

Patent Owner Stratasys, Inc.'s Presentation March 6, 2026

IPR2025-00257 — U.S. Patent No. 9,592,660

Overview of Argument

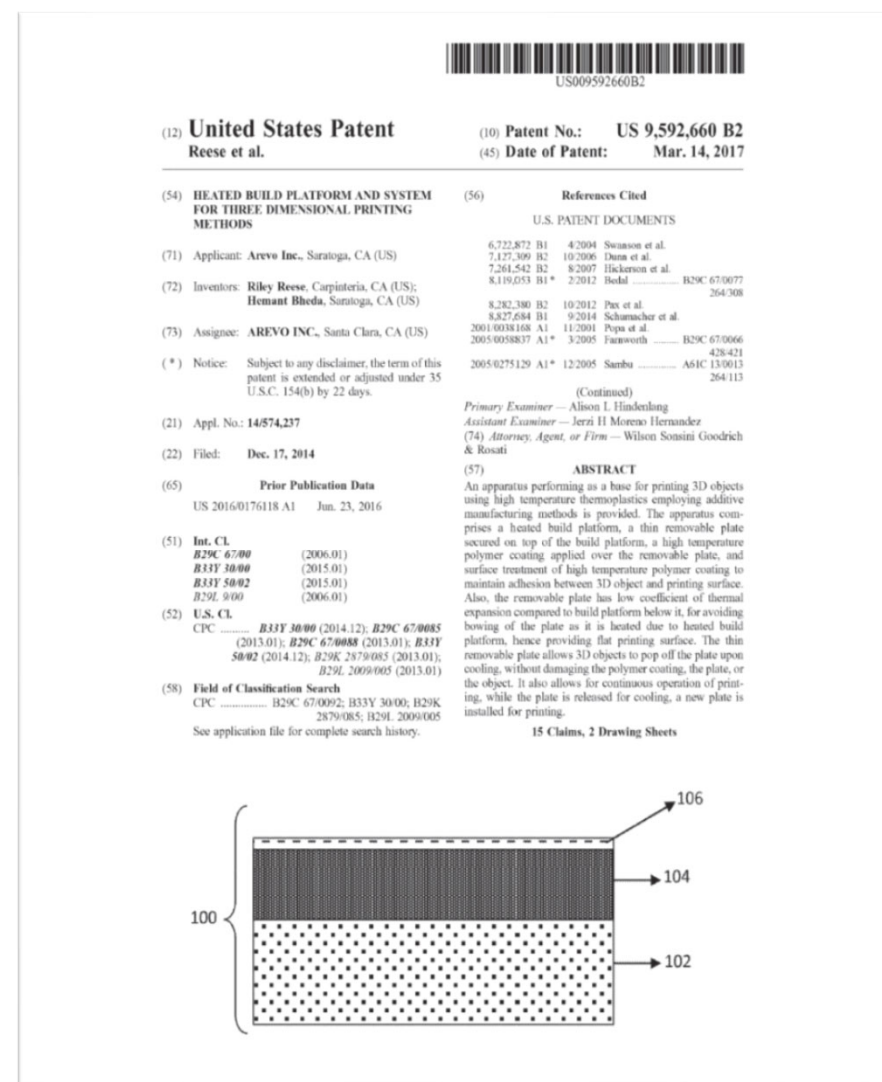
- I. Overview of the '660 Patent
- II. Petitioner's Untimely Claim Construction Should be Rejected
- III. Petitioner Took Contrary District Court Positions
- IV. The District Court Claim Construction Order
- V. Coatings Commonly Refer to Tape
- VI. Grounds 1A-1C do not Teach the Non-Tape Polymer Coating of the '660 Patent
- VII. Grounds 2A-2B do not Teach the Non-Tape Polymer Coating of the '660 Patent
- VIII. The Asserted Grounds do not Teach Non-Damaging, Non-Chemical, Non-Mechanical Removal
- IX. The Asserted Grounds do not Teach the Dependent Claims

Overview of Argument

- I. Overview of the '660 Patent
- II. Petitioner's Untimely Claim Construction Should be Rejected
- III. Petitioner Took Contrary District Court Positions
- IV. The District Court Claim Construction Order
- V. Coatings Commonly Refer to Tape
- VI. Grounds 1A-1C do not Teach the Non-Tape Polymer Coating of the '660 Patent
- VII. Grounds 2A-2B do not Teach the Non-Tape Polymer Coating of the '660 Patent
- VIII. The Asserted Grounds do not Teach Non-Damaging, Non-Chemical, Non-Mechanical Removal
- IX. The Asserted Grounds do not Teach the Dependent Claims

Overview of the '660 Patent

- The '660 Patent relates to "a temperature controlled build platform for three dimensional printing methods for high temperature thermoplastics," a "plate secured on top of the build platform," and "a high temperature polymer coating applied over the removable plate."
- EX1001 at 1:7–8, 2:13–15, Abstract.



Overview of the '660 Patent

- Independent Claim 1 requires that the non-tape coating facilitate adhesion during printing, but also permit non-chemical, non-mechanical “removal of the “3D object” and without damaging the coating, plate, or object.

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

Overview of the '660 Patent

- Dependent claims 2-15 depend on claim 1

2. The build apparatus of claim 1, wherein the polymer coating is a polyimide.

3. The build apparatus of claim 1, wherein the temperature control unit comprises heater cartridges that are spaced along a surface of the build platform.

4. The build apparatus of claim 1, wherein the build platform comprises thermocouples situated at one or several locations to provide feedback to a controller for maintaining temperature set points.

5. The build apparatus of claim 1, further comprising a ceramic or high temperature dielectric that insulates the build platform.

6. The build apparatus of claim 1, wherein the build platform, the thermally conductive plate, and the polymer coating are able to withstand high temperature ranging between 150 degree Celsius and 300 degree Celsius.

7. The build apparatus of claim 1, wherein the material for the thermally conductive plate comprises one or more of aluminum, steel, brass, ceramic, glass, or alloys with a low coefficient of thermal expansion (CTE).

8. The build apparatus of claim 1, wherein the material for the build platform comprises one or more of aluminum, steel, brass, ceramic, glass, or alloys with a low coefficient of thermal expansion (CTE).

9. The build apparatus of claim 1, wherein the thermally conductive plate thickness ranges from 0.025-0.5" and wherein the thickness is selected depending on the flexural character of the material.

10. The build apparatus of claim 1, wherein the thickness of the polymer coating ranges from 0.001" to 0.1".

11. The build apparatus of claim 1, wherein a surface of the polymer coating includes nano-, micro-, or milli-meter scale features that increase adhesion to the 3D object.

12. The build apparatus of claim 1, wherein the thermally conductive plate is flexible so as to allow for easier dissociation between the 3D object and the thermally conductive plate upon cooling and reduce damage to the polymer coating or the 3D object during removal of the 3D object.

14. The build apparatus of claim 1, wherein the build platform has a first coefficient of thermal expansion (CTE) and the thermally conductive plate has a second CTE, wherein the first CTE is greater than the second CTE.

15. The build apparatus of claim 1, wherein the thermally conductive plate is non-magnetically secured to and removable from the build platform.

Overview of Argument

- I. Overview of the '660 Patent
- II. Petitioner's Untimely Claim Construction Should be Rejected**
- III. Petitioner Took Contrary District Court Positions
- IV. The District Court Claim Construction Order
- V. Coatings Commonly Refer to Tape
- VI. Grounds 1A-1C do not Teach the Non-Tape Polymer Coating of the '660 Patent
- VII. Grounds 2A-2B do not Teach the Non-Tape Polymer Coating of the '660 Patent
- VIII. The Asserted Grounds do not Teach Non-Damaging, Non-Chemical, Non-Mechanical Removal
- IX. The Asserted Grounds do not Teach the Dependent Claims

Petitioner's Untimely Claim Construction Should be Rejected

- The Petition claimed that the challenged claims are “obvious under any reasonable interpretation according *Phillips*. ”
 - Pet., 7.
- Petitioner's expert confirmed that “[t]he language in the claims speaks for themselves in terms of their ordinary and customary meaning.”
 - EX2010, 51:8-18.
- In its Reply, Petitioner implicitly seeks to broaden the claims by asserting that “damage” or “damaging” does not encompass leaving residue.
 - Reply, 3-4.

8 Q Dr. Hickner, today -- sitting here today,
9 do you have an opinion as to the interpretation of
10 the '660's patent claims?
11 A So I -- I list the claims in my
12 declaration and in the section of Claim
13 Interpretation, Paragraph 18 I used their -- I say
14 that the terms appearing in the patent claims
15 should be interpreted according to their ordinary
16 and customary meaning. The language in the claims
17 speaks for themselves in terms of their ordinary
18 and customary meaning.

