UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SHENZHEN TUOZHU TECHNOLOGY CO., LTD,
Petitioner,

v.

STRATASYS, INC.,
Patent Owner.

Case IPR2025-00257
Patent 9,592,660

PETITIONER'S REPLY TO PATENT OWNER'S RESPONSE TO THE PETITION

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EX1046	Preliminary Constructions, *Stratasys, Inc. v. Shenzhen Tuozhu Technology Co. Ltd. et al*, 2-24-cv-00644 (EDTX)
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**All emphasis is added in this brief.*

I. INTRODUCTION

The Petition exposes the ’660 patent for what it is: an obvious variant of the prior art. Lacking true patentable distinctions, Patent Owner tries a variety of futile tactics, from contradicting the asserted references and unfairly denigrating their teachings to bypassing large swaths of the Petition’s analysis. The Board should reject these maneuvers and find the Challenged Claims unpatentable.

II. GROUND 1A: CABLE IN VIEW OF NAWARE

A. Claim 1, Element [1.c.ii]: Cable’s Teachings Render Obvious Object Removal Without Damage and Without Chemically or Mechanically Removing the Coating from the Object

1. Cable Explicitly Discloses Removal Without Damage or Chemical/Mechanical Contact

Cable could hardly be clearer: When adhesion characteristics are optimized based on the material properties of the polymer-coated substrate and the printed 3D object, “the object can be removed from the substrate with minimal or no damage to the object and to the substrate. Thus, the substrate can be re-used or recycled after removal of the object therefrom such that another object can be formed on the same substrate.” EX1006, [0052] (reference numbers removed); Pet., 23–25. Cable also expressly states that this no-damage removal is performed “without mechanically contacting the object with a device, chemically contacting the object, and/or thermal/temperature cycling.” *Id*. Given the lack of mechanical/chemical contact with the object and the lack of damage, it follows that Cable’s removal process

occurs as claimed at Element [1.c.ii]—i.e., without chemically or mechanically removing the polymer coating from the 3D object. Indeed, just like the '660 patent, Cable describes this phenomenon as the object simply "pop[ping] off." EX1006, [0067]; EX1001, 5:5–18–20 ("the object will pop off the plate").

That the '660 patent's claims and description are a near-verbatim replica of Cable's earlier disclosure creates an exceptionally strong obviousness case.

2. Patent Owner's "Residue" Argument Artificially Constrains Cable's Disclosure, Misreads Cable's Examples, and Stands on Unreliable Expert Testimony

Ignoring the '660 patent's remarkable similarity to Cable, Patent Owner says the existence of "residue" in Cable's working examples means there was damage to the object or substrate and/or the coating was chemically or mechanically removed from the object. POR, 32–38. This argument fails for multiple reasons.

To begin with, even if all of Cable's working examples were deemed contrary to the Challenged Claims based on the existence of residue, that hypothetical would not undercut the Petition's mapping analysis. Cable makes clear that these "examples…do not limit" or alter the preceding description that the Petition cites. EX1006, [0084]; *see also* [0052] ("no damage"), [0067] ("without mechanically [or chemically] contacting the object") ("without leaving a residue"). Constraining Cable's disclosure to a smattering of non-limiting examples is both factually and legally incorrect. *Cf. Ultradent Prods. v. Life-Like Cosmetics, Inc.*, 127 F.3d 1065,

1068 (Fed. Cir. 1997) ("The district court thus erred by construing the scope of the [prior art's] disclosure as limited to the preferred embodiment."). Thus, even when cast in an artificially favorable light, Patent Owner's position remains flawed.

And to be clear, this hypothetical is far from reality. Cable's examples do not support Patent Owner's view that residue means damage or chemical/mechanical removal operations. Examples 1 and 3 suggest the exact opposite. Although these examples produced "a minimum amount of residue," Cable expressly confirms that "the object [] was not damaged." EX1006, [0085], [0087]. Example 2 tells a different story. There, the object was "removed…using a blade," and Cable notably omits any assurance that no damage occurred. EX1006, [0086]; *see also* EX2009, ¶99 (Patent Owner's Dr. Osswald explaining that "the damage [in Example 2] corresponds to the removal of object 900 by using a blade, resulting in scratch marks on the top surface of the substrate"). Taking Examples 1–3 as a whole shows that Cable views mechanical removal with a blade as the cause of damage, not residue.

Like Cable, the '660 patent's specification does not conflate damage with residue. There is no mention of residue at all in the '660 patent, which instead identifies "scratch[ing] or punctur[ing]" and "wear" from "removal [with] a blade or wedge" as potential forms of damage. EX1001, 4:47–51, 5:5–12, 6:7–13. Patent Owner has not, and cannot, point to such damage in Cable. Indeed, Cable shares the same goal as the '660 patent in terms of facilitating an easy removal process that

avoids damage because the printed object simply "pop[s] off." EX1006, [0067]; EX1001, 5:5–18–20 (similar).

