

Patent Owner Stratasy, Inc.'s Presentation April 15, 2026

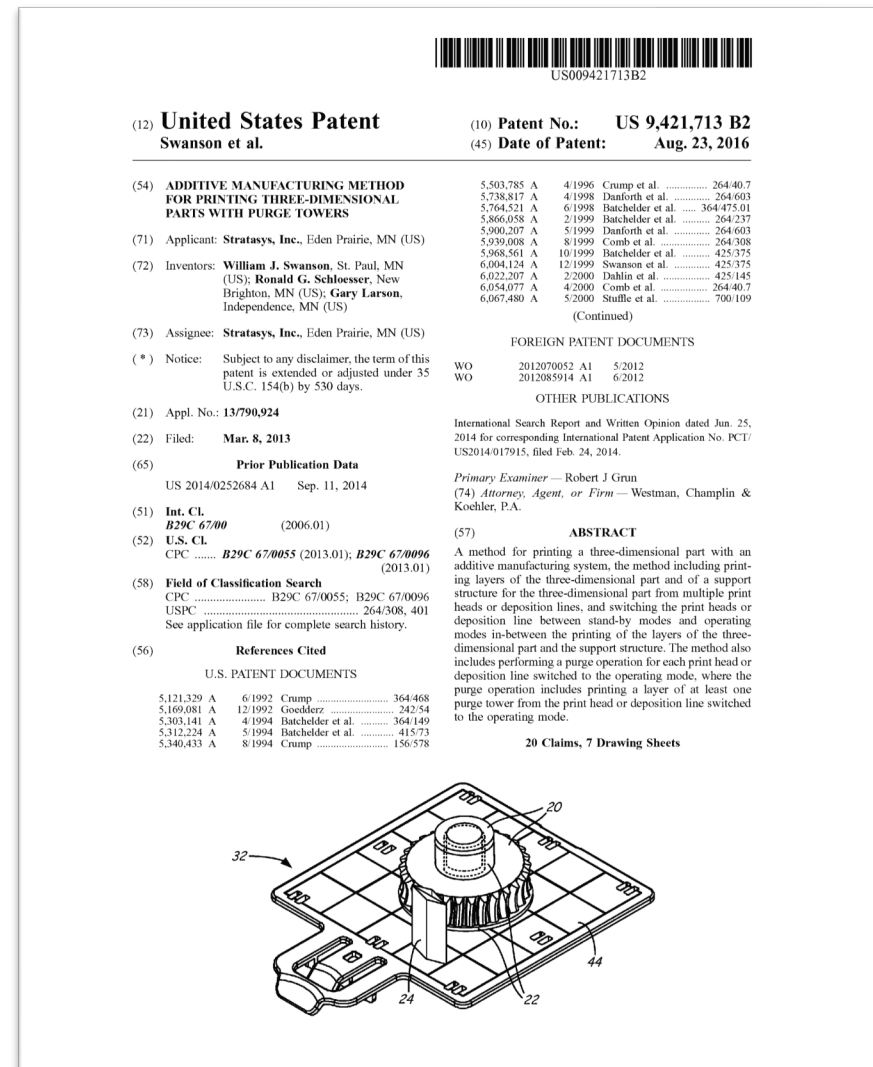
IPR2025-00321 — U.S. Patent No. 9,421,713

Overview of Argument

- I. Overview of the '713 Patent
- II. Overview of the Purported Prior Art
- III. The Challenged Claims were Reduced to Practice before September 2012
- IV. RepRap Article, RepRap Video, and Boyer Are Not Prior Art
- V. RepRap Article, RepRap Video, and KISSlicer Are Not Printed Publications
- VI. The “Purge Tower” of the '713 Patent Must Be a Separate Structure
- VII. The Challenged Claims are Patentable Under Ground 1
- VIII. The Challenged Claims are Patentable Under Ground 2A
- IX. Claim 5 is Patentable Under Ground 2B
- X. The Challenged Claims are Patentable Under Ground 3

Overview of the '713 Patent

- The '713 Patent relates to “additive manufacturing systems” to print 3D parts and support structures using “purge operation techniques.” EX1001 at 1:6-13.



Overview of the '713 Patent

- Petitioner challenges independent claims 1 and 16

<u>Claim Element</u>	<u>Language</u>
[1pre]	A method for printing a three-dimensional part with an additive manufacturing system, the method comprising:
[1a]	printing layers of the three-dimensional part and of a support structure for the three-dimensional part from multiple print heads or deposition lines using a layer-based, additive manufacturing technique;
[1b]	switching the print heads or deposition line between stand-by modes and operating modes in-between the printing of the layers of the three-dimensional part and the support structure;
[1c]	performing a purge operation for each print head or deposition line switched to the operating mode, the purge operation comprising printing at least one purge tower in a layer-by-layer manner, wherein the layers of the at least one purge tower are printed from the print head or deposition line switched to the operating mode.

[16pre]	A method for printing a three-dimensional part with an additive manufacturing system, the method comprising:
[16a]	(a) printing a first layer of a support structure from a support material for the three-dimensional part;
[16b]	(b) printing a first layer of a purge tower from a part material;
[16c]	(c) printing a first layer of the three-dimensional part on at least a portion of the first layer of the support structure from the part material after printing the first layer of the purge tower;
[16d]	(d) printing a second layer of the purge tower from the support material; and
[16e]	(e) printing a second layer of the support structure on at least a portion of the first layer of the three-dimensional part from the support material after printing the second layer of the purge tower.

Overview of the '713 Patent

- Petitioner also challenges claims 2, 5, 6, 7, and 9, depending on claim 1, and claim 17, depending on claim 16.

2. The method of claim 1, wherein the multiple print heads or deposition lines comprise a first deposition line and a second deposition line, and wherein switching the deposition lines between the stand-by modes and the operating modes comprises:

switching the first deposition line from the stand-by mode to the operating mode; and
switching the second deposition line from the operating mode to the stand-by mode.