Petitioner's Untimely Claim Construction Should be Rejected

- Petitioner could and should have sought such a construction in its Petition.
- "Petitioner cannot raise new claim construction issues in the Reply that were not previously raised in its Petition."
 - *GCE Gas Control Equipment Inc. v. VBOX, Inc.*, IPR2023-00326, Paper 27, at 10-11; *see also* 37 C.F.R. § 42.104(b)(3).
- Construction should only deviate from plain meaning:
 - "1) when a patentee sets out a definition and acts as his own lexicographer, or
 - 2) when the patentee disavows the full scope of a claim term either in the specification or during prosecution."
 - *Thorner v. Sony Computer Ent. Am. LLC*, 669 F.3d 1362, 1365 (Fed. Cir. 2012).

Petitioner's Untimely Claim Construction Should be Rejected

- The plain meaning of “damage” includes leaving residue
- Removal without damaging requires that the plate still function.
 - EX1001 at 6:39-47

a polymer coating attached to a surface of the thermally conductive plate which is capable of (i) facilitating adhesion to the 3D object during printing and (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, wherein the polymer coating is not a polymer tape.

Petitioner's Untimely Claim Construction Should be Rejected

- Examples of damage: air gaps creating an uneven surface, coatings that burn off with heat, adherence between the coating and 3D part, and coatings that easily scratch or puncture.
 - EX1001 at 1:49-64; *see also* 6:7-18, 4:47-60, 5:6-12, 6:11-15

Polyimide tape has been applied to heated build plates for its tactility and performance under high temperatures. Applying polyimide tape is a difficult process inevitably allowing for tiny debris or air to be trapped between the tape and metal surface. Once the metal surface is heated, the air gaps expand creating an uneven printing surface. Further, the adhesive for the polyimide tape can burn off under high temperatures releasing fumes and damaging the coating.

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. At elevated temperatures, 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. Even when the part has been fully cooled, the polyimide tape can still adhere to the bottom layer resulting in damage or tearing of the tape upon part removal.

Petitioner's Untimely Claim Construction Should be Rejected

- '660 Patent explains:
 - how to achieve no residue
 - EX1001 at 5:15-25
 - that an “uneven” surface means the “printing process doesn't have a flat surface to print on”
 - EX1001 at 5:37-40

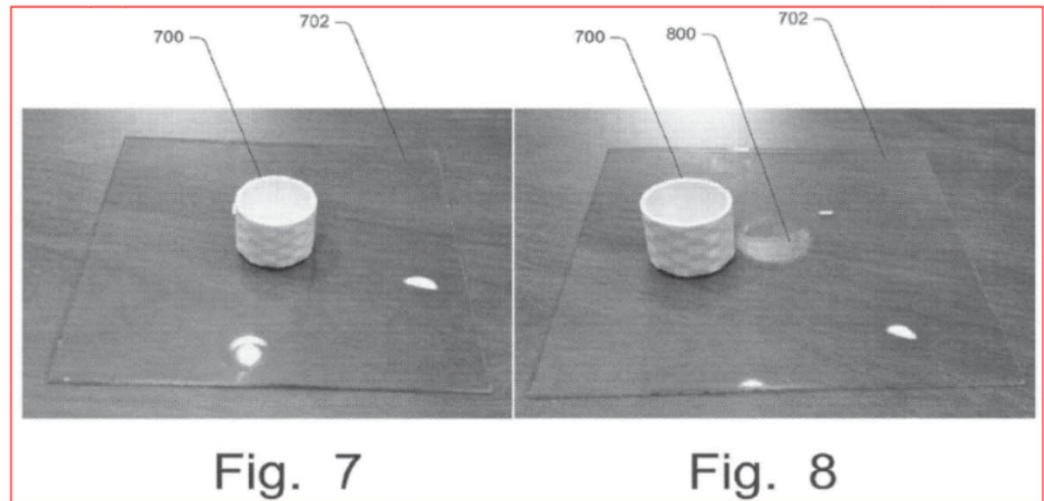
object upon completion. This happens, since the removable plate 104 is thin and also there is a significant difference in thermal contraction between the removable plate and the 3D printed polymer object. Therefore once the building of the object is finished, the object will pop off the plate 104 when the plate and part have cooled. This efficiently avoids the general issue in the current art, where the 3D object sticks to the heated build platform, and the object has to be dug out from the platform in order to remove it or having to remove the object from a support raft requiring an additional step to dissolve or mechanically remove the support from the part.

platform 102. Resultantly, the surface for printing a 3D object, which is the surface of the removable plate 104, will become uneven and hence, the printing process doesn't have a flat surface to print on. Therefore, the plate 104 should

Petitioner's Untimely Claim Construction Should be Rejected

- Residue impacts the function of the plate.
 - EX2009, ¶¶95-101.
- The object is necessarily damaged when residue is left.
 - EX2009, ¶¶104, 106.

104. As shown in Figures 7 and 8 below, the residue (800) is clearly visible in Figure 8 at a location corresponding to the location of object 700 in Figure 7.



Id. at Figs. 7-8. Additionally, the residue 800 has a similar circular shape as the shape of object 700. A POSITA would have understood that object 700 is damaged because a visible portion of the object (700) was not properly removed from the surface of substrate 702. A POSITA would also have understood that the surface of substrate 702 is damaged because there is a visible portion of object (700) that remains. A

Overview of Argument

- I. Overview of the '660 Patent
- II. Petitioner's Untimely Claim Construction Should be Rejected
- III. Petitioner Took Contrary District Court Positions**
- IV. The District Court Claim Construction Order
- V. Coatings Commonly Refer to Tape
- VI. Grounds 1A-1C do not Teach the Non-Tape Polymer Coating of the '660 Patent
- VII. Grounds 2A-2B do not Teach the Non-Tape Polymer Coating of the '660 Patent
- VIII. The Asserted Grounds do not Teach Non-Damaging, Non-Chemical, Non-Mechanical Removal
- IX. The Asserted Grounds do not Teach the Dependent Claims

Petitioner Took Contrary District Court Positions

Term	Claim(s)	Proposed Construction
“a polymer coating attached to a surface of the thermally conductive plate... wherein the polymer coating is not a polymer tape”	1	No construction necessary
“a temperature control unit configured to control heating”	1	No construction necessary
“a build platform with a temperature control unit”	1	No construction necessary
a thermally conductive plate disposed adjacent to the build platform; and	1	Indefinite

8 Q Dr. Hickner, today -- sitting here today,
 9 do you have an opinion as to the interpretation of
 10 the '660's patent claims?
 11 A So I -- I list the claims in my
 12 declaration and in the section of Claim
 13 Interpretation, Paragraph 18 I used their -- I say
 14 that the terms appearing in the patent claims
 15 should be interpreted according to their ordinary
 16 and customary meaning. The language in the claims
 17 speaks for themselves in terms of their ordinary
 18 and customary meaning.

Term	Claim(s)	Proposed Construction
“without chemically or mechanically removing the polymer coating from the 3D object”	1	Indefinite
“without damaging the polymer coating”	1	Indefinite

Overview of Argument

- I. Overview of the '660 Patent
- II. Petitioner's Untimely Claim Construction Should be Rejected
- III. Petitioner Took Contrary District Court Positions
- IV. The District Court Claim Construction Order**
- V. Coatings Commonly Refer to Tape
- VI. Grounds 1A-1C do not Teach the Non-Tape Polymer Coating of the '660 Patent
- VII. Grounds 2A-2B do not Teach the Non-Tape Polymer Coating of the '660 Patent
- VIII. The Asserted Grounds do not Teach Non-Damaging, Non-Chemical, Non-Mechanical Removal
- IX. The Asserted Grounds do not Teach the Dependent Claims

The District Court Claim Construction Order

The Court accordingly hereby finds that “a thermally conductive plate disposed adjacent to the build platform” is **indefinite** (although the parties discussed dependent claims during the December 9, 2025 hearing, the Court does not address (and has not been asked to address) whether any of the dependent claims are indefinite).

The District Court Claim Construction Order

As for “chemically” removing, Defendants argue that this is unclear because “one might say that using warm water constitutes chemical removal and another might not.” Dkt. No. 105 at 26. On its face, “without chemically . . . removing” refers to the absence of any chemical reaction. Defendants’ hypotheticals regarding “using warm water” (*id.*) or adjusting humidity (discussed at the December 9, 2025 hearing) are not plausible concerns when faced with the claim language reciting “without chemically . . . removing.”