Patent Owner's expert, Dr. Osswald, openly contradicts Cable's teachings that damage was avoided in Examples 1 and 3. He insists Cable is wrong about all of these things entirely based on the existence of "visible residue." *See generally* EX2009, ¶¶103–106. But expert testimony cannot change what the prior art says. When, as here, an expert "makes several incorrect statements with respect to the record," the Board "must disregard [that] testimony." *Homeland Housewares, LLC v. Whirlpool Corp.*, 865 F.3d 1372, 1378 (Fed. Cir. 2017).

The directive to disregard facially incorrect *ipse dixit* testimony is especially strong in a case like this one, where Dr. Osswald has no corroborating evidence to support his denial of Cable's no-damage description and fails to provide a coherent analytical framework for his opinion that residue means damage. *See Xerox Corp. v. Bytemark, Inc.*, IPR2022-00624, Paper 9 at 15 (PTAB Precedential Aug. 24, 2022) (assigning "little weight" to expert testimony that "does not cite to any additional supporting evidence or provide any technical reasoning"). In fact, the meandering response he gave during cross-examination when asked about his "understanding of the term 'damage'" notably did <u>not</u> include the word residue. EX1040, 81:2–12. When pressed to explain how one might determine when damage occurs, Dr. Osswald equivocated and said the person of ordinary skill in the art "is not dumb"

and "they know what damage means." *Id*., 83:23–84:3. The truth is that Dr. Osswald has no objective technical reasoning underlying his opinions. So, when asked, "What analysis would the person of skill in the art do?" all he could say is, "I don't know." *Id*., 87:9–20.

3. Cable's Teachings, and the Prior Art as a Whole, Are Sufficiently Enabling

Patent Owner suggests "Cable fails to provide an enabling disclosure" because "[a] POSITA would have understood that undue experimentation would have been required to determine whether any solution supports removal without damage such that there is no visible residue." POR, 38–39. This argument fails for at least the threshold reason discussed above—visible residue does not mean damage. *Supra*, II.A.1. What's more, the law says all of Cable's teachings are presumed enabling, and Patent Owner fails to rebut the presumption. Conclusory assertions based on the wrong legal standard are not nearly enough, especially when Cable's teachings are more useful and robust than the '660 patent's.

i. Cable's Teachings Are Presumed Enabling, and Patent Owner Fails to Rebut the Presumption

"Prior art disclosures are presumed enabling." *Agilent Techs., Inc. v. Synthego Corp*., 139 F.4th 1319, 1327 (Fed. Cir. 2025). This rule holds true "regardless of the forum," and it means "the patentee/applicant has the burden to prove nonenablement for such prior art." *Apple Inc. v. Corephotonics, Ltd*., 861 F.

App'x 443, 449-50 (Fed. Cir. 2021); *Amgen Inc. v. Hoechst Marion Roussel*, 314 F.3d 1313, 1355 (Fed. Cir. 2003) ("[I]t was [the patentee] who bore the burden of proving the nonenablement[.]"). The patentee's burden requires evidence that "undue experimentation," *In re Wands*, 858 F.2d 731, 737 (Fed. Cir. 1988), was necessary to practice even "a single embodiment," *In re Morsa*, 803 F.3d 1374, 1377 (Fed. Cir. 2015), of the '660 patent's claimed invention based on Cable and the prior art "as a whole," *Raytheon Techs. Corp. v. GE*, 993 F.3d 1374, 1380 (Fed. Cir. 2021). For at least the following reasons, Patent Owner fails to surmount this high hurdle.

First, Patent Owner insists a skilled artisan "would have needed to…run experiments" to reach the claimed invention based on Cable's teachings. POR, 38–39 (citing EX2009, ¶107). But the necessity of some experimentation—even "a considerable amount"—does not preclude enabling prior art. *Wands*, 858 F.2d at 737. "The key word is 'undue,' not 'experimentation.'" *Id*. Thus, the law demands that the "quantity of experimentation necessary" be placed in context based on factors like "the state of the prior art" and "the relative skill of those in the art." *Id*. The purpose of this inquiry is to distinguish experimentation that is truly "undue" from the kind of "routine" experimentation that signals obviousness. *Id*. at 736–37; *In re Geisler*, 116 F.3d 1465, 1470 (Fed. Cir. 1997) ("[I]t is not inventive to discover the optimum or workable ranges by routine experimentation."). Patent Owner fails

to provide this critical analysis and offers no credible evidence that the supposed experimentation stemming from Cable would have been anything more than routine.