9. The method of claim 7, wherein the generating of the tool path instructions for printing the layer of the at least one purge tower is performed prior to printing the layers of the three-dimensional part and of the support structure.

5. The method of claim 1, wherein the at least one purge tower has a cross-sectional area that reduces in height along an axis that is perpendicular to a build plane.

6. The method of claim 1, wherein the at least one purge tower is stopped at a highest layer at which there is a material change for the printed layers of the three-dimensional part and support structure.

7. The method of claim 1, and further comprising:
generating tool path instructions for printing the layers of the three-dimensional part and of the support structure;
and
generating tool path instructions for printing the layer of the at least one purge tower.

17. The method of claim 16, and further comprising repeating steps (b)-(e) for at least a portion of the three-dimensional part and support structure.

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Overview of the Purported Prior Art

- *Leavitt, Priedeman, and Boyer* are patent application publications
 - EX1004; EX1007; EX1008.
- *RepRap Article* is a blog post on a “personal website”
 - EX1005; EX1016, ¶7.
- *RepRap Video* is a YouTube video
 - EX1006; EX1018, ¶¶13-14
- *KISSlicer* is a software “Quick Start Guide”
 - EX1010

<u>Reference</u>	<u>Prior Art Status</u>
Leavitt	pre-AIA §102(b) – Published on Feb. 5, 2009
RepRap Article	pre-AIA §102(a) – Published by Oct. 29, 2012
RepRap Video	pre-AIA §102(a) – Published by Oct. 29, 2012
Priedeman	pre-AIA §102(b) – Published on Jan. 2, 2003
KISSlicer	pre-AIA §102(b) – Published by Feb. 15, 2012
Boyer	pre-AIA §102(e) – Filed on Sep. 21, 2012

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The Challenged Claims were Reduced to Practice before September 2012

- The invention of the '713 Patent was conceived and reduced to practice as part of developing a dual-extruder 3-D printer ("Solo")

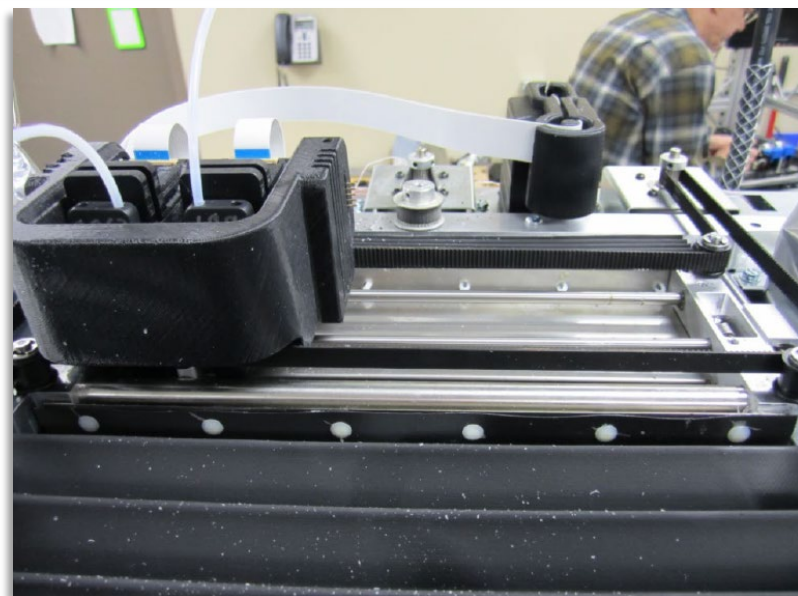
10. I will now explain various features of the Solo printer. The Solo printer was a 3-D printer (additive manufacturing system) that printed a three-dimensional part using FDM processes developed by Stratasy. A March 16, 2010, photograph of four prototype Solo printers in early development is shown below.



The Challenged Claims were Reduced to Practice before September 2012

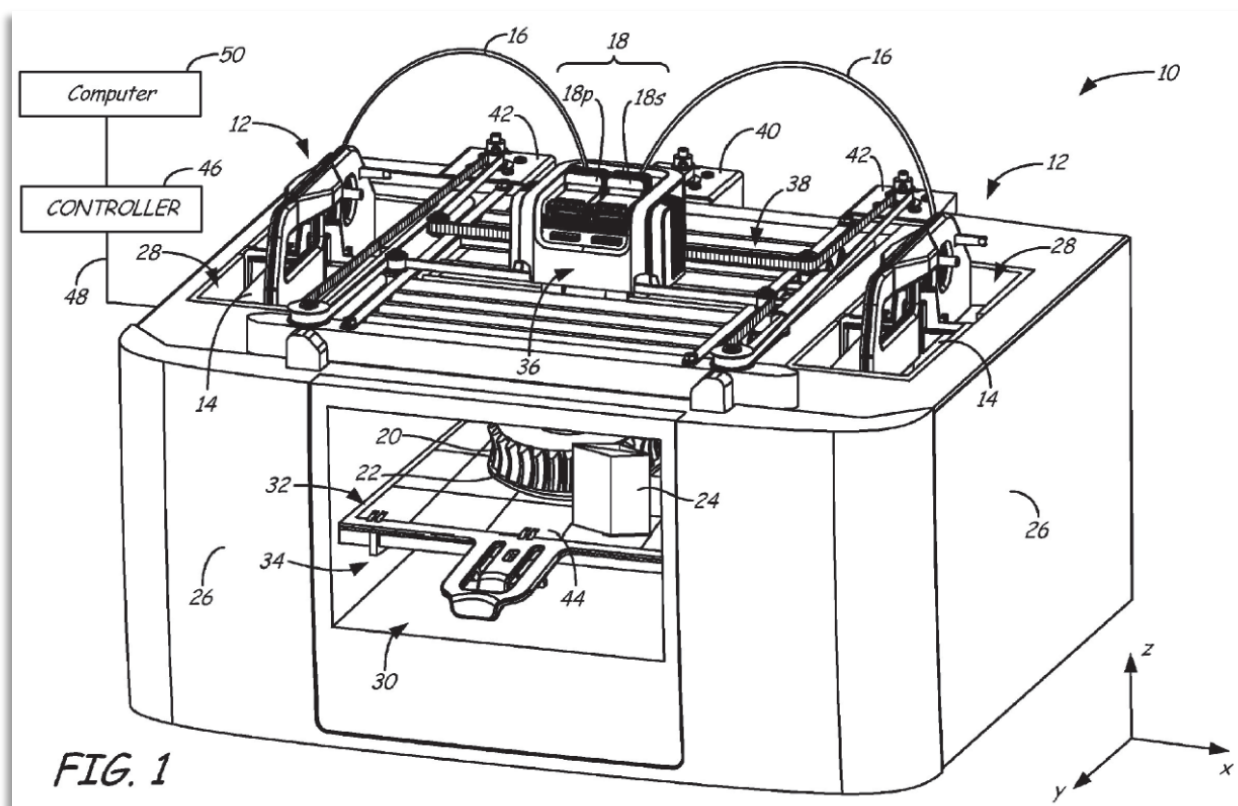
11. The Solo printer printed layers of the three-dimensional part and of a support structure for the three-dimensional part from multiple print heads and deposition lines using a layer-based, additive manufacturing technique known as FDM. For example, the Solo printer had a print head with a part material deposition line (the “Part Print Head”) and a second print head with a support material deposition line (the “Support Print Head”) to print the layers of the three-dimensional part and the support structure, respectively.