In the context of the above-reproduced disclosures, the recital of “without . . . mechanically removing” refers to removal without applying mechanical force to the polymer coating other than by manipulating (and thereby applying force to) the 3D object that is being removed. This does not preclude holding the plate in place when force is applied to the 3D object, but the intrinsic evidence demonstrates that “without . . . mechanically removing” precludes any “pry[ing]” by inserting a tool between the 3D object and the polymer coating. ’660 Patent at 5:6–25 & 6:23–25.

Overview of Argument

- I. Overview of the '660 Patent
- II. Petitioner's Untimely Claim Construction Should be Rejected
- III. Petitioner Took Contrary District Court Positions
- IV. The District Court Claim Construction Order
- V. Coatings Commonly Refer to Tape**
- VI. Grounds 1A-1C do not Teach the Non-Tape Polymer Coating of the '660 Patent
- VII. Grounds 2A-2B do not Teach the Non-Tape Polymer Coating of the '660 Patent
- VIII. The Asserted Grounds do not Teach Non-Damaging, Non-Chemical, Non-Mechanical Removal
- IX. The Asserted Grounds do not Teach the Dependent Claims

Petitioner takes inconsistent positions about tapes and coatings

- Petitioner argues plain meaning in district court
 - EX2018, 14
- In this proceeding, Petitioner attempts to narrow “coating” to not include tapes.
 - Reply, 11; *see also* Pet., 11-13.

Term	Claim(s)	Proposed Construction
“a polymer coating attached to a surface of the thermally conductive plate... wherein the polymer coating is not a polymer tape”	1	No construction necessary

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 all cases,” a coating process involves “a liquid dispersion [that] is deposited, spread onto a substrate, and subsequently solidified.”

Coatings Commonly Refer to Tape

- “coating” is commonly used to refer to tape.
 - EX2009, ¶111.

111. As an initial matter, I disagree with Petitioner’s assertion that the use of the term “coating” connotes a structure that is not tape. *See* Pet. at 25-26 (citing EX1006, at [0002]; EX1003, at ¶¶93-95, 37-39, 44). In my opinion, a POSITA would have understood that a coating can commonly refer to a tape that is used in the process of making a coated surface. The ’660 Patent recognizes that polyimide tape is a coating that may be damaged “under high temperatures” in which its adhesive “can burn off.” EX1001, at 1:54-56. In relation to three-dimensional

Coatings Commonly Refer to Tape

- The '660 Patent confirms that coatings include tape.
 - See, e.g., EX1001, 1:54-56.

Polyimide tape has been applied to heated build plates for its tactility and performance under high temperatures. Applying polyimide tape is a difficult process inevitably allowing for tiny debris or air to be trapped between the tape and metal surface. Once the metal surface is heated, the air gaps expand creating an uneven printing surface. Further, the adhesive for the polyimide tape can burn off under high temperatures releasing fumes and damaging the coating.

Coatings Commonly Refer to Tape

- In 3D printing, uncoated surfaces were compared to surface coated with tape
- Polymer tapes were used as coatings in other fields too
- Tapes were also used as a laminate

adhesive “can burn off.” EX1001, at 1:54-56. In relation to three-dimensional printing, comparison between the performance of uncoated surfaces to the performance of surfaces coated with tape was common. *See* EX1011 at 269 (“some have had success with printing PLA on clean, uncoated heated glass or using hardware store–variety blue painter’s tape with both PLA and ABS”). Additionally, a POSITA would have recognized that polymer tapes were also used as coatings in other fields, such as making coated pipes using polymer tapes. In fact, by 1976, it was known that “[t]he use of coatings applied in the form of tape is also increasing.” EX2017, at 14. It was also known that tapes were used as a laminate. *See id.* at 22 (Laminated tapes).

EX2009, ¶111.

Coatings Commonly Refer to Tape

- No reference precludes tapes from being coatings.

[0043] Top surface **24** (i.e., a polymer-coated surface) may be formed by coating the adhesion-promoting polymeric material onto metal surface **40**, and drying the adhesion-promoting polymeric material to form polymer film **42**. The adhesion-promoting polymeric material may be coated onto metal surface **40** in a variety of manners, such as with spray coating, knife coating, extrusion coating, and combinations thereof.

EX1043 ("Mannella"), ¶[0043]

4.9 COATING

In coating a liquid film is continuously deposited on a moving, flexible or rigid substrate. Coating is done on metal, paper, photographic films, audio and video tapes, and adhesive tapes. Typical coating processes include wire coating, dip coating, knife coating, roll coating, slide coating, and curtain coating. In wire

EX1042 (*International Plastics Handbook*), 4.

Overview of Argument

- I. Overview of the '660 Patent
- II. Petitioner's Untimely Claim Construction Should be Rejected
- III. Petitioner Took Contrary District Court Positions
- IV. The District Court Claim Construction Order
- V. Coatings Commonly Refer to Tape
- VI. Grounds 1A-1C do not Teach the Non-Tape Polymer Coating of the '660 Patent**
- VII. Grounds 2A-2B do not Teach the Non-Tape Polymer Coating of the '660 Patent
- VIII. The Asserted Grounds do not Teach Non-Damaging, Non-Chemical, Non-Mechanical Removal
- IX. The Asserted Grounds do not Teach the Dependent Claims

Grounds 1A-1C do not Teach the Non-Tape Polymer Coating of the '660 Patent

Asserted Grounds		
ID	Claims	Prior Art Basis
1A	1–13, 15	§103: Cable (US 2016/0075091), Naware (US 2016/0096326)
1B	1–2, 4, 6–12, 15	§103: Cable, Kritchman (US 2006/0054039)
1C	7–8, 14	§103: Cable, Naware or Kritchman, Comb (US 9,744,730)
2A	1–3, 5–15	§103: Comb, Tummala (US 2013/0310507)
2B	1–15	§103: Comb, Tummala, Kritchman

Grounds 1A-1C do not Teach the Non-Tape Polymer Coating of the '660 Patent

- Cable discloses the use of tape and indicates that its coatings are not different than tape coating.
 - EX1006, [0002]; *see also* [0036], [0061], [0080].
- Cable does not recognize any disadvantages of tapes.
 - *See* EX1006, [0062]-[0078].
- Cable does not disclose how its coating is applied, merely describing that a substrate is made by coating a main portion of the substrate with a top layer.
 - *See, e.g.*, EX1006, [0061], [0036], [0080].

[0002] Common build materials used in extrusion-based additive manufacturing systems include polylactic acid (PLA) and acrylonitrile butadiene styrene (ABS), among others, which are typically supplied from filament spools to a hot end of the extrusion head where the filament is melted to a semi-liquid, flowable state and forced or extruded through the nozzle onto the platform. The substrate on which the build material is deposited is typically made of metal, glass, or plastic to provide adequate adhesion of the build material to the substrate. The adequate adhesion characteristics can minimize movement of the object during the formation of the object on one hand, and also allow the object to be removable after formation of the object on the other hand so that the substrate can be re-used for producing a subsequent object thereon. To this end, a variety of substrate surfacing materials (i.e., materials applied to the surface of the substrate) have been developed to facilitate separation of the object from the substrate after printing, those materials including painter's tape, glass, garolite, fiberglass, among others.

Grounds 1A-1C do not Teach the Non-Tape Polymer Coating of the '660 Patent

- Petitioner resorted to arguing that it would have been obvious to pursue a non-tape solution.
 - Pet., 25-26.
- The Petition claims that the drawbacks of polymer tapes, such as Kapton tape, were well documented, but largely relies on the '660 Patent itself and Petitioner's expert's testimony.
- The sole additional reference Petitioner's expert used to support this conclusion provides that the plate is "*ideally layered*" with Kapton tape.
 - EX1003, ¶39; EX1011, 284-288.

Grounds 1A-1C do not Teach the Non-Tape Polymer Coating of the '660 Patent

- Petitioner argues that Cable distinguishes its solutions from the use of tapes.
 - Pet., 25-26
- But a POSITA would have recognized that Cable instead teaches the use of painter's tape.
 - EX2009, ¶112

selects various materials and material sizes. For example, the first material of the substrate and material of the first layer of the object may be selected according to surface energies and Hildebrand solubility parameters. *See* EX1006, at [0062]–[0078]. A POSITA would have recognized that the known solutions for substrate surfaces, such as blue painter's tape, would have been used if the corresponding material is selected according to Cable's teachings.

Grounds 1A-1C do not Teach the Non-Tape Polymer Coating of the '660 Patent

- Petitioner alternatively argues that Cable does not compel the use of tape, and non-tape coatings would have been considered.
 - Pet., 26
- However, nothing in Cable suggests or compels a non-tape solution, and tapes were used to, for example, provide Cable's "laminar arrangement." EX2009, ¶114; *see also* ¶¶109-13, 115-16.