Second, Patent Owner contends that "Cable's own experiments…were [not] able to support object removal…such that no visible residue is left behind." POR, 39. Yet the law says, "a prior art reference asserted under § 103 does not necessarily have to enable its own disclosure." *Apple Inc. v. Gesture Tech. Partners, LLC*, 129 F.4th 1367, 1379 (Fed. Cir. 2025) (quote omitted). Such a reference is still "prior art for all that it teaches." *Beckman Instruments, Inc. v. LKB Produkter AB*, 892 F.2d 1547, 1551 (Fed. Cir. 1989). As a matter of law, Patent Owner's attempt to defeat obviousness by critiquing Cable's self-enablement must fail.[1]

Third, Patent Owner claims that "Cable recognizes the unpredictable nature of its teachings." POR, 38. Yet even were it so, that would still not make the case for Patent Owner. Less than perfect predictability does not mean the prior art fails to enable the claimed invention. The Federal Circuit confirmed as much less than a year ago in its *Agilent Technologies* decision, which upheld the Board's conclusion

[1] Patent Owner's legal error also infected the testimony of its expert, who premised his analysis and conclusion on the same misunderstanding. *See* EX2009, ¶41 (Dr. Osswald stating incorrectly that "a reference must contain an enabling disclosure").

that the presumption of enabling prior art was not overcome despite finding that "the art was somewhat unpredictable." 139 F.4th at 1327–30.

Because Patent Owner's attacks on Cable are deficient under the law, even if assumed true, the presumption of enabling prior art must remain intact.

ii. Cable's Teachings Provide Sufficient Direction and Guidance; Far More Than the '660 Patent

Compounding their legal deficiencies, Patent Owner's criticisms of Cable are also factually incorrect. It is not true, for example, that "Cable recognizes the unpredictable nature of its teachings." POR, 38. Cable instead expresses full confidence that "a relationship between the material properties of the build material and the material of the substrate can be selected in order to promote optimal adhesion." EX1006, [0046]. "With optimal adhesion characteristics, the object can delaminate from the substrate without leaving a residue that is visible to the eye" and such that "the bottom of the object [has] a smooth finish." *Id*., [0067].

Far from uncertain, Cable identifies the material properties and relationships that drive this optimization with specificity, providing narrow ranges for each:

1. **Adhesion During Printing:** A percent difference of "within about 10%" between the "surface energy" of the substrate surface and the build material of the object, respectively;
2. **Release After Printing:** A percent difference of "at least about 5%" between the "Hildebrand solubility parameter" of the substrate surface and the build material of the object, respectively;

EX1006, [0063]–[0064]. Cable also provides exemplary temperature ranges for heating the build platform (e.g., [0045]), as well as suitable ranges for the overall dimensions of the substrate (e.g., [0068]–[0076]). Material properties like surface energy and the Hildebrand solubility parameter were well known by the time of the '660 patent in 2014, and they could be easily measured. Patent Owner's Dr. Osswald repeatedly confirmed this point during deposition. *See* EX1040, 21:25–22:23 ("They could measure it."), 22:24–25:11 ("[T]here's a method [for measuring] that goes back to 1949…") ("[I]n my book…I have a whole section of solubility of polymers…"). Surface temperature and size dimensions were likewise undeniably well-known and easily controllable variables. *E.g.*, EX1003, ¶¶31–36, ¶¶116–117.

Optimization is often a hallmark of obviousness, not undue experimentation. Thus, it is typically "not inventive to discover the optimum or workable ranges" of a known parameter. *E.I. du Pont de Nemours & Co. v. Synvina C.V.*, 904 F.3d 996, 1006 (Fed. Cir. 2018). In this case, obviousness is even clearer than the general rule suggests. Here, a skilled artisan need not "discover" any ranges—Cable already provides them. EX1006, [0063] ("within about 10%"), [0064] ("at least about 5%").

The passage Patent Owner isolates to suggest Cable concedes unpredictability merely confirms Cable's earlier teachings. POR, 38 (citing EX1006, [0088]). For example, Cable explains that printing "Amphora copolyester" on an uncoated "glass substrate" was unsuccessful because "the differences between the physical

characteristics of the substrate and the material of the object…may have prevented sufficient bonding." EX1006, [0088]. Put differently, had the surface energies of the substrate and build material been within Cable's prescribed 10% range, the object would not have "bec[o]me detached" during printing. *Id*.[2] Just because Cable was not "tied to any particular theory" when explaining the unsuccessful print does not mean, or even suggest, Cable's teachings are unpredictable. *Id*.

