated build substrates” were well-known at the time of the ’660 patent. Pet 53 (citing Ex. 1003 ¶¶ 174–176).

Patent Owner does not contest Petitioner’s arguments with respect to a reasonable expectation of success in combining Comb with Tummala. *See generally* Prelim. Resp. As discussed in more detail below, based on our review and consideration of the current record, we are persuaded that Petitioner has sufficiently shown for purposes of institution that there is a reasonable expectation in combining the teachings of Comb and Tummala in the manner suggested by Petitioner.

4. Analysis of Independent Claim 1

a. Preamble [1.pre]: “A build apparatus for printing a 3D object of thermoplastics employing additive manufacturing methods, the apparatus comprising:”

Petitioner argues that the combined teachings of Comb and Tummala render claim element 1.pre obvious. Pet. 54. In support of this contention, Petitioner quotes Comb’s teaching of an assembly having “a platen assembly for use in additive manufacturing systems . . . to print 3D parts” and “support structures.” *Id.* (alteration by Petitioner; emphasis omitted) (citing various portions of Ex. 1004).

Patent Owner does not contest Petitioner’s arguments with respect to the preamble recitation. *See generally* Prelim. Resp. Based on our review and consideration of the current record, we determine that Petitioner has sufficiently shown that Comb (including in combination with Tummala) teaches the preamble of claim 1, to the extent it is limiting, for purposes of institution.

b. [1.a]: “a build platform with a temperature control unit configured to control heating of the build platform;”

Petitioner contends that claim element 1.a is rendered obvious by the combined teachings of Comb and Tummala. Pet. 55–58. Petitioner argues plate 52 in Comb “is a heatable platen” which may be heated by heating elements 56. *Id.* at 55 (quoting various portions of Ex. 1004). Heating elements 56 “are configured to heat and maintain platen plate 52 at an elevated temperature.” Ex. 1004, 8:9–11 (cited in Pet. 55). Heating elements 56 may “conductively heat platen plate 52.” Ex. 1004, 11:14–15 (cited in Pet. 55).

Patent Owner does not contest Petitioner’s arguments with respect to claim element 1.a. *See generally* Prelim. Resp. Based on our review and consideration of the current record, we determine that Petitioner has sufficiently shown that the Comb (including in combination with Tummala) teaches this limitation for purposes of institution.

c. [1.b]: “a thermally conductive plate disposed adjacent to the build platform; and”

Petitioner contends that claim element 1.b is rendered obvious by the combined teachings of Comb and Tummala. Pet. 59. Petitioner argues that Comb discloses “platen assembly 26, with a platen plate 52 that supports a ‘multiple-layer’ interchangeable build sheet 36 ‘having a top film 36a laminated on or otherwise adhered to a metallic base sheet 36b.’” *Id.* (citing Ex. 1004, 8:17–26) (emphasis removed). Petitioner argues that such metallic base sheet is thermally conductive. *Id.*

Patent Owner does not contest Petitioner’s arguments with respect to claim element 1.b. *See generally* Prelim. Resp. Based on our review and consideration of the current record, we determine that Petitioner has

sufficiently shown that the combination teaches this limitation for purposes of institution.

d. [1.c]: “a polymer coating attached to a surface of the thermally conductive plate”

Petitioner argues that claim element 1.c is rendered obvious by the combined teachings of Comb and Tummala. Pet. 60–61. Petitioner argues that Comb teaches build sheet 36 which “is a multiple-layer sheet having a top film 36a laminated on or otherwise adhered to a metallic base sheet 36b.” Ex. 1004, 8:20–23 (cited in Pet. 60). “Top film 36a may be derived from one or more polymeric coatings, tapes, or other lamina, which may be adhered to base sheet 36b.” Ex. 1004, 8:27–29 (cited in Pet. 60).

Petitioner additionally argues that Tummala teaches “applying an adhesive to a build surface of a print pad of a 3D printer” and such coating has “one polymeric component.” Ex. 1005 ¶¶ 63, 34 (cited in Pet. 61).