114. While Cable describes a substrate made by coating a main portion or body, Cable does not teach or suggest a non-tape coating to a POSITA. *See* EX1006, [0061], [0036], [0080]. As I explained above, coatings can commonly refer to tapes. In addition, a POSITA would have understood that tapes were commonly used in multiple layers to provide a "laminar arrangement." *See* EX1006 (Cable), at [0078]

Grounds 1A-1C do not Teach the Non-Tape Polymer Coating of the '660 Patent

- Silence in a reference cannot support a finding of unpatentability. *Int'l Bus. Machines Corp. v. Iancu*, 759 F. App'x 1002, 1011 (Fed. Cir. 2019).

The overall finding that this portion of Mellmer teaches a process involving only one user authentication action is not supported by substantial evidence. To begin with, even if the Board were correct that Mellmer is “silent” about the content of the accessCard, that characterization would not alone support a finding that there was *no* user authentication action in this scenario if, as appears, the Board meant that it simply could not tell one way or the other whether the accessCard contains credentials. Silence in that sense would not by itself suffice for the Petitioner to meet its burden to prove, by a preponderance of the evidence, that there was *no* user authentication action in this scenario. See 35 U.S.C. § 316(e). Nor would that burden be met merely by adding a finding that IBM did not prove the opposite, *i.e.*, a finding of “the absence of sufficient evidence showing the provision or validation of a set credentials at the partner site” in this scenario. J.A. 67.

Grounds 1A-1C do not Teach the Non-Tape Polymer Coating of the '660 Patent

- Petitioner introduced new arguments regarding the obviousness theory in its Reply, and left Patent Owner's arguments unrebutted.
- Petitioner's new "two predictable choices" argument centers on background references and the '660 Patent itself.
 - Reply, 14-16.
- But the background references teach a polymer for "a heated glass," whereas Petitioner relies on a metal plate as the "thermally conductive plate" in its grounds.
 - Pet., 15, 20; EX1003, ¶41 (citing EX1018, p.1)

Grounds 1A-1C do not Teach the Non-Tape Polymer Coating of the '660 Patent

- Both the Petition and Reply rely on disclosure of the '660 Patent to show problems with the use of polymer tape.
 - Pet., 26; Reply 15-16.
- Petitioner's reliance on the '660 Patent itself is improper hindsight.
 - See *Cardiac Pacemakers, Inc. v. St. Jude Medical, Inc.*, 381 F.3d 1371, 1376 (Fed. Cir. 2004).

At the trial each side explained what the cited references taught, as well as the general knowledge in this field of technology at the time the invention was made. The jury was instructed that:

The suggestion [to combine elements from separate references] can be expressly stated in a particular reference or it can be within the knowledge that was generally available to one of ordinary skill in the art.

Jury Instruction No. 46. Prior knowledge in the field of the invention must be supported by tangible teachings of reference materials, and the suggestion to combine references must not be derived by hindsight from knowledge of the invention itself. See *Gambro Lundia AB v. Baxter Healthcare Corp.*, 110 F.3d 1573, 1578–79

Overview of Argument

- I. Overview of the '660 Patent
- II. Petitioner's Untimely Claim Construction Should be Rejected
- III. Petitioner Took Contrary District Court Positions
- IV. The District Court Claim Construction Order
- V. Coatings Commonly Refer to Tape
- VI. Grounds 1A-1C do not Teach the Non-Tape Polymer Coating of the '660 Patent
- VII. Grounds 2A-2B do not Teach the Non-Tape Polymer Coating of the '660 Patent**
- VIII. The Asserted Grounds do not Teach Non-Damaging, Non-Chemical, Non-Mechanical Removal
- IX. The Asserted Grounds do not Teach the Dependent Claims

Grounds 2A-2B do not Teach the Non-Tape Polymer Coating of the '660 Patent

Asserted Grounds		
ID	Claims	Prior Art Basis
1A	1–13, 15	§103: Cable (US 2016/0075091), Naware (US 2016/0096326)
1B	1–2, 4, 6–12, 15	§103: Cable, Kritchman (US 2006/0054039)
1C	7–8, 14	§103: Cable, Naware or Kritchman, Comb (US 9,744,730)
2A	1–3, 5–15	§103: Comb, Tummala (US 2013/0310507)
2B	1–15	§103: Comb, Tummala, Kritchman

Grounds 2A-2B do not Teach the Non-Tape Polymer Coating of the '660 Patent

- Comb similarly does not teach the non-tape polymer coating.
- The only teaching in Comb of a coating for use with a heated build platform is polyimide tape.
 - EX1004, 8:27-39

For use with higher-temperature part materials, such as polyetherimide part materials, top film 36a may be applied to base sheet 36b as a high-temperature tape, such as polyimide tapes commercially available under the trademark “KAPTON” from E. I. du Pont de Nemours and Company, Wilmington, Del. Alternatively, for use with lower temperature part materials, such as polylactic acid part materials, tapes derived from polymeric materials having lower glass transition temperatures may be applied to base sheet 36b.

Grounds 2A-2B do not Teach the Non-Tape Polymer Coating of the '660 Patent

- This is consistent with the examiner's reasoning during prosecution, who found that Comb did not teach the '660 Patent's polymer coating.

Regarding claim 1, a primary reason why the invention is deemed novel and non-obvious over the prior art of record to a build apparatus as instantly claimed is that Comb (US 2015/0145174 – of record), Farnworth (US 2005/0058837; Abstract, P0039, Claims 90-91), Buser (US 2013/0297320 – of record, P0022) and Jacobs (US 2015/0037527 – of record; P0005 and P0007-0008) which are regarded as being the prior art closest to the subject-matter of claim 1, alone or in combination, fail(s) to teach or suggest a polymer coating that is not a polymer tape attached to a surface of the thermally conductive plate capable of (i) facilitating adhesion to the 3D object during printing and (ii) permitting removal of the 3D object once the 3D object has been formed and 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. This is considered to be novel because it solves critical issues in the current art (e.g. difficulty to remove the 3D object (P0005-0006 of instant PG-PUB), need of chemical/mechanical means to remove 3D object (P0028 of instant PG-PUB), or preventing damage to the polymer coating/3D object/plate (P0024 of instant PG-PUB)).

Grounds 2A-2B do not Teach the Non-Tape Polymer Coating of the '660 Patent

- A POSITA would have recognized that polycarbonate film for top film 36a in Comb is an example of using a tape to apply a coating.
 - EX2009, ¶¶168-169

also EX1001, at 1:54-56; EX1011 at 269; EX2017, at 14. A POSITA would have understood that a coating can commonly refer to a tape that is used in the process of making a coating surface. *See id.* Further, it was known that tapes were used as a laminate in multi-layer applications. *See id.*; *see also* EX2017, at 22; EX1001, at 1:59-62; EX1011, at 269. Thus, a POSITA would have recognized that Comb is merely describing source materials from which top film 36a is derived from and that the film can be laminated on or otherwise adhered to the base sheet in a manner consistent with the use of tapes.

169. In addition, I discussed above that Comb provides three examples of its top film 36a: polycarbonate film, polyimide tapes, and tapes with lower glass transition temperatures. *See* EX1004 (Comb), at 8:29-42; *supra* Section VI.A (Overview of Comb). A POSITA would have recognized that each of these examples describes using a tape to apply a coating. Further, a POSITA would have recognized that for applications with a heated build platform where high-temperature part materials are used, Comb teaches the use of polyimide tape. *See id.* at 8:34-39. Thus,

Grounds 2A-2B do not Teach the Non-Tape Polymer Coating of the '660 Patent

- Petitioner argues that Comb teaches printing with a “polycarbonate-coating top film” for ABS and polycarbonate, which require a heated build platform. (Reply, 21).
- But Petitioner’s newly introduced evidence only states that printers without heated platforms “probably” cannot print these materials. (EX1045, 5)
- Also Comb recognizes alternatives to heated build platforms, such as heated chambers. (EX1004, 7:48-53)

In further alternative embodiments, one or more of liner 50, heat shield 54, and heating elements 56 may be omitted, such that platen plate 52 is not directly heated during a printing operation. For example, these components may be omitted when layer transfusion assembly 16 operates in a heated chamber. Alternatively, these components may be omitted when printing from low-temperature part and support materials (e.g., in room-temperature environment).
- Therefore, these materials do not require, and Comb does not teach that they require, a heated build platform. (see claim element [1.a]: “heating of the build platform”)

Grounds 2A-2B do not Teach the Non-Tape Polymer Coating of the '660 Patent

- No motivation to combine Tummala with Comb to teach a non-tape polymer coating and Tummala fails to remedy the deficiencies of Comb
 - Tummala's adhesive is "a viscous gel at room temperature." (EX1005, [0053], [0063])
- Patent Owner's expert explained that Tummala "does not suggest using a polyimide gel at room temperature." (EX2009, ¶170)

While making a gel out of PVOH at room temperature, as Tummala teaches, is feasible, a POSITA would have recognized that it would have been difficult and impractical to make a gel out of thermoplastic polyimide at room temperature, requiring experimentation with environmentally unfriendly solvents. *See* EX1005 (Tummala), at [0058] ("an adhesive described herein can be safely dissolved and/or rinsed away from a print pad or finished part, including down the sink and/or into the environment"). Tummala does not suggest using a polyimide gel at room temperature and a POSITA would not have understood Tummala to teach such a gel.