The '660 patent's sparse specification confirms that a skilled artisan was equipped to practice the claimed invention based on Cable's teachings. Cable's disclosure is materially more detailed than the '660 patent's, the former naming the specific material properties and relationships, temperatures, and dimensions to optimize, all paired with preferred ranges to achieve desired results. *E.g.*, EX1006, [0045], [0063]–[0064], [0068]–[0076]. That the '660 patent leaves such implementation details unstated is proof that they were already known, a fact that cements the presumption of enabling prior art. *See Hybritech, Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 1384 (Fed. Cir. 1986) ("[A] patent need not teach, and preferably omits, what is well known in the art."); *In re Epstein*, 32 F.3d 1559,

[2] It is well known that glass has a much higher surface energy than polyester. EX1041, 7 (listing "Glass" surface energy as in the range of "1100–400" dynes/cm); EX1036, 2 (listing the surface energy of "Polyester" as 41 dynes/cm).

1568 (Fed. Cir. 1994) ("[T]he Board's observation that appellant did not provide the type of detail in his specification that he now argues is necessary in prior art references supports the Board's finding that one skilled in the art would have known how to implement the features of the references and would have concluded that the reference disclosures would have been enabling.").

B. Claim 1, Element [1.c.iii]: The Non-Tape Polymer Coating

1. A Skilled Artisan Would Have Understood That Cable Teaches a Non-Tape Polymer Coating

"Nothing in Cable teaches that the coating is not tape" is a statement that could not be further from the truth. POR, 41.

Generally, and particularly in 3D printing, tapes and coatings are not the same thing. "The term 'tape,' as understood by a POSITA in the 3D printing community (and even more colloquially), refers to a thin, flexible piece of material with a pre-applied adhesive that is sticky at room temperature to allow the tape to adhere to another surface; it often comes packaged in rolls." EX1003, ¶37. Coatings are different. *Id*., ¶38, ¶¶40–42. "In <u>all</u> cases," a coating process involves "a <u>liquid</u> dispersion [that] is deposited, spread onto a substrate, and subsequently solidified." EX1020, 62. Though he takes a contrary position now, Patent Owner's Dr. Osswald restated this well-known fact in the "International Plastics Handbook" he authored back in 2006. *Compare* EX2009, ¶111, *with* EX1042, 4. There, Dr. Osswald

explained: "In coating a liquid film is continuously deposited on a moving, flexible or rigid substrate." EX1042, 4. His writing confirms that, although "[c]oating is done on…adhesive tape," the tape itself is not a coating. *Id*.

For all these reasons, "when skilled artisans talked about tape, they used the word 'tape,' not 'coating.'" Pet., 25 (citing EX1003, ¶¶93–95, ¶¶37–39, ¶44). Cable is no different. Cable references "painter's tape" in a list of substrate materials used in earlier 3D printing systems that had not yet successfully "achieve[d] optimal platform adhesion" and "easy removal of the object." EX1006, [0002], [0024]. By contrast, when later discussing his solution to this optimal-adhesion problem, Cable refers to a substrate "manufactured by coating a main portion or body of the substrate with a first material." *Id*., [0061] (reference numbers omitted). If, by "coating," Cable simply meant applying something as ubiquitous as painter's tape, he would have said so. The Board should decline Patent Owner's invitation to treat Cable's substrate coating as a synonym for the very tape Cable sought to improve upon.

Patent Owner (Stratasys) knows the distinction between "tapes" and "coatings" as well as anyone. For example, a patent filed in 2013 and assigned to Patent Owner separately lists these distinct terms in a disjunctive list of alternative options for covering the base sheet of a 3D printing system. EX1004 (Comb), 8:27–33; *infra*, §V.A. Similarly, in 2006, Patent Owner applied for a patent on 3D printing

that describes a top surface "formed by coating," such as by "spray coating, knife coating, [and/or] extrusion coating"—but fails to mention tape. EX1043, [0043].

Short on credible evidence, Patent Owner retreats to "other fields, such as making coated pipes." POR, 41 (citing EX2017). There, Patent Owner suggests, "polymer tapes were also used as coatings." *Id*. But that is irrelevant. The pertinent question is how a person skilled in the art of 3D printing would have interpreted Cable. A one-off example from a far-off field does Patent Owner no good.

In fact, on closer inspection, Patent Owner's evidence is merely an exception proving the general rule that coatings and tapes are different things. The evidence is an excerpt from a book on corrosion control that was first published in 1963. EX2017, 2. The exhibit is limited to a single chapter—"15.8 Protective Coatings for Underground Use." *Id*., 11, 13. Although this specific section about underground pipes introduces the concept of "tape coatings," (*id*., 17), more general discussions in the same book on "[t]he use of plastics for corrosion-resistant coatings" make no mention of tapes, (EX1044, 1–10). So, even in Patent Owner's cherry-picked other fields, the coined term "tape coating" is merely sector-specific jargon. Plus, "tape coating" still includes "tape," a word Cable chose not to use.