Patent Owner does not contest Petitioner’s arguments with respect to claim element 1.c. *See generally* Prelim. Resp. Based on our review and consideration of the current record, we determine that Petitioner has sufficiently shown that the combination teaches this limitation for purposes of institution.

e. [1.c.i]: “which is capable of (i) facilitating adhesion to the 3D object during printing and”

Petitioner argues that claim element 1.c.i is rendered obvious by the combined teachings of Comb and Tummala. Pet. 61. Petitioner argues the polymer coating in Comb “is capable of facilitating ‘good adhesion to the part . . . used in the system.’” *Id.* (citing Ex. 1004, 8:43–50, 13:36–48) (alteration by Petitioner; emphases removed). Petitioner also argues that the

polymeric adhesive coating in Tummala “provides satisfactory bonding of the extrude print material.” Ex. 1005 ¶ 7 (cited in Pet. 61).

Patent Owner, on the other hand, argues that the prosecution history of the ’660 patent shows that the examiner allowed claim 1 over a combination of Comb and three additional references (not at issue here) because these references, “alone or in combination,” fail to teach or suggest claim elements 1.c.i, 1.c.ii, and 1.c.iii. Ex. 1002, 49 (cited in Prelim. Resp. 51). Patent Owner argues that “there is no reason to revisit the examiner’s conclusion that *Comb* does not teach these elements of claim 1.” Prelim. Resp. 51.

Having considered the parties’ respective arguments and the cited evidence, we are persuaded that Petitioner has sufficiently shown for purposes of institution that the combination of Comb and Tummala (a reference not before the examiner during prosecution) teaches or suggests claim element 1.c.i. For example, the ’660 patent does not require a particular type of non-tape polymer coating to impart the adhesion capability. Ex. 1001, 4:40–44 (“The surface of the removable plate 104 is coated with thin layer of a high temperature polymer in order to impart better adherence properties both to the bottom layer of a 3D object and the plate 104 over the current methods of using polyimide plate.”). And, Patent Owner does not contest Comb’s teaching that “[t]op film 36a may be derived from one or more polymeric coatings, tapes, or other lamina, which may be adhered to base sheet 36b.” Ex. 1004, 8:27–29; *see* Prelim. Resp. 49–57. Patent Owner also does not contest Tummala’s teaching regarding an adhesive that permits “adhesion of a print material or printed part to a print pad throughout the print process until the part is complete” Ex. 1005 ¶ 50; *see* Prelim. Resp. 51–57. Likewise, Patent Owner does not contest that one

of skill in the art would have combined the teachings Comb and Tummala, but instead asserts that Comb (alone or in combination with other references) fails to suggest certain limitations, including this one. *Id.* at 46–57. Based on the preliminary record before us, we find that Petitioner has sufficiently shown for purposes of institution that the combination teaches or suggests claim element 1.c.i.

f. [1.c.ii]: “(ii) permitting removal of the 3D object once the 3D object has been formed and cooled without chemically or mechanically removing the polymer coating from 3D object and without damaging the polymer coating, the thermally conductive plate, or the 3D object;”

Petitioner argues that claim element 1.c.ii is rendered obvious by the combined teachings of Comb and Tummala. Pet. 62–68. Petitioner argues Comb teaches removal of a 3D object “after ‘the printing operation is completed’” suggesting at least some cooling before the removal. *Id.* at 63 (citing Ex. 1003 ¶ 193; Ex. 1004, 8:9–16). Petitioner argues that based on Comb’s teaching of removing the 3D object cleanly without damaging the platen or build sheet 36, a POSITA would have found claim element 1.c.ii obvious. *Id.* at 63–64 (citing Ex. 1004, 4:9–19, 13:6–9; Ex. 1003 ¶¶ 196, 197) (internal quotations omitted). Petitioner argues that these findings were also confirmed by the examiner during prosecution. *Id.* at 64.