- Petitioner ignores this and fails to explain its purported distinction between a gel "at" and "made at" made at room temperature. (Reply 21-22)

Overview of Argument

- I. Overview of the '660 Patent
- II. Petitioner's Untimely Claim Construction Should be Rejected
- III. Petitioner Took Contrary District Court Positions
- IV. The District Court Claim Construction Order
- V. Coatings Can Include Tape
- VI. Grounds 1A-1C do not Teach the Non-Tape Polymer Coating of the '660 Patent
- VII. Grounds 2A-2B do not Teach the Non-Tape Polymer Coating of the '660 Patent
- VIII. The Asserted Grounds do not Teach Non-Damaging, Non-Chemical, Non-Mechanical Removal**
- IX. The Asserted Grounds do not Teach the Dependent Claims

The Asserted Grounds do not Teach Non-Damaging, Non-Chemical, Non-Mechanical Removal

- Cable teaches that removal of the 3D object results in damage to the coating and 3D object, as residue is left.
 - See EX2009, ¶¶103-106; see, e.g., EX1006, [0024], [0082]-[0088].
- The 3D object is damaged because a portion of it is removed.
- The substrate is damaged because the portion remains behind.
- The portion left behind as residue would require chemical/mechanical removal.

of object 700. A POSITA would have understood that object 700 is damaged because a visible portion of the object (700) was not properly removed from the surface of substrate 702. A POSITA would also have understood that the surface of substrate 702 is damaged because there is a visible portion of object (700) that remains. A

POSITA would have recognized that in order to use the substrate again it would have needed to chemically or mechanically remove the surface of the substrate (702) from a visible portion of object 700, shown as residue 800. See EX1006, [0024] (“a tool, such as a chisel or knife, or a chemical process may be used to remove an object from the substrate that cause unwanted damage (e.g., removal of portions of the object, removal of portions of the substrate, etc.)”). As shown in Figure 9 of Cable

EX2009, ¶104

The Asserted Grounds do not Teach Non-Damaging, Non-Chemical, Non-Mechanical Removal

- Petitioner attacks Patent Owner's expert as contradicting Cable. Reply, 4.
- But Dr. Osswald simply explains what Cable teaches to a POSITA.
 - EX2009, ¶107
- Cable merely *aspires* to achieve removal without damage
 - See, e.g., EX1006, [0052].
- Cable's aspirational statement must be read in light of Cable's full disclosure. *W.L. Gore & Assoc., Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1550 (Fed. Cir. 1983).

[11] In its consideration of the prior art, however, the district court erred in not taking into account the import of the markedly different behavior of PTFE from that of conventional thermoplastic polymers clearly established and undisputed on the record, and in thus disregarding the unpredictability and unique nature of the unsintered PTFE to which the claimed inventions relate, *In re Whiton*, 420 F.2d 1082, 164 USPQ 455 (CCPA 1970); in considering claims in less than their entirety, *Schenck, supra*; and in considering the references in less than their entirety, i.e., in disregarding disclosures in the references that diverge from and teach away from the invention at hand. *In re Kuderna*, 426 F.2d 385, 165 USPQ 575 (CCPA 1970).

The Asserted Grounds do not Teach Non-Damaging, Non-Chemical, Non-Mechanical Removal

- Cable does not enable the invention
- Nothing explains how the different elements of Cable's system would be used and function together to achieve removal without damage.
- Cable merely speculates why his examples do not work.
 - See EX2009, ¶¶95-107; EX1006, at [0085]-[0088]; *see also* Pet. 9-26

Comparative Example 1

[0088] An attempt was made to form an object on a glass substrate using an Ultimaker® 3D printer. An Amphora copolyester was used in the attempt to form the object. The thickness of the substrate was about 10 mm. The Ultimaker® 3D printer was set at an extrusion head temperature of 260° C. with a 0.1 mm layer height and 100% infill. No external heating was applied to the platform of the Ultimaker® 3D printer. During the process to form the object, the base of the partially completed object became detached from the substrate. After the partially completed object was detached from the substrate, the partial object was dragged along the surface of the substrate by the nozzle of the 3D printer and the 3D printer was unable to complete the formation of the object.

Without being tied to any particular theory, the differences between the physical characteristics of the substrate and the material of the object in addition to the lack of heating of the 3D printer platform may have prevented sufficient bonding to take place between the substrate and the material of the object. Thus, the object was prevented from being completely formed.

EX1006, at [0088]

The Asserted Grounds do not Teach Non-Damaging, Non-Chemical, Non-Mechanical Removal

- A lack of explanation and understanding shows that Cable does not enable the invention
- Cable's lack of explanation and understanding of his system and solution stands in contrast to *Agilent*, where a POSITA understood how the different elements of a CRISPR/Cas system were used and functioned together.
 - *Agilent Technologies, Inc. v. Synthego Corp.*, 139 F.4th 1319, 1329 (Fed. Cir. 2025).

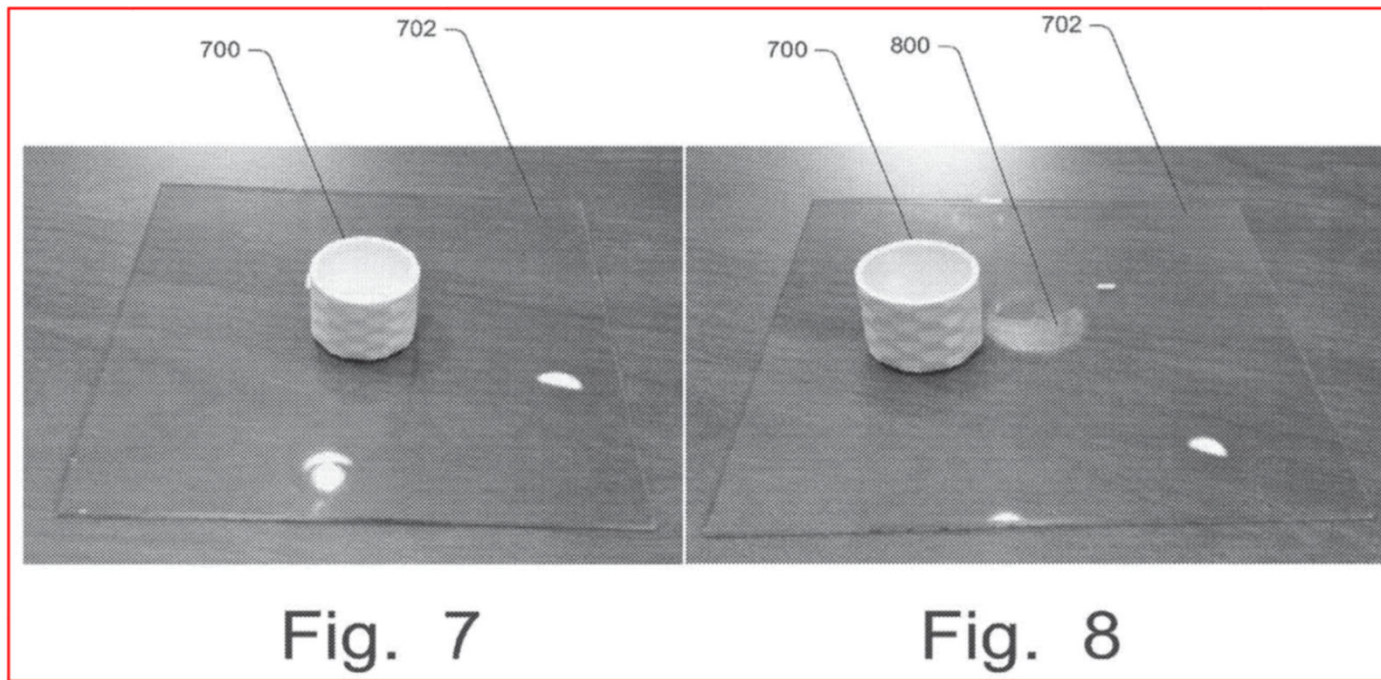
[W]hile the art was somewhat unpredictable in December 2014, it was far from a blank slate with a [person of ordinary skill in the art] understanding how the different elements of a CRISPR/Cas system are used and function together, including the role of gRNA; the types of chemical modifications that had been successfully used in other systems to reduce RNA degradation, while preserving functionality; and standard techniques for making gRNAs with the modifications disclosed and exemplified in Pioneer Hi-Bred.