1. A method for printing a three-dimensional part with an additive manufacturing system, the method comprising: printing layers of the three-dimensional part and of a support structure for the three-dimensional part from multiple print heads or deposition lines using a layer-based, additive manufacturing technique;



The Challenged Claims were Reduced to Practice before September 2012

Also, the Solo printer with multiple print heads shown in the photograph above resembles the printer illustrated in Figure 1 of the '713 Patent:



The Challenged Claims were Reduced to Practice before September 2012

13. The Solo printer switched between stand-by modes and operating modes for the print heads and deposition lines in-between the printing of the layers of the three-dimensional part and the support structure. For example, the Part Print Head would be in the operating mode, where the liquefier assembly of the print head would be heated to its operating temperature, during which time it would print the part material layer. During that time, the Support Print Head would be in a stand-by mode, during which time it would not be printing material and it would be cooled down from its operating mode temperature to a stand-by temperature to prevent oozing. When the printing of the part material layer concluded, the Part Print Head would be switched to a stand-by mode and the Support Print Head would be switched to an operating mode.

switching the print heads or deposition line between stand-by modes and operating modes in-between the printing of the layers of the three-dimensional part and the support structure;

The Challenged Claims were Reduced to Practice before September 2012

14. The Solo printer performed a purge operation for each print head / deposition line switched to the operating mode. The purge operation comprised printing purge tower(s) in a layer-by-layer manner, where the layers of the purge towers were printed from the print head / deposition line switched to the operating mode. For example, when the Part Print Head / part material deposition line was switched to the operating mode, the printer would perform a purge operation by printing a layer of a purge tower using the part material. Likewise, when the Support Print Head / support material deposition line was switched to the operating mode, the printer would perform a purge operation by printing a layer of the purge tower using the support material.

performing a purge operation for each print head or deposition line switched to the operating mode, the purge operation comprising printing at least one purge tower in a layer-by-layer manner, wherein the layers of the at least one purge tower are printed from the print head or deposition line switched to the operating mode.

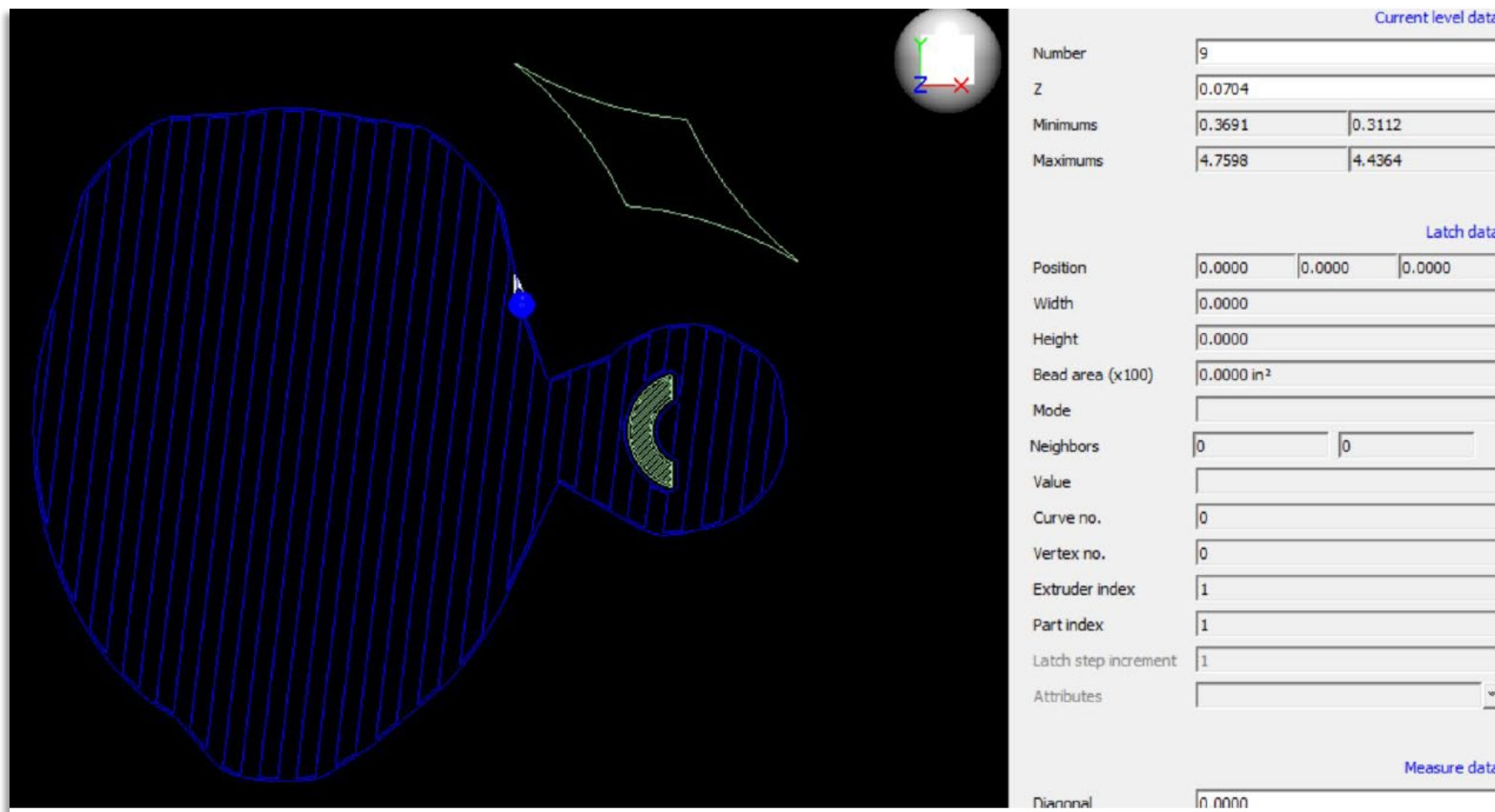
The Challenged Claims were Reduced to Practice before September 2012