Petitioner also argues that the adhesive in Tummala can be easily separated without damaging the adhesive or the print pads. *Id.* at 65 (citing various portions of Ex. 1005).¹⁰ For example, Tummala teaches the “use of an adhesive . . . [which] permits print materials and/or printed parts to be

¹⁰ Petitioner cites to “EX1007” which is Naware. Pet. 65. We believe the correct citation should have been Ex. 1005.

removed or peeled from the print pad easily, without breaking, and/or without the use of tools.” Ex. 1005 ¶ 50. Petitioner argues that based on Tummala’s teaching of reusable print pads, a skilled artisan would have found claim element 1.c.ii obvious by “employing Tummala’s polymer material in lieu of Comb’s.” Pet. 65 (citing Ex. 1003 ¶¶ 98–200).

Petitioner next argues that Comb teaches “build sheets 36 may be individually customized for use with particular part and support materials to improve adhesion and/or peeling characteristics.” Ex. 1004, 13:36–48 (cited in Pet. 66). According to Petitioner, this teaching “encourages the POSITA to select a coating material that optimizes delamination of the part,” rendering claim element 1.c.ii obvious. Pet. 66.

Petitioner also argues that the capabilities of claim element 1.c.ii “are a ‘natural result’ of Comb’s teaching.” *Id.* Petitioner argues that the prior art polymer coating in Comb and Tummala “would have been reasonably expected to achieve” the same capabilities (recited in claim element 1.c.ii) as the polymer coating recited in claim 1. *Id.* at 66–67. Petitioner argues that “Comb further discloses the same operative structural details—i.e., a polyimide coating applied directly to the surface of a thin and flexible metallic conductive plate—as are identified in the ’660 patent’s specification.” *Id.* at 68 (citing Ex. 1003 ¶¶ 204–206).

In response, Patent Owner argues that the prosecution history of the ’660 patent shows that the examiner allowed claim 1 over a combination of Comb and three additional references (not at issue here) because these references, “alone or in combination,” fail to teach or suggest claim elements 1.c.i, 1.c.ii, and 1.c.iii. Ex. 1002, 49 (cited in Prelim. Resp. 51). Patent Owner argues that “there is no reason to revisit the examiner’s conclusion that *Comb* does not teach these elements of claim 1.” Prelim. Resp. 51.

Patent Owner argues that “Petitioner does not specifically address how *Tummala*’s teaching of a polymer coating (or motivation to select a non-tape coating) enables removal without chemically or mechanically removing the polymer coating and without damaging the polymer coating, the thermally conductive plate, or the 3D object.” *Id.* at 52. Patent Owner argues that to the extent that Petitioner relies on inherency, such reliance is improper because Petitioner does not show claim element 1.c.ii is a necessary result of the Comb and Tummala combination or Comb alone. *Id.* at 52–53.

Patent Owner also argues that Tummala does not teach or suggest a coating that is capable of both adhesion and removal as claim elements 1.c.i and 1.c.ii require. *Id.* at 53. Patent Owner argues that Table 1 of Tummala “teaches a coating that generally does not permit removal at high temperatures (100 °C) or in dry conditions.” *Id.* at 54. According to Patent Owner, “[a]bsent the use of a raft, there is no disclosure in *Tummala* of enabling removal via a low adhesion or bonding strength (e.g., 0-0.5 lbs in *Tummala*) without the use of a chemical solvent.” *Id.* Patent Owner contends that “[t]he only condition in *Tummala* that may enable removal without a chemical solvent requires a raft,” but the use of a raft “fails to satisfy the element of claim 1 that requires ‘facilitating adhesion to the 3D object during printing.’” *Id.* at 55–56. Patent Owner argues that “*Tummala* does not teach or disclose that the polymer coating does not need to be chemically or mechanically removed from the 3-D part, such as when the polymer coating is attached, in part or whole, to the raft of support material, which must subsequently be removed from the 3-D part.” *Id.* at 56 (citing Ex. 1005 ¶ 21). Patent Owner lastly argues that whereas Tummala teaches a reusable print pad, “the adhesive is not permanent or reusable” but is instead “re-

applied at the start of each printing process” and therefore does not teach or suggest claim element 1.c.ii. *Id.* at 56–57.