J.A. 32. Considering these findings, the Board concluded that “undue experimentation would not have been required to make and use a gRNA with the recited chemical modifications and functionality.” J.A. 33.

The Asserted Grounds do not Teach Non-Damaging, Non-Chemical, Non-Mechanical Removal

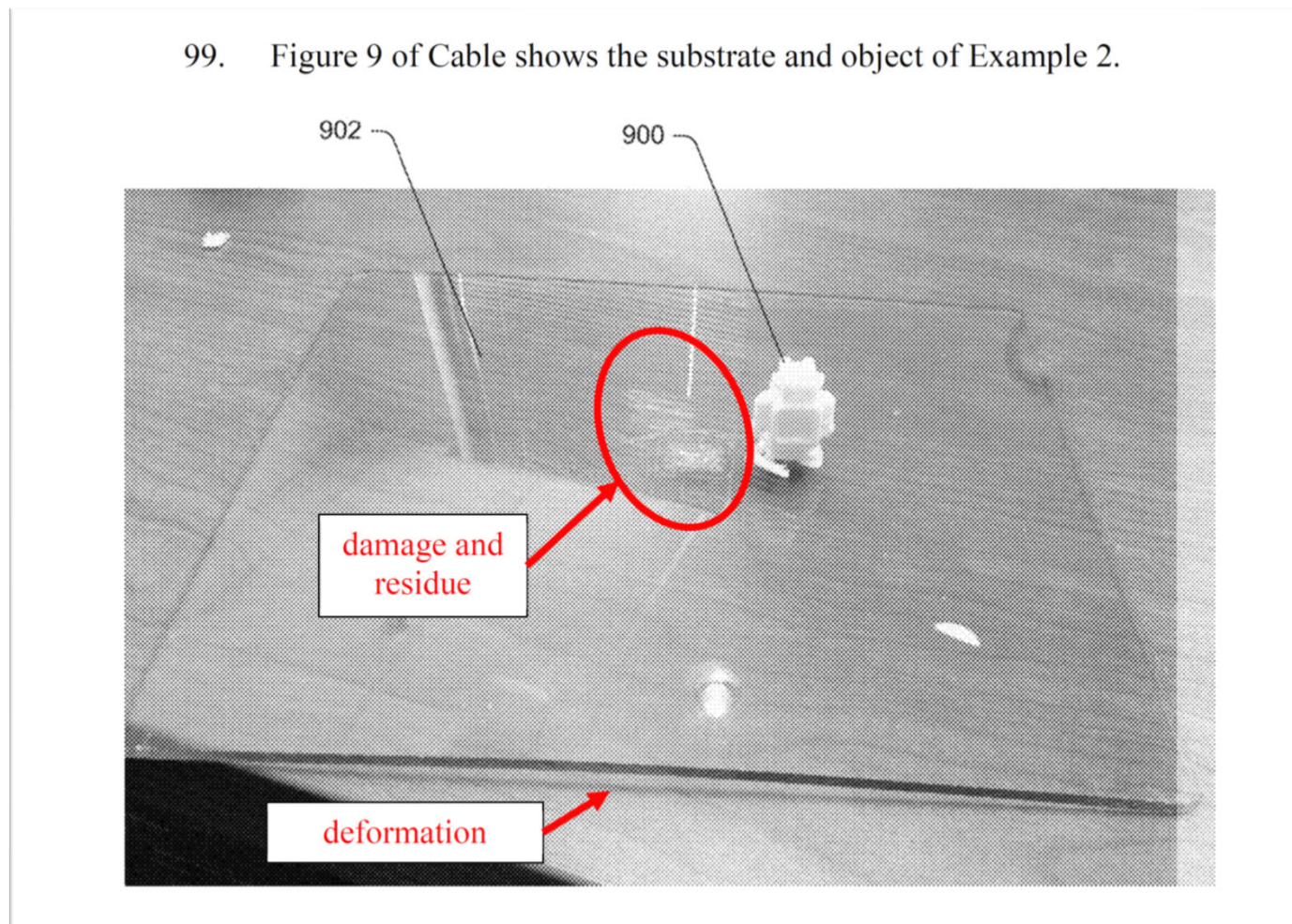
- Cable Example 1; EX2009, ¶104.

104. As shown in Figures 7 and 8 below, the residue (800) is clearly visible in Figure 8 at a location corresponding to the location of object 700 in Figure 7.



The Asserted Grounds do not Teach Non-Damaging, Non-Chemical, Non-Mechanical Removal

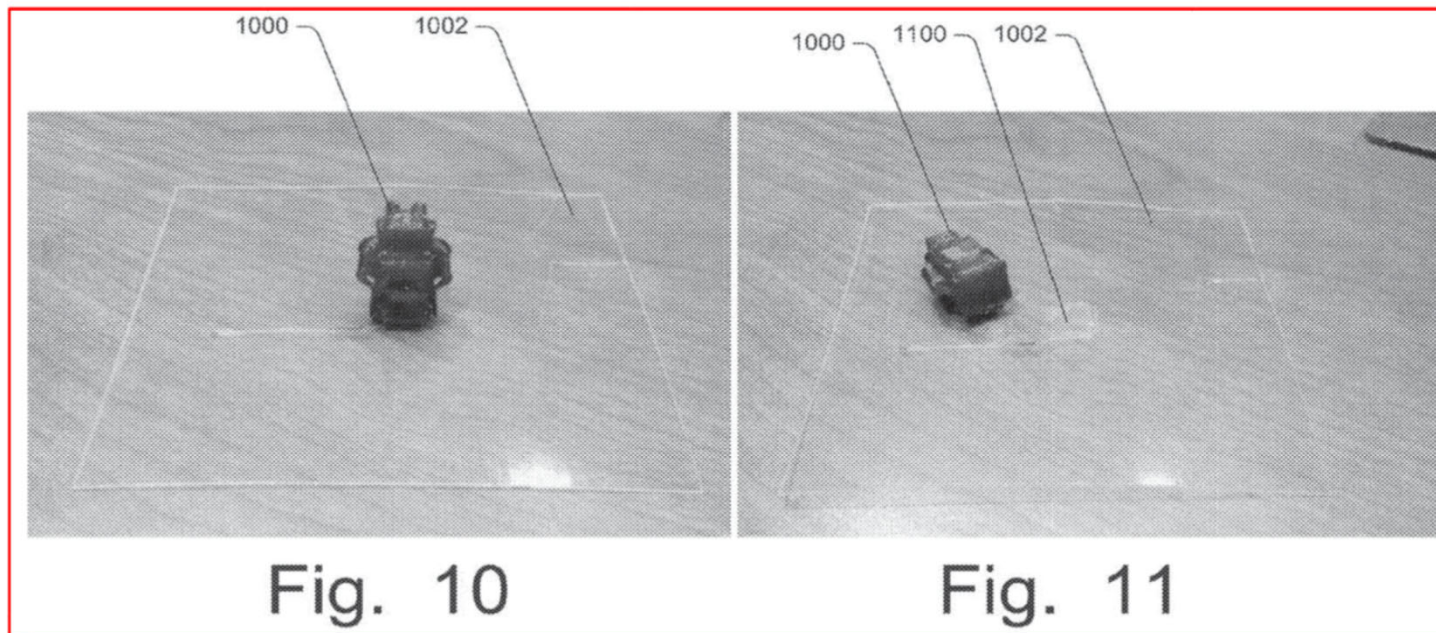
- Cable Example 2; EX2009, ¶199.



The Asserted Grounds do not Teach Non-Damaging, Non-Chemical, Non-Mechanical Removal

- Cable Example 3; EX2009, ¶106.

106. As shown in Figures 10 and 11 below, the residue (1100) is clearly visible in Figure 11 at a location corresponding to the location of the object (1000) in Figure 10.