16. The information shown in the following screenshots is from Ex. E (July 5, 2011, packed CMB file). This CMB file was last modified on July 5, 2011 in conjunction with the Solo project. I recognize the shape of purge tower in this CMB file from my involvement in the development of the Solo printer and confirmed the date of this CMB file from its file properties, as shown below.

Name	Date modified	Type	Size	Date created
 Pack_338311575.cmb	7/5/2011 8:50 AM	CMB File	12,954 KB	3/20/2025 12:24 PM

Ex. E (July 5, 2011, packed CMB file) at 20. These screenshots depict a version of the purge tower constructed of alternating layers of part and support material:

The Challenged Claims were Reduced to Practice before September 2012



The Challenged Claims were Reduced to Practice before September 2012

24. To confirm, a prototype of the Solo printer including the elements discussed above was used and shown to work for its designed purpose at least by November 20, 2011 (before September 21, 2012), at Stratasy's Minnesota facilities. In fact, as I have discussed above, the photograph of the Solo printer is from November 20, 2011. Ex. C. The named inventors, including Bill Swanson, Ronald Schloesser, and myself, printed purge towers and appreciated that the Solo development using the purge tower worked for its intended purposes discussed above. The development and testing of the Solo project was confidential and performed out of view of the public. Accordingly, the subject matter of at least Claims 1, 2, 5-7, 9, 16, and 17 of the '713 Patent was conceived of, actually used, by November 2011 (before September 21, 2012).

The Challenged Claims were Reduced to Practice before September 2012

- Reduction to practice is evaluated under a “rule-of-reason” approach that considers all pertinent evidence.

Price v. Symsek, 988 F.2d 1187, 1195 (Fed. Cir. 1993)

[13, 14] A “rule of reason” analysis is applied to determine whether the inventor’s prior conception testimony has been corroborated. *Coleman*, 754 F.2d at 360, 224 USPQ at 862. *See also Holmwood v. Sugavanam*, 948 F.2d 1236, 1238, 20 USPQ2d 1712, 1714 (Fed.Cir.1991) (applied in reduction to practice determination); *Berry v. Webb*, 412 F.2d 261, 266, 162 USPQ 170, 174 (CCPA 1969) (“There is no single formula that must be followed in proving corroboration.”). An evaluation of all pertinent evidence must be made so that a sound determination of the credibility of the inventor’s story may be reached. *Coleman*, 754 F.2d at 360, 224 USPQ at 862.³ We conclude that the board extended the requirement of corroboration beyond reasonable bounds. *Cf. In re Reuter*, 670 F.2d at 1021, 210 USPQ at 256.

The Challenged Claims were Reduced to Practice before September 2012

- Petitioner argues there is no reduction to practice because the inventors did not testify they personally executed a specific CMB file.
 - Reply, 3-5.
- But the law does not require an “over-the-shoulder witness” or “corroboration for every factual issue.”

Cooper v. Goldfarb, 154 F.3d 1321, 1330 (Fed. Cir. 1998)

1714. The rule requires an evaluation of all pertinent evidence when determining the credibility of an inventor’s testimony. *See Price*, 988 F.2d at 1195, 26 U.S.P.Q.2d at 1037. In order to corroborate a reduction to practice, it is not necessary to produce an actual over-the-shoulder observer. Rather, sufficient circumstantial evidence of an independent nature can satisfy the corroboration requirement. *See Knorr*, 671 F.2d at 1373, 213 U.S.P.Q. at 200. Furthermore, an actual reduction to practice does not require corroboration for every factual issue contested by the parties. *See Ethicon, Inc. v. United States Surgical Corp.*, 135 F.3d 1456, 1464, 45 U.S.P.Q.2d 1545, 1551 (Fed.Cir.1998);

The Challenged Claims were Reduced to Practice before September 2012

- The record includes:
 - Contemporaneous prototype photos (EX2014/2015, Exs. B, C)
 - An example packed toolpath (CMB) file for printing an object (EX2014/2015, Ex. E)
 - Inventor and non-inventor testimony explaining the packed CMB file in detail (EX2014/2015)
 - Declaration and claim chart mapping the reduction to practice using the example CMB file to the claims (EX2014/2015, Ex. A)
 - Declaration testimony that the CMB file was printed for testing:

The packed CMB file shown in Exhibit E was used to print the objects shown therein on a Solo printer in 2011. The printed parts were used to continue the product development of the Solo printer.