Having considered the parties’ respective arguments and the cited evidence, we are persuaded that Petitioner has sufficiently shown for purposes of institution that the combination teaches or suggests claim element 1.c.ii. From the outset, we do not agree that Petitioner relies on inherency when making its arguments in relation to this limitation. Rather, Petitioner relies on the express disclosures of Comb and Tummala in asserting that claim element 1.c.ii would have been obvious. Pet. 62–68; Ex. 1003 ¶¶ 192–206.

For example, Petitioner notes that Comb describes that “the build substrate is preferably flexible enough to allow a user to peel the build substrate from the base of the printed 3D part/support structure.” Ex. 1004, 4:1–7. In addition, Comb describes “build sheet 36b” as “providing sufficient flexibility to remove 3D part 38 and support structure 40 after a printing operation is completed.” *Id.* at 8:58–61. Comb describes that “if the previous 3D part 38 and support structure 40 cleanly are removed from the previous build sheet 36, and the previous build sheet 36 retains its integrity, the same previous build sheet 36 may be reused.” *Id.* at 13:6–9. Comparing to a less advantageous system where “the only effective solution of removal . . . involved prying the 3D part off with crow bar-like device or chisel, which could damage the 3D part or platen,” “the flexing of the build substrate [in Comb] amplifies the stresses induced at the bending line of action, causing delamination of the 3D part from its base layers, or delamination of the base layers from the build substrate.” *Id.* at 4:8–16.

Tummala similarly describes the “use of an adhesive . . . [which] permits print materials and/or printed parts to be removed or peeled from the

print pad easily, without breaking, and/or without the use of tools.” Ex. 1005 ¶ 50. Tummala describes “printing of accurate 3D objects with surfaces that are easily separated from both the print pad and from the support structures in a manner not previously achieved.” *Id.* ¶ 7. Petitioner’s technical declarant states that a skilled artisan would have understood “easily separated” in Tummala to mean “the polymer material is also separated” without chemical or mechanical means and without damage to the coating, the support, or the 3D product. Ex. 1003 ¶¶ 199, 200. In other words, according to Petitioner, one of skill in the art would have read Tummala as teaching a relevant polymer coating, i.e., a coating that a skilled artisan would have been motivated to use in Comb’s system for printing 3D parts, that permits removal of a 3D object without chemically or mechanically removing the coating from the 3D object, and without damaging the polymer, conductive plate or the 3D object.

Based on these express teachings of Comb and Tummala, Petitioner argues that the combination teaches or suggests claim element 1.c.ii and that one of ordinary skill in the art would have combined the teachings of the two references to arrive at the claimed invention with a reasonable expectation of success. *See* Pet 53 (citing Ex. 1003 ¶¶ 174–176).

Patent Owner argues that “Tummala teaches a coating that generally does not permit removal at high temperatures (100°C) or in dry conditions and that “proper removal with a low adhesion or bonding strength typically requires a wet, room-temperature condition (e.g., 23°C). Prelim. Resp. 53 (citing Ex. 1005, Table 1). Patent Owner also argues that “[a]bsent the use of a raft, there is no disclosure in Tummala of enabling removal via a low adhesion or bonding strength (e.g., 0-0.5 lbs in Tummala) without the use of a chemical solvent” such as water. *Id.* at 54. We discern no disclosure in

Tummala, however, that the use of water is the only method for releasing a 3D object from the surface of the device. Indeed, Tummala also discloses that in some embodiments the adhesive has a bonding strength that is 10 times greater at 100° C than at room temperature, and this disclosure does not mention the need for a “raft” to achieve these results. Ex. 1005 ¶ 47.

Moreover, the ’660 patent provides that it is the “[t]he surface toughness of this coating 106 [that] prevents damage from occurring during 3D object removal.” Ex. 1001, 4:49–51. The ’660 patent also provides that “[t]he flexibility of the removable plate 104 also reduces the possibility of damage to the coating 106 . . . during object removal since a blade or wedge is no longer needed to pry off the part.” *Id.* at 6:21–26. Patent Owner does not contest, and the record does not show, that the non-tape polymer coating of the ’660 patent must be limited to a particular composition to impart the capabilities required in claim elements 1.c.ii. *See* Prelim. Resp. 51–57.