The Asserted Grounds do not Teach Non-Damaging, Non-Chemical, Non-Mechanical Removal

- Petitioner relies on Cable to enable removal without damage.
 - Reply, 5-11.
- Petitioner maintains that there is insufficient evidence that experimentation would not be routine, that self-enablement is not necessary, and that less than perfect predictability is not sufficient.
 - Reply, 6-8.
- But Cable does not explain how to perform needed experimentation.
 - See, e.g., EX1006, [0085]-[0088]; EX2009, ¶107.

consistently level.”). Moreover, Cable teaches that there are multiple, speculative theories for why the solution will not work. See, e.g., EX1006 at [0088]. As such, a POSITA would have needed to construct working examples according to identified

solutions and run experiments, as Cable did. See EX1006, [0085]-[0088], Figs. 7-11. But as Cable’s experiments show and as I discussed above, none of the working examples were able to support object removal without damage such that no visible residue is left behind. See *id.* Given this unpredictability, a POSITA would have needed to run extensive experiments to identify many possible solutions and determine if any of them were able to support object removal without such damage.

EX2009, ¶107.

The Asserted Grounds do not Teach Non-Damaging, Non-Chemical, Non-Mechanical Removal

- Lack of self-enablement can be dispositive when the reference is the sole evidence for enablement.
 - *Raytheon Techs. Corp. v. Gen. Elec. Co.*, 993 F.3d 1374,1381-82 (Fed. Cir. 2021).

Thus, Knip's self-enablement (or lack thereof) is not only relevant to the enablement analysis, in this case it is dispositive. GE does not contend that the '751 patent's

turbofan engine is enabled by other prior art or evidence of record. Instead, GE relies solely on Knip's disclosure. See, e.g., Appellee's Br. at 48, 51. At oral argument, counsel for GE asserted that the Board determined, based on GE's expert's analysis, that Knip's engine could have been in fact "successfully constructed, and therefore is enabled with respect to the claimed invention." See Oral Arg. at 27:19–29:00 (citing J.A. 42–44, 781). We disagree that the Board made such a finding. Moreover, GE neglected to mention that what its expert "constructed" was a computer model simulation of Knip's imagined engine, see J.A. 781, not a physical working engine. GE's expert never suggested that a skilled artisan could have actually built such an engine.

The Asserted Grounds do not Teach Non-Damaging, Non-Chemical, Non-Mechanical Removal

- Cable does not state which materials and conditions would actually work or fall within its guidelines.

and “lack of heating of the 3D printer platform.” *Id.* A POSITA would have recognized that it would have needed to experiment based on Cable’s teachings about surface energies (*see* EX1006, [0063]-[0064]), Hildebrand solubility parameters (*see id.*, [0064], [0067]), and deflection, stiffness, and strength (*see id.* at [0068]-[0072]), to identify possible materials for the first layer of the object, surface of the substrate, and substrate, possible sizes of those materials, and other conditions, such as the temperatures applied to build material at various stages of extrusion. *See*

The Asserted Grounds do not Teach Non-Damaging, Non-Chemical, Non-Mechanical Removal

- Comb fails to teach a non-tape polymer coating at all.
- Tummala teaches a non-reusable coating that must be applied at the start of each print.
 - EX1005, [0023]; *see also* [0006], [0010], [0031], [0053], [0063], [0064]; EX2009, ¶¶172-173.

I. Adhesives

[0023] In one aspect, adhesives for use with a 3D printer are described herein. More specifically, adhesives for use with a print pad of a 3D printer are described herein. An “adhesive,” in some embodiments, comprises a material that is operable to bond a print material or a raft to a print pad, including one or more print materials, rafts, and/or print pads described herein, such as PLA or ABS print materials and metal, glass, or plastic print pads. Moreover, in some embodiments, an adhesive is operable to selectively bond or release a print material or raft to or from a print pad. For example, in some embodiments, the adhesive properties of an adhesive described herein are temperature-dependent. In some embodiments, the adhesive properties are water-sensitive. As described herein, **an adhesive can be applied to a print pad prior to beginning of a printing process.** Such application of an adhesive to a print pad of a 3D printer as described herein has not previously been known in the art.

The Asserted Grounds do not Teach Non-Damaging, Non-Chemical, Non-Mechanical Removal

- Petitioner argues that removing and reapplying Tummala's gel would be time consuming.
 - Reply, 23.
- But Tummala describes how removal of **extruded material** is "tedious and time consuming."
 - EX1005, [0006].

[0006] In addition, because print pads are often reusable, it can be desirable to remove all of the extruded print material or support material of a previous print process prior to beginning a new print process. In some instances, such removal can be tedious and time consuming as well as damaging to the print pad. Therefore, a need exists to improve the printing of 3D objects to provide accurate parts, models, and other 3D objects that are easily and safely removed from the print pad.

The Asserted Grounds do not Teach Non-Damaging, Non-Chemical, Non-Mechanical Removal

- In contrast, Tummala describes the gel as water soluble, and thus it is easy to remove.
 - EX1005, [0058].

[0058] In some embodiments, **an adhesive described herein is water soluble**. A water-soluble adhesive, for reference purposes herein, has a solubility in water at 25° C. of greater than 10 mass percent, greater than 30 mass percent, greater than 50 mass percent, or greater than 90 mass percent, based on the mass of the adhesive. Moreover, in some embodiments, an adhesive is **water soluble before, during, and after being used in a print process**, even if some or all of the solvent present in the adhesive evaporates during the print process. In addition, in some embodiments, an adhesive described herein is biodegradable. In some embodiments, an adhesive described herein is safe and non-toxic to humans. Therefore, in some embodiments, an adhesive described herein can be safely dissolved and/or rinsed away from a print pad or finished part, including down the sink and/or into the environment.

The Asserted Grounds do not Teach Non-Damaging, Non-Chemical, Non-Mechanical Removal

- Tummala provides general statements about its adhesive
 - EX2009, ¶175

175. Tummala provides general statements about its adhesive. Tummala states that its adhesive has a bonding strength between 2 and 50 times greater at 100° C than at room temperature. *Id.* at ¶[0047]. Similarly, Tummala's adhesive has a bonding strength between 2 and 60 times greater when dry than when wet at 23° C. *Id.* at ¶[0048]. Accordingly, "in some embodiments," Tummala's adhesives "permit adhesion of a print material or printed part to a print pad throughout the print process until the part is complete" and 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." *Id.* at ¶[0050]; *see also id.* at [0005] ("[A] strong bond can prevent the

The Asserted Grounds do not Teach Non-Damaging, Non-Chemical, Non-Mechanical Removal

- A POSITA would have interpreted Tummala's general statements in view of Tummala's entire disclosure, including Tummala's tests whose results are summarized in Table I.
 - EX2009, ¶176

176. However, a POSITA would have interpreted Tummala's general statements in view of Tummala's entire disclosure. Tummala explains that its adhesive "has adhesive properties that are tunable or selectable, so that the adhesive can act as both a bonding agent and a releasing agent." *Id.* at ¶[0046]. A bonding agent "bond[s] a print material or printed part to a print pad" and a releasing agent "facilitates release or separation of a print material or printed part from a print pad." *Id.* Tummala also provides Table I to show the properties of its adhesives as bonding and releasing agents. *See id.* As shown below in Table I, Tummala tested its adhesives on different footprints (2x2 and 3x3), raft configurations (raft and no raft), print pads (anodized aluminum and coarse grind textured glass), temperatures (100° C and 23° C), and dry/wet conditions.

The Asserted Grounds do not Teach Non-Damaging, Non-Chemical, Non-Mechanical Removal

- Tummala requires using either a raft (amounting to a failure to facilitate adherence *to the 3D object*) or a wet (chemical) removal process.
 - POR 66-68

Based on Tummala's experimental setup and tests, Tummala teaches a coating that generally does not permit removal at high temperatures (100°C) or in dry conditions. EX2009, ¶¶176-179. As shown by the yellow annotations to Table 1 of Tummala below, proper removal with a low adhesion or bonding strength (0-0.5 lbs in the table) typically requires a wet, room-temperature condition (e.g., 23°C).