EX2015, ¶116

The Challenged Claims were Reduced to Practice before September 2012

- The record further contains deposition testimony explaining that the relevant CMB file was printed:

20 Q. Did you ever, personally, execute this CMB file
21 on a three-dimensional printer?

22 A. I do not recall. We -- I -- I did many. This
23 geometry -- I know I printed the purge tower. That, I
24 definitely recognize. The customer geometry, like I
25 said, we have thousands of those. That particular part,

1 I do not recall. I know it was printed. I just don't
2 think I did it.

EX2030,
22:20-23:2

The Challenged Claims were Reduced to Practice before September 2012

3 Q. Did you ever, personally, witness someone
4 execute this CMB file on a three-dimensional printer?

5 A. I do not recall. I just know that it was in a
6 folder where we printed all the parts, so this was in a
7 test folder --

8 (Technical

EX2030, 23:3-19

9 THE WITNESS: Yeah. So this was -- these
10 parts -- so we had a folder with a list of parts where
11 you would pack -- you know, using that control setting,
12 you pack the purge part with the geometry and then the
13 test engineer would -- would print the parts in the
14 folder. And then they would report if anything failed
15 or anything was -- so like I said, there's nothing
16 terribly unique about this particular assembly. So it's
17 not necessarily memorable. The purge tower is, purge
18 part is, but not the -- not the -- not the combination
19 of these two parts.

The Challenged Claims were Reduced to Practice before September 2012

- Printing occurred soon after July 5, 2011, during ongoing development:

2 Q. Earlier today, you testified that the CMB file
3 referenced in your declaration was last modified on
4 July 5th of 2011 in conjunction with the Solo project;
5 is that correct?

6 A. Correct.

7 Q. And relative to that date, when would the CMB
8 file have been executed on a Solo printer?

9 A. Fairly recently after that. We were in the
10 process of developing the purge part in that time frame.

11 Q. Okay. And subsequent to that time frame, did
12 the development of the Solo printer continue?

13 A. Yes.

EX2030,
59:2-13

The Challenged Claims were Reduced to Practice before September 2012

- Petitioner argues that developmental Solo printer was not compatible with the CMB file: “Larson and Leavitt stated the CMB file was designed for use with a ‘Fortus 400mc Large’ printer.” Reply, 5.
- But compare with EX2014 and EX2015, ¶16:

I note that Exhibit E lists the “Fortus 400mc Large” under “Machine Type” in the file header, however early on in the Solo project development CMB files for the Fortus 400mc were repurposed for the smaller Solo printer.

Notably, the dimensions of the build space in Exhibit E align with the constraints of the Solo printer (5x5x5 inch build space) that was under development at that time.

The packed CMB file shown in Exhibit E was used to print the objects shown therein on a Solo printer in 2011. The printed parts were used to continue the product development of the Solo printer.

The Challenged Claims were Reduced to Practice before September 2012

- Further confirmed during depositions. See EX1029 at 72:2–17; EX1030 at 33:17–34:24.

19 Q. BY MR. BISENIUS: What adjustments, if any,
20 needed to be made to the CMB file to repurpose the CMB
21 file for the Solo printer?
22 A. We just had to change that size in that def
23 file, the bounding -- we call it the bounding box or the
24 build area. That's it.

EX2030, 34:19-24

The Challenged Claims were Reduced to Practice before September 2012

- Deposition testimony confirms that the relevant CMB file was printed on the Solo printer:

1 Q. Would the test engineer execute CMB files on
2 multiple different types of three-dimensional printers?

3 A. That -- that would fall under their job
4 description, yes.

5 Q. Do you know which model of three-dimensional
6 printer the test engineer executed this specific CMB
7 file on?

8 A. The Solo printer.

9 Q. How do you know that?

10 A. Because it's got a 5 by 5 by 5 build envelope,
11 and only the Solo had a 5 by 5 by 5 build envelope.

12 That was unique.

EX2030,
24:1-12

The Challenged Claims were Reduced to Practice before September 2012

- The declarations also explain the actual workflow for creating the packed CMB files. EX2014 and EX2015, ¶¶20-21.

The Solo printer used Stratasys software called Insight™ to generate the tool path instructions for printing the layers of the three-dimensional part and support structure. Additionally, I used Insight™ to generate the tool path instructions for printing the layers of the purge tower(s). These instructions were stored in coordinate machine binary (“CMB”) files I discussed above.

These CMB files were packed together using Stratasys software called Control Center™ (an application within Insight™). The resulting combined CMB file contained the tool path instructions for the three-dimensional part, the support structure, and the purge tower(s). Resulting combined CMB files were used to print the three-dimensional part, the support structure, and the purge tower(s).

EX2014, ¶20.

The Challenged Claims were Reduced to Practice before September 2012

- Petitioner also argues that there was “[n]o determination that the invention worked for its intended purpose.”
 - Reply, 8-10.
- But Petitioner only points to “further research and development” that occurred after reduction to practice.
 - *Id.*
- This does not undo the successful reduction to practice.

[5–7] In cases requiring testing, this court’s predecessor addressed many times the nature of testing necessary to show reduction to practice. Several important principles emerge from these cases. For instance, the testing requirement depends on the particular facts of each case, with the court guided by a common sense approach in weighing the sufficiency of the testing. *Gelbert v. Wanberg*, 495 F.2d 779, 783, 181 USPQ 648, 652 (CCPA 1974); *Gordon v. Hubbard*, 347 F.2d 1001, 1006, 146 USPQ 303, 307 (CCPA 1965). Reduction to practice does not require “that the invention, when tested, be in a commercially satisfactory stage of development.” *Dardick*, 496 F.2d at 1238;

Scott v. Finney, 34 F.3d 1058,
1061 (Fed. Cir. 1994)

The Challenged Claims were Reduced to Practice before September 2012

- And shown test print was related to a **different two-tower** implementation:

8 Q. So is that purge part only model material?
9 A. Correct. So the one on the right is support;
10 the one on the left is model. So you can print them
11 every other layer like we did in the example of the CMB
12 files earlier, or another example of a purge part is to
13 print it out of a single material and print multiple
14 purge parts. This is the latter example.