2. Alternatively, It Would Have Been Obvious to Apply Cable's Polymer Coating Without Using Tape

Viewed most charitably, the best Patent Owner could hope to establish is that Cable's disclosed coating could be applied using tape because (purportedly) tape was a known option for creating a coating. POR, 41. But even assuming that view is hypothetically correct, it does not weaken the Petition's obviousness theory.

Patent Owner does not and cannot deny that non-tape techniques were well-known, suitable options for creating the kind of polymer-coated substrate that Cable describes. *See supra*, §II.B.1. This undisputed fact alone is enough to establish obviousness because skilled artisans are motivated to use known techniques to address the design problem at hand. In the Federal Circuit's words:

> It's enough for [the Petition] to show that there was a known problem of [forming a polymer coating on a substrate], that [non-tape coating techniques] helped address that issue, and that combining the teachings of [Cable with known non-tape coatings] wasn't beyond the skill of an ordinary artisan.

Intel Corp. v. PACT XPP Schweiz AG, 61 F.4th 1373, 1381 (Fed. Cir. 2023). Or, to put it differently, because tape and non-tape solutions were known and suitable, it follows that implementing either of these "two predictable choices" would have been obvious. *Uber Techs., Inc. v. X One, Inc.*, 957 F.3d 1334, 1339-41 (Fed. Cir. 2020).

If that were not enough—and it is—the Petition also shows that a skilled artisan would have been motivated to employ non-tape solutions to avoid the complications and user frustration that was known to exist with tape coverings in the field of 3D printing. Pet., 26 (citing EX1003, ¶96, ¶¶40–43). Patent Owner says the known problems with tape have not been substantiated, but that ignores the record. As Petitioner's Dr. Hickner explained at the outset of this proceeding:

> By 2014, the desire for polymer coatings as a cure to user frustration with applying tapes led to commercial products like Wolfbite, marketed by AirWolf3D. Wolfbite, a commercially available polymer coating, was "specially engineered to bond Acrylonitrile Butadiene Styrene (ABS) plastic parts directly to a heated glass 3D printing surface without lifting—also known in the industry as "warpage,"—and to enable smooth release of objects after printing." EX1018, p.2; EX1019, p.2 ("Proprietary aqueous solution of selected polymers.").

EX1003, ¶41 (citing EX1018, p.1; pictured at right); *see also* ¶39.

The '660 patent's background discussion lends further support to Dr. Hickner's detailed, evidence-backed testimony. EX1001, 1:11–2:8 (section titled "BACKGROUND"). Setting the scene for its forthcoming detailed description of preferred embodiments, the '660 patent clearly concedes that "the present methods

use polyimide tape," that such tape was known for its "tactility and performance under high temperatures," and that "[a]pplying polyimide tape is a difficult process inevitably allowing for tiny debris or air to be trapped between the tape and metal surface." EX1001, 1:31–56. These statements are all true and substantiated by other record evidence. *E.g.*, EX1011, 10 (explaining that "surfaces are often covered in one kind of tape or another…includ[ing] Kapton or polyimide tape"), 284 (noting that "polyimide tape can be a little tricky"), 288 (warning that "[i]t might take a little practice to get [the tape application process] down"). Patent Owner's hindsight complaints, (POR, 42–43), are factually incorrect and ignore decades of well-established law. *See Sanofi-Aventis Deutschland GMBH v. Mylan Pharms. Inc.*, 791 F. App'x 916, 923 (Fed. Cir. 2019) ("[The Board] used the specification for its teachings about prior-art knowledge, and that use of a specification is not just common, given patent drafters' standard practice of reciting prior art in setting out the background of the invention, but permissible.").

If, as Patent Owner suggests, tape is one specific kind of coating, that means Cable discloses the coating genus and the '660 patent claims that same genus minus one species—tape. Because non-tape coatings were common, and because tapes were saddled with known problems, a skilled artisan would have been motivated to implement Cable's teachings using the former. What could be more obvious?

C. Dependent Claims 4, 7, & 11 Are Equally Obvious, Not Patentably Distinct

Claim 4: Patent Owner says the claimed "thermocouples are just one of many thousands of solutions for measuring surface temperature." POR, 47. True or not, this general statement misses the point. Again, this case is about the art of 3D printing. In that context—the only relevant one—thermocouples were a known option for sensing the temperature of a heated printbed surface and offered superior accuracy compared to certain alternatives. EX1003, ¶106.

Dr. Hickner: "[T]hermocouples [were] one of a limited number of solutions for measuring surface temperature. Thermocouples were commonly used and desired in industry given their increased accuracy[.]"