TABLE I

Footprint	Raft	Print Pad	100° C. (Dry)	23° C. (Dry)	23° C. (Wet)
2 × 2	raft	anodized aluminum	>20 lbs	0-0.5 lbs	0-0.5 lbs
2 × 2	no raft	anodized aluminum	>20 lbs	>20 lbs	0-0.5 lbs
2 × 2	no raft	Course Grind textured glass	—	>20 lbs	0-0.5 lbs
3 × 3	raft	anodized aluminum	>20 lbs	>20 lbs	0-0.5 lbs
3 × 3	no raft	anodized aluminum	>20 lbs	19 lbs	0-0.5 lbs

The Asserted Grounds do not Teach Non-Damaging, Non-Chemical, Non-Mechanical Removal

- Tummala's dry, raftless removal requires forces that would result in broken parts.
 - EX2009, ¶¶177-178.

separation with raft

TABLE I

Footprint	Raft	Print Pad	100° C. (Dry)	23° C. (Dry)	23° C. (Wet)
2 × 2	raft	anodized aluminum	>20 lbs	0-0.5 lbs	0-0.5 lbs
2 × 2	no raft	anodized aluminum	>20 lbs	>20 lbs	0-0.5 lbs
2 × 2	no raft	Course Grind textured glass	—	>20 lbs	0-0.5 lbs
3 × 3	raft	anodized aluminum	>20 lbs	>20 lbs	0-0.5 lbs
3 × 3	no raft	anodized aluminum	>20 lbs	19 lbs	0-0.5 lbs

broken parts

“wet” separation

178. Also shown by my annotations to Table I above, a POSITA would have understood that Tummala's configurations requiring around 20 pounds of force or greater would have resulted in broken parts upon part removal. See EX1005, at [0046] ("For entries in Table I below having an adhesion or bonding strength greater than 20 pounds, the parts broke before the parts separated from the print pad.").

The Asserted Grounds do not Teach Non-Damaging, Non-Chemical, Non-Mechanical Removal

- Using a raft amounts to a failure to facilitate adherence *to the 3D object* during printing.
 - EX2009, ¶179.

179. In addition, one of the conditions requires the use of a raft for separation at a dry room temperature condition. As Tummala teaches, the raft is used as an intermediary between the object being printed and the print pad. EX1005, at ¶[0004]

* * *

the raft and the surface of the print pad[.]”). Tummala explains that the raft must separately be removed from the object itself. See *id.* at ¶[0021] (“However, unlike

* * *

Thus, a POSITA would have recognized that the raft that adheres at high temperatures (e.g., 100° C) is not the 3D object itself, which must be chemically or mechanically removed. Thus, in Tummala’s configurations requiring a raft for object removal, Tummala (as used in the combination with Comb) does not teach facilitating adhesion to the 3D object during printing.

The Asserted Grounds do not Teach Non-Damaging, Non-Chemical, Non-Mechanical Removal

- A “wet” removal process uses water as a solvent (chemical removal)
 - EX2009, ¶1177; *see also* EX2009, ¶1176

177. As shown by my annotations below to Table I of Tummala, each of configurations enable the parts to separate when “submerged in water” under the “Wet” condition. A POSITA would have recognized that water is a solvent that is used for chemical separation. *See* EX1005, [0046], [0036] (“a solvent comprises water”), [0037], [0068]. Thus, in these conditions, Tummala (as used in the

2 x 2	no raft	Course Grind textured glass	—	>20 lbs	0-0.5 lbs
3 x 3	raft	anodized aluminum	>20 lbs	>20 lbs	0-0.5 lbs
3 x 3	no raft	anodized aluminum	>20 lbs	19 lbs	0-0.5 lbs

broken parts

“wet” separation

Overview of Argument

- I. Overview of the '660 Patent
- II. Petitioner's Untimely Claim Construction Should be Rejected
- III. Petitioner Took Contrary District Court Positions
- IV. The District Court Claim Construction Order
- V. Coatings Commonly Refer to Tape
- VI. Grounds 1A-1C do not Teach the Non-Tape Polymer Coating of the '660 Patent
- VII. Grounds 2A-2B do not Teach the Non-Tape Polymer Coating of the '660 Patent
- VIII. The Asserted Grounds do not Teach Non-Damaging, Non-Chemical, Non-Mechanical Removal
- IX. The Asserted Grounds do not Teach the Dependent Claims

The Asserted Grounds do not Teach the Dependent Claims

- The Cable-Naware combination (Ground 1A) does not teach Claim 4, which requires the use of “thermocouples situated at one or several locations to provide feedback to a controller for maintaining temperature set points.”.
 - POR, 46-48; EX2009, ¶¶119-122.

119. In my opinion, it would not have been obvious to a POSITA to try thermocouples with Naware’s design. Dr. Hickner only recognizes two options: thermocouples and thermistors. *See id.* However, a POSITA would have understood that there are thousands of options for measuring surface temperature. For example,

The Asserted Grounds do not Teach the Dependent Claims

- Grounds 1B (Cable-Kritchman) and 2B (Comb-Tummala-Kritchman) also do not teach claim 4.
- Kritchman uses a temperature sensor for controlling the temperature of the object, not for the controlling the temperature of the printing tray.
 - EX2009, ¶1144; EX1009, [0027]; *see also* EX2009, ¶¶1143, 145-146, 191-196.

144. Further, a POSITA would have understood that there is no motivation to try using thermocouples in Kritchman's design. Paragraph [0027] of Kritchman, which Petitioner cites to, discloses that "the temperature of *an object* being printed

* * *

may be controlled" using "an electromagnetic radiation associated with the device,

* * *

Id. at Fig. 3A. A POSITA would have recognized that Kritchman teaches temperature sensing for many components of sub-system or cell 180, including tray 170 and the building materials as they are heated by the heating element 312, radiation source 315, and lamp 320. To measure the temperature of the changing surface, such as the shape and location, of the building materials, a POSITA would have recognized that thermocouples, which are typically affixed to a surface, would not have been used to sense temperature. Instead, a POSITA would have recognized that non-contact temperature sensors, such as an infrared sensor, would have been used to measure temperature according to Kritchman's teachings. *See* EX2015, at 1-3; EX2016, at 1-2.

The Asserted Grounds do not Teach the Dependent Claims

- Petitioner fails to show that Cable teaches the specific claimed plate materials of Claim 7 (such as aluminum or steel) in the context of the proposed Cable-Naware combination.
 - *See, e.g.*, EX2009, ¶128.

128. Although Cable discloses that metals can generally bend or flex resiliently, Cable does not teach which metals work for this purpose or whether any particular metal can bend or flex resiliently by 12 millimeters, sufficient to remove an object. Petitioner and Dr. Hickner have not analyzed whether aluminum or steel would have worked under all of the conditions imposed by Cable's teachings. For example, a POSITA would have understood that thicker plates of aluminum or steel are difficult to flex or bend, requiring significant force. A POSITA would also have

The Asserted Grounds do not Teach the Dependent Claims

- The Cable-Naware combination does not teach Claim 11, which requires surface texturing.
- Petitioner's expert, Dr. Hickner, states that:
 - Cable increases adhesion by increasing the "surface energy" of the substrate surface and
 - "[a]dding a slight amount of texturing could increase the surface energy of the polystyrene coating, such that it is 10% higher than the ABS, in line with Cable's preferred embodiment"

0064]; *see also* [0023], [0036], [0052], [0080]. According to Cable, increased object/part adhesion is achieved by increasing the "surface energy" of the substrate surface contacting the object—here, the *polymer coating surface*. EX1006, [0061–

35 dynes/cm). *See* EX1036, p.2. Adding a slight amount of texturing could increase the surface energy of the polystyrene coating, such that it is 10% higher than the ABS, in line with Cable's preferred embodiment. EX1006, [0005].

EX1003, ¶¶120, 122.

The Asserted Grounds do not Teach the Dependent Claims

- Following Dr. Hickner's increase of the surface energy so that it is 10% higher risks forming a permanent bond between the object and substrate.
- Cable states that surface energies must be *within* 10% to avoid permanent bonding. EX2009, ¶134; *see also* ¶133.

134. A POSITA would have recognized that increasing the surface energy, as Petitioner proposes, risks forming a permanent bond between the object and substrate. See EX1006, at [0064]. In fact, Dr. Hickner provides an example of increasing the surface energy of polystyrene so that it is 10% *higher* than ABS. EX1003, at ¶122 (“Adding a slight amount of texturing could increase the surface energy of the polystyrene coating, such that it is 10% higher than the ABS, in line with Cable’s preferred embodiment.”). However, Cable expressly states that the surface energies of the materials must be *within* 10% to avoid the risk of permanent bonding. See EX1006, at [0005], [0063], [0081]. Moreover, a POSITA would have

The Asserted Grounds do not Teach the Dependent Claims

- Nor does the Comb-Tummala combination teach Claim 11.
 - EX2009, ¶¶183-184; *see also* ¶¶185-186.

[0064]. A POSITA would have recognized that surface treating an adhesive that is applied at the start of each print would have been time consuming and costly and thus a POSITA would not have been motivated to add surface treatment.

184. Further, surface treatment of Tummala's coating risks damage to the coating, which would impair or prevent the coating from being used for a print.

Tummala teaches that its coating, which is applied as a gel, has a thickness of only 0.01 to 0.1 millimeters, or 10 to 100 micrometers. *See* EX1005, at [0045] (“Second,