EX1030, 53:8-14

EX1029, 76:16-22

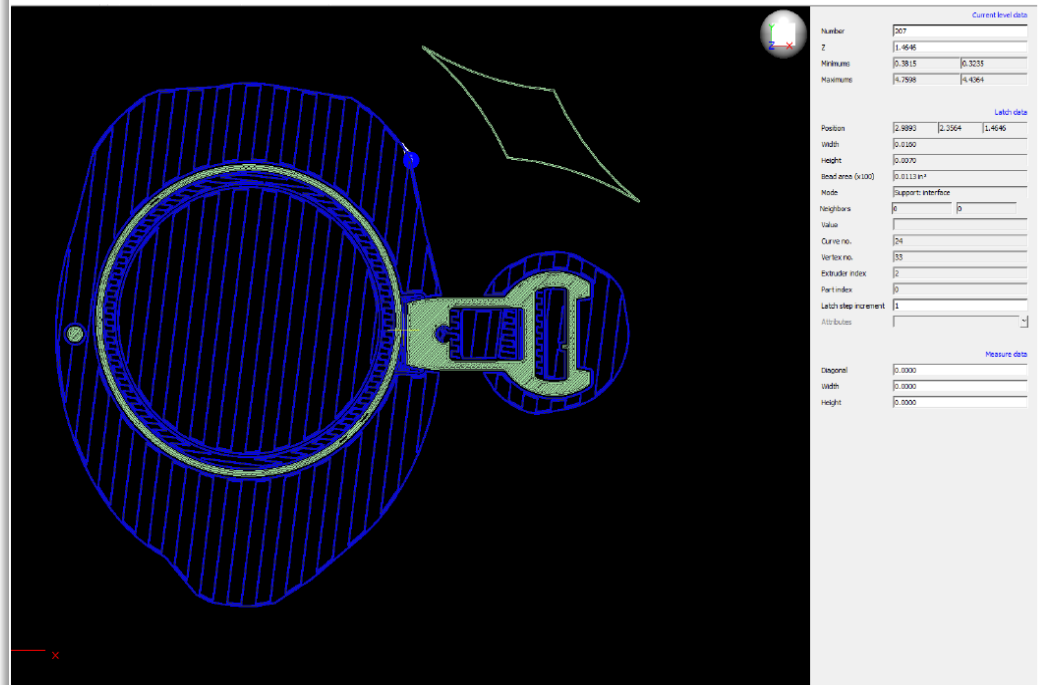
16 Q. Regarding the delamination of the support purge
17 tower that you just mentioned, did you make any
18 adjustment to the printing process to correct for or
19 account for that issue?

20 A. Well, in this particular case, what we did is
21 we went from two purge towers to one with the
22 alternating, which is depicted in the other photos.

The Challenged Claims were Reduced to Practice before September 2012

- Petitioner attacks one example implementation of claim 16 (layers 207-208).
 - Reply, 10-11.
- But Petitioner ignores the evidence of layers 209-210.
- And Petitioner *does not dispute* that alternative example of layers 148-152 of the model demonstrate claim 16's sequence.
 - EX2014 ¶22; EX2015 ¶22.

These series of steps are also shown by layers 207-210 of the CMB file. For instance, as shown in layer 207, the blue lines indicate the tool paths for (a) printing a first layer of a support structure from a support material for the three-dimensional part; and the green lines in a diamond shape indicate the tool paths for (b) printing a first layer of a purge tower from a part material.



The Challenged Claims were Reduced to Practice before September 2012

- Petitioner complains about declarations drafted by counsel, but ignores that:
 - Both declarants swore to the truth of the statements and tied them to specific contemporaneous exhibits, *which Petitioner cannot refute show RTP*.
 - The record shows the witnesses acted independently and Leavitt testified he located most of the underlying exhibits by searching historical project folders:

22 A. So I went through historical documents. You
23 know, I found most of the exhibits in this document, so
24 I was searching old folders that existed back then.

3 And -- and then once I did that, I spoke
4 with counsel, and then they actually typed in the words
5 you see here. Then we reviewed it, I -- we made the
6 corrections multiple times. I then agreed that it's
7 100 percent true and accurate and then signed it, and

EX1030,
9:22-24,
10:3-7

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RepRap Article, RepRap Video, and Boyer Are Not Prior Art

- Petitioner asserts that *RepRap Article* and *RepRap Video* were available on October 29, 2012.
 - Pet., 2, 11.
- *Boyer* was filed on September 21, 2012.
 - Pet., 2.
- Each date is after the challenged claims were reduced to practice (November 2011), so the references are not prior art.

<u>Reference</u>	<u>Prior Art Status</u>
Leavitt	pre-AIA §102(b) – Published on Feb. 5, 2009
RepRap Article	pre-AIA §102(a) – Published by Oct. 29, 2012
RepRap Video	pre-AIA §102(a) – Published by Oct. 29, 2012
Priedeman	pre-AIA §102(b) – Published on Jan. 2, 2003
KISSlicer	pre-AIA §102(b) – Published by Feb. 15, 2012
Boyer	pre-AIA §102(e) – Filed on Sep. 21, 2012

Pet., 2

RepRap Article, RepRap Video, and Boyer Are Not Prior Art

- Ground 1 and Ground 2B therefore fail at least because *RapRap Article* and *RepRap Video* are not prior art.
- Ground 3 fails because *Boyer* is not prior art.

<u>Ground</u>	<u>Claims</u>	<u>Basis for Rejection</u>
1	1, 2, 5-7, 9, 16, 17	§103 – Obvious based on Leavitt (EX1004) in view of RepRap Article (EX1005) and RepRap Video (EX1006)
2A	1, 2, 6, 7, 9, 16, 17	§103 – Obvious based on Priedeman (EX1007) view of KISSlicer (EX1010)
2B	5	§103 – Obvious based on Priedeman in view of KISSlicer, RepRap Article and RepRap Video
3	1, 2, 6, 7, 9	§102 – Anticipated by Boyer (EX1008)

Pet., 1

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RepRap Article, RepRap Video, and KISSlicer Are Not Printed Publications

- Petition failed to present any arguments as to why *RepRap Article*, *RepRap Video*, and *KISSlicer* were published and publicly accessible, providing only conclusory statements and citations to declarations.