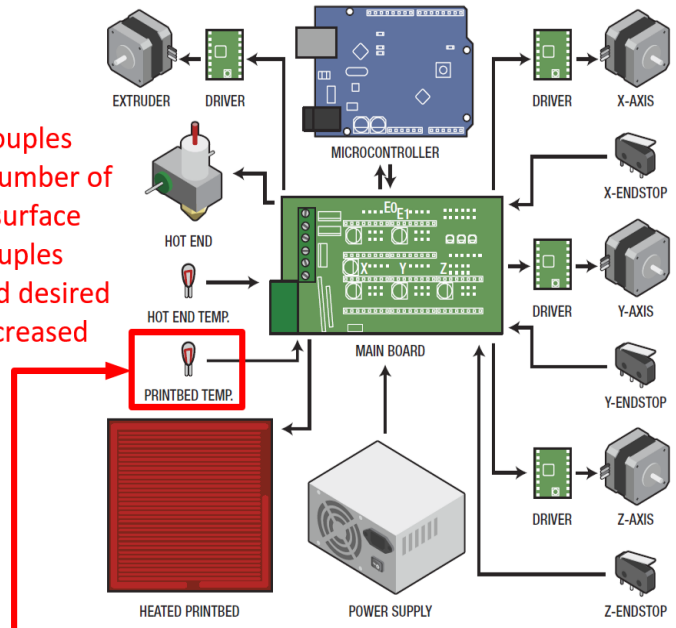

Figure 2-3. *3D printer electronics map*

In this 3D printer electronic map, you can see how each of the different parts of the electronics system interconnect, with arrows representing the direction of control from one component to the next. Central to the electronics platform is a controller main board that connects all the different hardware needed by a 3D printer to the microcontroller; it is essentially the brain of the entire system. To switch the high current associated with the printbed and extruder heaters, the main board will have specialized switching hardware rated for the necessary maximum loads. Most electronic main boards have the capability of reading resistive-based temperature sensors called *thermistors*, while others can make more-accurate readings using a type of sensor called a *thermocouple*. The main board also forms the power hub to the whole system, taking in a high current power source and distributing power to the other systems as needed. Finally, the main board will also need to interface with the endstop limit switches on each of the axes to allow the printer to locate its print head prior to a print job.

EX1011, p.36 (annotated/highlighted).

Claim 7: Patent Owner does not contest the facts alleged in the Petition—i.e., that Cable teaches a conductive plate made of "metal," and that aluminum and steel were well-known metallic materials for 3D printing substrates. *Compare* Pet., 32 (citing EX1006, [0077]; EX1003, ¶114 (explaining the ubiquity of aluminum and steel printbeds), *with* POR, 48–50. Selecting known and widely used materials to implement Cable's teaching of a metallic plate is a quintessential case of obviousness. *KSR Int'l Co. v. Teleflex Inc*., 550 U.S. 398, 421 (2007) ("[A] a person of ordinary skill has good reason to pursue the known options[.]"). Even if it were true, as Patent Owner claims, that steel or aluminum plates would be "thin" and "risk deformation," (POR, 50), that does not make them any less obvious in view of Cable's express teaching to use a metallic material. They remain "suitable" options and need not be the very "best." *Intel*, 61 F.4th at 1380.

Claim 11: Here too, Patent Owner does not deny the dispositive facts: Adding surface features to a coating was a known technique for increasing surface energy and, thus, adhesion during 3D printing. *Compare* Pet., 35 (citing EX1003, ¶¶120–122), *with* POR, 50–52. This understanding dovetails neatly with Cable's teaching to "promote good adhesion at the interface between the surface of the substrate and the first layer during the formation of the object." EX1006, [0062]; *see also* [0088] (demonstrating how "[in]sufficient bonding" will ruin a print).

Patent Owner's concern that raising the surface energy too high would risk a permanent bond that inhibits removal is a non-issue. POR, 51. Cable curtails this risk by providing a clear guideline—"about 10%"—within which the surface energy of the substrate must match that of the build material. EX1006, [0063]. A skilled artisan would naturally abide this guideline when adding surface features to the coating. EX1002, ¶122. There is no debate that doing so is within the ordinary level of skill in the art. *Id*.; *see also* EX1040, 20:20–22:23 (explaining that "measuring" surface energy was known).

III. GROUND 1B: CABLE IN VIEW OF KRITCHMAN

Patent Owner incorporates many of its fruitless arguments from Ground 1A into Ground 1B. POR, 52–53. The only thing new pertains to Claim 4, where Patent Owner suggests a skilled artisan would not have used thermocouples because that kind of sensor is not well suited for Kritchman's teaching to "sense the temperature of the building material of the object being printed as layers of material are deposited." *Id*., 54. But "attacking [combined] references individually" has never been a valid rebuttal." *In re Merck & Co., Inc*., 800 F.2d 1091, 1097 (Fed. Cir. 1986). The Petition proposes to "augment Cable by employing Kritchman's teachings of a temperature control unit [with temperature sensors] integral within a build tray." Pet., 38–39, 42–43. Thus, in the Cable-Kritchman Combination, it is the temperature of the "printing tray" (or substrate) being measured and controlled

to reach "a selected temperature," not the printed part. EX1009, [0027]. Patent Owner does not argue that thermocouples would have been ill-suited to this task.