Claim 1 also does not require the capabilities recited in claim element 1.c.ii be solely attributable to the non-tape polymer coating. Claim 1 requires only the capability of “without chemically or mechanically removing the polymer coating.” Patent Owner’s arguments with regard to Table 1 and other portions of Tummala do not explain why we should ignore Tummala’s other teachings, such as its teaching that prior art adhesives permit “print materials and/or printed parts to be removed or peeled from the print pad easily, without breaking, and/or without the use of tools.” Ex. 1005 ¶ 50; *see* Prelim. Resp. 51–57.

Based on the foregoing, in view of evidence of record at this preliminary stage, we determine that Petitioner has sufficiently shown that the combination of Comb and Tummala teaches or suggests this limitation for purposes of institution.

g. [1.c.iii]: “wherein the polymer coating is not a polymer tape”

Petitioner argues that claim element 1.c.iii is rendered obvious by the combined teachings of Comb and Tummala. Pet. 68–69. Petitioner notes Comb teaches that “[t]op film 36a may be derived from one or more polymeric coatings, tapes, or other lamina, which may be adhered to base sheet 36b.” Ex. 1004, 8:27–29 (cited in Pet. 68). Petitioner argues that Comb’s teaching distinguishes tape from other coating. Pet. 68 (citing Ex. 1004, 8:43–50; Ex. 1003 ¶ 207). Petitioner also argues that Tummala teaches a polymeric adhesive coating in the form of a gel which may be applied to a print pad in a 3D printing process. *Id.* (citing various portions of Ex. 1005, including ¶¶ 7, 45, 52).

Patent Owner does not contest Petitioner’s arguments with respect to claim element 1.c.iii. *See generally* Prelim. Resp. Based on our review and consideration of the current record, we determine that Petitioner has sufficiently shown that the combination teaches this limitation for purposes of institution.

h. Conclusion Regarding Independent Claim 1 (Comb & Tummala)

For the reasons set forth above, we determine that Petitioner has sufficiently shown at this stage of the proceeding that the combination of Comb and Tummala teaches each of the limitations of claim 1 and that the information presented in the Petition demonstrates a reasonable likelihood that claim 1 is unpatentable under 35 U.S.C. § 103 over that combination.

F. Remaining Challenges

As set forth in Section II.E. above, Petitioner additionally challenges claims 2–13 and 15 as unpatentable over Cable and Naware; claims 1, 2, 4,

6–12, and 15 as unpatentable over Cable and Kritchman; claims 7, 8, and 14 as unpatentable over Cable, Naware or Kritchman, and Comb; claims 2, 3, and 5–15 as unpatentable over Comb and Tummala; and claims 1–15 as unpatentable over Comb, Tummala, and Kritchman. *See* Pet. 26–45, 69–81. Patent Owner does not present separate arguments for these challenges. *See* Prelim. Resp. 46, 57–58. Because we determine above that Petitioner demonstrated a reasonable likelihood of prevailing in its challenge to at least one claim of the ’660 patent, we institute *inter partes* review on all claims and grounds. *See* 37 C.F.R. § 42.108(a) (“When instituting . . . review, the Board will authorize the review to proceed on all of the challenged claims and on all grounds of unpatentability asserted for each claim.”).

V. CONCLUSION

After considering the evidence and arguments presented in the Petition, we determine Petitioner has established a reasonable likelihood of prevailing on its assertion that at least one claim of the ’660 patent is unpatentable, and we institute an *inter partes* review on all the challenged claims and on all grounds presented in the Petition. *See* 37 C.F.R. § 42.108(a).

VI. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that pursuant to 35 U.S.C. § 314, *inter partes* review is instituted as to the challenged claims of the ’660 patent and on all grounds of unpatentability presented in the Petition; and

FURTHER ORDERED that *inter partes* review is commenced on the entry date of this Order, and pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, notice is hereby given of the institution of a trial.

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