This Petition is accompanied by testimony evidence confirming that the RepRap Article and the RepRap Video were published together in October 2012 and publicly accessible to interested persons in this field. EX1016, 1-2; EX1018, 1-9. Additionally, this Petition is accompanied by testimony evidence confirming that the KISSlicer Quick-Start Guide (“KISSlicer”) was published and made publicly accessible to interested persons in this field in February 2012—more than one year prior to the filing date of the ’713 Patent. EX1017, 1-2.

Pet., 2

RepRap Article, RepRap Video, and KISSlicer Are Not Printed Publications

- Petitioner's incorporation by reference of the arguments within the declarations is prohibited by PTAB rules and opinions

§ 42.6 Filing of documents, including exhibits; service.

(3) *Incorporation by reference; combined documents.* Arguments must not be incorporated by reference from one document into another document. Com-

“somehow unduly burdensome” miss the mark. Req. 7. As we explained in our Decision, “incorporation ‘by reference amounts to a self-help increase in the length of the . . . brief.’” Dec. 28–29 (quoting *DeSilva v. DiLeonardi*, 181 F.3d 865, 866–67 (7th Cir. 1999)). This is not an issue of us finding Petitioner’s declaration testimony “somehow unduly burdensome”; it is an issue of Petitioner relying on declaration testimony to expand its word count beyond the word count limit, to the prejudice of Patent Owner. Our

reviewing court has explained that “incorporating argument by reference ‘cannot be used to exceed word count’” because “[i]t is ‘fundamentally unfair to allow a party to use incorporation to exceed word count.’”

Promptu Sys. Corp. v. Comcast Cable Comm’s, LLC, 92 F.4th 1384, 1385 (Fed. Cir. 2024) (quoting *Microsoft Corp. v. DataTern, Inc.*, 755 F.3d 899, 910 (Fed. Cir. 2014)).

Medivis, Inc. v. Novarad Corp., IPR2023-00042, Paper 37 at 10 (PTAB Apr. 23, 2024)

RepRap Article, RepRap Video, and KISSlicer Are Not Printed Publications

- Petitioner asks the board to piece together arguments that might be made based on the declarations.
 - Does not set forth the legal standard for printed publications to be publicly accessible, much less present legal theories.

It is Petitioner's responsibility to cite specific evidence to support its arguments, not the Board's responsibility to piece together evidence or speculate as to Petitioner's position. Petitioner has not adequately done so here. By way of further explanation, we provide several examples below as to Petitioner's deficiencies with respect to challenged independent claims 1 and 32. However, we note that Petitioner applies the same approach to each limitation in each challenged claim, resulting in ambiguity throughout the contentions that we do not explicitly discuss herein.

TCL Communication Technology Holdings Ltd. v. DataQuill Ltd.,
IPR2020-00746, Paper 21 at 22
(PTAB Sept. 18, 2020)

RepRap Article, RepRap Video, and KISSlicer Are Not Printed Publications

- Petitioner has not shown that the documents were available to a person of skill in the art exercising reasonable diligence.

SRI Int'l, Inc. v. Internet Sec. Sys., Inc., 511 F.3d 1186, 1194 (Fed. Cir. 2008).

[6, 7] “Because there are many ways in which a reference may be disseminated to the interested public, ‘public accessibility’ has been called the *touchstone* in determining whether a reference constitutes a ‘printed publication’ bar under 35 U.S.C. § 102(b).” *In re Hall*, 781 F.2d 897, 898–99 (Fed.Cir.1986) (emphasis added). “A given reference is ‘publicly accessible’ upon a satisfactory showing that such document has been disseminated or otherwise made available to the extent that persons interested and ordinarily skilled in the subject matter or art exercising reasonable diligence, can locate it.” *Bruckelmyer v. Ground Heaters, Inc.*, 445 F.3d 1374, 1378 (Fed.Cir.2006). “The decision whether a

RepRap Article, RepRap Video, and KISSlicer Are Not Printed Publications

- Technical accessibility does not show that an interested person would have located the reference with reasonable diligence.

What constitutes a “printed publication” must be determined in light of the technology employed. *See Samsung Elecs. Co. v. Infobridge Pte. Ltd.*, 929 F.3d 1363, 1369 (Fed. Cir. 2019) (citing *In re Wyer*, 655 F.2d 221, 226 (CCPA 1981)). Public accessibility requires more than technical accessibility. *See id.* (citing *Acceleration Bay, LLC v. Activision Blizzard Inc.*, 908 F.3d 765, 773 (Fed. Cir. 2018)). “[A] work is not publicly

accessible if the only people who know how to find it are the ones who created it.” *Id.* at 1372. On the other hand, “a petitioner need not establish that specific persons actually accessed or received a work to show that the work was publicly accessible.” *Id.* at 1374. “In fact, a limited distribution

Guardian Alliance
Technologies, Inc. v.
Tyler Miller, IPR2020-
00031, Paper 23 at *8-
*9 (PTAB Mar. 26, 2020)

RepRap Article, RepRap Video, and KISSlicer Are Not Printed Publications

- Petitioner contends *RepRap Video* was findable through “reasonable diligence” because YouTube is searchable by title and description.
 - Reply, 14–15.
- The Talbot and Bakin declarations provide no explanation why interested members of the public would know to search for the title or description of the *RepRap Video* to locate the video with reasonable diligence. EX1016, ¶15.

web address. Instead, Groupon argues that an internet search engine would have been able to locate the report. But that argument does not allow us to automatically infer that Dr. Ratsimor’s webpage was “indexed . . . (through search engines or otherwise)” and thus locatable by a search engine. *See Voter Verified*, 698 F.3d at 1381. The record is devoid of any evidence that a query of a search engine before the critical date, using any combination of search words, would have led to Ratsimor appearing in the search results.