IV. GROUND 1C: CABLE IN VIEW OF NAWARE OR KRITCHMAN AND COMB

Claims 7 and 14: Patent Owner's argument that Comb's steel build sheet is too thick, and thus, incompatible with Cable's flexible-substrate teachings stems from a severe misreading of Comb. POR, 55–57. Comb does not teach that the build sheet is "between 5 and 100 millimeters"—it says "from about 5 mils to about 100 mils." EX1004, 8:51–57. "1 mil is equivalent to 0.001 inches," which is about 0.0254 millimeters. EX1003, ¶221. So, Comb's range converts to just 0.127–2.540 millimeters (or 0.005–0.1 inches). *Id*. Patent Owner's incompatibility arguments necessarily fail because they do not address Comb's true disclosure.

V. GROUND 2A: COMB IN VIEW OF TUMMALA

A. Claim 1, Element [1.c.iii]: Comb Alone or with Tummala Provides a Non-Tape Polymer Coating

Comb discloses a build sheet topped with a film made of "polymeric coatings," an alternative to "tapes." EX1004, 8:27–33; *see also* 8:43–50 (similar), 13:12–15 (similar), 13:36–43 (similar).

> Top film **36***a* may be derived from one or more polymeric coatings, tapes, or other lamina, which may be adhered to base sheet **36***b*. For example, a polycarbonate top film **36***a* may be adhered with a high-temperature adhesive to a steel base sheet **36***b*, which is advantageous for use with ABS and polycarbonate part materials due to their similar glass transition temperatures.

EX1004, 8:27–33. By listing them separately in a disjunctive list using the coordinating conjunction "or," Comb expressly discloses that coatings and tapes are distinct alternatives. *Id*.; *see also Schumer v. Lab. Comput. Sys*., 308 F.3d 1304, 1311 (Fed. Cir. 2002) ("We have consistently interpreted the word 'or' to mean that the items in the sequence are alternatives to each other."); *SkinMedica, Inc. v. Histogen Inc*., 727 F.3d 1187, 1199 (Fed. Cir. 2013) ("The disjunctive 'or' plainly designates that a series describes alternatives.").

Ignoring the plain meaning of this disclosure, Patent Owner argues that Comb's only teaching of a coating that "would be used with a heated build platform, is polyimide tape." POR, 63. But that's not right. Comb also discloses "a polycarbonate-coating top film 36a for use with ABS and polycarbonate part materials," both of which were known to require heated print surfaces. EX1004, 13:36–43 (distinguishing "a polyimide-tape top film 36a for use with polyetherimide part materials"); EX1045, 5 ("For many materials (like ABS and polycarbonate) the platform has to be kept warm so that the print sticks to it.").

"As an additional and alternative basis" on the non-tape limitation, the Petition turns to the straightforward modificiation of Comb's coating applied as a gel, like in Tummala. Pet., 69. Patent Owner's only response is that "Comb's polymer would not be applied as a gel because a POSITA would have recognized

that making a gel at room temperature out of polyimide would be difficult and impractical." POR, 63–64. But this theory is severely flawed in multiple respects:

1. It is limited to "polyimide," which is not the only polymer Comb describes (e.g., "polycarbonate-coating top film," per EX1004, 13:36–43);
2. It misses that Tummala says the coating "is a viscous gel at room temperature," not that it was made at room temperature (EX1005, [0053]);
3. Tummala's teachings are presumed enabling, and Dr. Osswald's conclusory testimony that "it would have been difficult and impractical to make a gel out of thermoplastic polyimide at room temperature" does not rebut the presumption (EX2009, ¶170; *supra*, II.A.1.iii.a).

B. Claim 1, Element [1.c.ii]: Comb Alone or with Tummala Provides a Coating Capable of Facilitating Removal Without Damage or Chemical/Mechanical Intervention

Patent Owner's substantive analysis of Element [1.c.ii] focuses solely on Tummala and does not attack the many disclosures of Comb mapped to these features in the Petition. *See generally* POR, 64–69 (citing EX2009, ¶¶171–180, which is titled "Tummala's Coating" and limited to that subject); Pet., 62–68. This aspect of the Petition is uncontested, and any argument Patent Owner may have had against it should "be deemed waived." Paper 10, 9.

Accordingly, it may be unnecessary for the Board to consider the Petition's alternative theory that Tummala's coating provides the features of Element [1.c.ii]. Nevertheless, Patent Owner's efforts to distinguish Tummala fail. POR, 64–69.

Like Comb, Tummala teaches a polymer coating for reusable print pads that facilitates easy removal without tools or damage. *See* Pet., 64–65 (citing EX1005, [0005]–[0008], [0046], [0049]–[0050], TABLE 1). Patent Owner disagrees, arguing that Tummala's coating "must be applied at the start of each print." POR, 64 (citing EX1005, [0010], [0023], [0053], [0063]–[0064]). But the passages of Tummala that Patent Owner cites simply say the coating "can be applied to a print pad prior to the beginning of a printing process." EX1005, [0023]. There is no discussion of reapplying the coating before each and every print. Such reapplication would undermine Tummala's goal of avoiding "tedious and time consuming" removal of material from a reusable print pad. EX1005, [0060]. Removing and reapplying the coating each time would be no better than removing printed material, which Tummala sought to avoid. These disclosures are all more than enough to demonstrate that Tummala's coating is at least "capable of" providing a release without damage (or chemical/mechanical intervention). *See* EX1003, ¶¶198–200.

Next, Patent Owner labels Tummala deficient based on specific examples that achieve removal with water as a solvent or using a raft. POR, 65–68 ("Tummala teaches that chemical removal is typically required[.]"). What Patent Owner misses (as before) is that these cherry-picked examples are not limiting, and Tummala also teaches "some embodiments" where the coating's properties are "temperature dependent," as opposed to "water-sensitive." EX1005, [0008], [0023]; *see also*

[0046], [0047], [0049], [0059]–[0060], [0068]; *see also* Pet., 48–49 ("once cooled"). Patent Owner makes no attempt to explain why a skilled artisan would ignore these other aspects of Tummala's disclosure that the Petition promotes.

C. Dependent Claim 11 Is Equally Obvious, Not Patentably Distinct

Patent Owner's only new argument is that Tummala's coating is so thin that it would get damaged during the surface roughening procedure. POR, 70–71. To start, this argument does not apply to the aspects of the Petition that rely on Comb's coating. The argument also fails because it seeks to impose implementation requirements—i.e., specific coating thickness and roughness ranges—that are not claimed or otherwise necessary to the Petition's analysis. Here, as before, Patent Owner leaves the Petition's case-in-chief untouched. *See* Pet., 73.

VI. GROUND 2B: COMB IN VIEW OF TUMMALA, KRITCHMAN

The parties' dispute at Ground 2B is subsumed by those addressed above at Grounds 2A (Claims 1, 4, 11) and 1B (Claim 4). *See* POR, 71.

VII. THE DISTRICT COURT'S PRELIMINARY CONSTRUCTIONS DO NOT IMPACT THIS IPR

The parties recently argued claim construction before the Honorable Magistrate Judge Payne in the co-pending district court litigation. There, Judge Payne came to the correct—albeit preliminary and non-binding—conclusion that the recitation of "a thermally conductive plate disposed adjacent to the build platform" renders the '660 patent's Claim 1 indefinite. EX1046, 3.

Be that as it may, Claim 1's indefiniteness has no impact on this proceeding. *See Samsung Elecs. Am., Inc. v. Prisua Eng'g Corp*., 948 F.3d 1342, 1355 (Fed. Cir. 2020) (That a "claim [is] indefinite for purposes of determining when infringement occurs…does not speak to whether the claim is also invalid for obviousness."). After all, the offending claim language is not at issue. Claim 1 is indefinite because it is unclear what kind of plate would not be thermally conductive. While that question may be intractable for adjudicating infringement in the district court litigation, it is unproblematic here on patentability—everyone knows the art discloses such a plate. Patent Owner effectively concedes this point, having failed to argue otherwise.

VIII. CONCLUSION

For the reasons discussed above and in the Petition, Petitioner submits that all the Challenged Claims are unpatentable.

Respectfully submitted,

Dated December 19, 2025

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CERTIFICATION UNDER 37 CFR §42.24

Under the provisions of 37 CFR § 42.24(d), the undersigned hereby certifies that the word count for the foregoing Petitioner's Reply to Patent Owner's Response totals 5,597 words, which is less than the 5,600 allowed under 37 CFR § 42.24(c)(4).

Respectfully submitted,

Dated December 19, 2025

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Proceeding No.: IPR2025-00257
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CERTIFICATE OF SERVICE

Pursuant to 37 CFR § 42.6(e)(4), the undersigned certifies that on December 19, 2025, a complete and entire copy of this Petitioner's Reply to Patent Owner's Response to Petition and Accompanying Exhibits were provided by email, to the Patent Owner by serving the email correspondence address of record as follows:

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