Blue Calypso, LLC v. Groupon, Inc., 815 F.3d 1331, 1350 (Fed. Cir. 2016)

RepRap Article, RepRap Video, and KISSlicer Are Not Printed Publications

- Petitioner argues that YouTube is a reputable publisher, and thus *RepRap Video* was publicly accessible.
- But *Ericsson*, cited by Petitioner, involved IEEE as a reputable publisher, not YouTube, which any person can upload to.

accessibility. IEEE is a well-known, reputable compiler and publisher of scientific and technical publications, and we take Official Notice that members in the scientific and technical communities who both publish and engage in research rely on the information published on the copyright line of IEEE publications. The information published on the copyright line of Stadler thus falls under an exception to the hearsay rule as lists, etc., generally relied on by the public or by persons in particular occupations. Fed. R. Evid. 803(17).¹⁰

Ericsson Inc. v. Intell. Ventures I LLC,
IPR2014-00527, Paper
41 at 11 (PTAB May
18, 2015)

RepRap Article, RepRap Video, and KISSlicer Are Not Printed Publications

- *VidStream's* limited presumption turned on evidence of copyright date, public distribution, and cataloging for a book.
- Petitioner offers no comparable evidence for the RepRap Video.

VidStream LLC v. Twitter, Inc., 981 F.3d 1060, 1065-66 (Fed. Cir. 2020)

Twitter responds that the Board correctly found that the collective evidence, including: the Copyright Office evidence of Bradford's 2011 copyright registration, the 2011 copyright date in every copy of Bradford, the presence of an established publisher, the listing for sale on Amazon web pages in 2011, and the book's existence in the MARC records dated August 25, 2011, all uniformly support publication and public accessibility before the '997 patent's priority date of May 9, 2012. Twitter states that the evidence established the identity of the pages of Bradford filed with the petitions and the pages from the copy of Bradford in the Library of Congress. Twitter explains that the copy "made" on December 13, 2015 was a reprint, for the 2015 copy has the same ISBN as the Library of Congress copy, as is consistent with a reprint, not a new edition. *See n.3, supra.*

The evidence well supports the Board's finding that Bradford was published and publicly accessible before the '997 patent's 2012 priority date. *See Nobel Biocare Servs. AG v. Instraden USA Inc.*, 903 F.3d 1365, 1376 (Fed. Cir. 2018) (considering the entirety of the evidence relevant to the Board's finding of printed publication).

RepRap Article, RepRap Video, and KISSlicer Are Not Printed Publications

- For the *RepRap Article*, Bakin provides only that (EX1016, ¶7):
 - The website “allows visitors to browse blog posts by category (including a 3D printing category) or to search for specific blog posts using keyword searching,”
 - Unsupported assertion that “interested members of the public would have been able to locate this blog post via keyword searching using popular search engines available at the time such as Google or Yahoo,” and
 - Unidentified and late-dated “archived forum discussions on okob.net, including discussion threads regarding 3D printing, demonstrate that members of the public were able to access and identify subject matter of interest on the website.”

RepRap Article, RepRap Video, and KISSlicer Are Not Printed Publications

- The website (okob.net) is the declarant's "personal website where [he] post[s] thoughts, discussions, and information about my various interests." EX1016, ¶7.
- Those interests range wildly.
 - EX1005 at 1.

- Recent Posts

- [Peaches Getting Destroyed before Harvesting, Brown Rot?](#)
- [Adding borders to terminal windows under Ubuntu 18.04](#)
- [Keyboard Input Problem with nedit under Ubuntu 18.04 in Virtual Box](#)

RepRap Article, RepRap Video, and KISSlicer Are Not Printed Publications

- There is no “testimonial evidence that a person interested in [the field] would be independently aware of the web address for [the] personal page”
 - See *Blue Calypso, LLC v. Groupon, Inc.*, 815 F.3d at 1349 (Fed. Cir. 2016)

2003.” Even if we assume that Ratsimor was available online on Dr. Ratsimor’s personal page before the critical date, Groupon does not point to any evidence indicating that Ratsimor was viewed or downloaded. Further, in contrast to *Voter Verified*, the present case lacks any testimonial evidence that a person interested in e-commerce and peer-to-peer marketing would be independently aware of the web address for Dr. Ratsimor’s personal page.

RepRap Article, RepRap Video, and KISSlicer Are Not Printed Publications

- The Petition did not articulate a public accessibility theory for KISSlicer with particularity.
- The Reply's reliance on additional exhibits and a new "industry discussion" narrative is an improper attempt to backfill that deficiency.

See 35 U.S.C. §§ 312(a)(3), 314(a). Additionally, the statute requires that the petition identify *with particularity* the grounds for institution and evidence supporting such grounds. 35 U.S.C. § 312(a). This includes the prior art relied upon and evidence that it qualifies as such. This standard is far more than is required in typical notice pleading, which only requires that a party make plausible claims. *See* F.R.Civ.P. 8(a)(2) (general rules of pleading in federal courts); *ABB Turbo Sys. AG v. Turbousa, Inc.*, 774 F.3d 979, 984 (Fed. Cir. 2014). Thus, at the institution stage, the petition must identify, with particularity, evidence sufficient to establish a reasonable likelihood that the reference was publicly accessible before the critical date of the challenged patent and therefore that there is a reasonable likelihood that it qualifies as a printed publication.

Hulu, LLC v. Sound View Innovations, LLC, IPR2018-01039, Paper 29 at 12–13 (PTAB Dec. 20, 2019) (precedential)

RepRap Article, RepRap Video, and KISSlicer Are Not Printed Publications

- Mr. Dummer's statements that the site "became popular" and users could find the guide via "search engines, blog posts, and through word of mouth" (EX1017, ¶12) are conclusory and insufficient.

Samsung also argues that the Board's factual findings about the website, and the accessibility of the WD4 reference on the website, were not supported by substantial evidence. We disagree. Samsung did not offer evidence, apart from the speculation of Mr. Bross, that a person of ordinary skill, exercising reasonable diligence, would have located the JCT-VC website or even known to look for it.³

Samsung Elecs. Co. v. Infobridge Pte. Ltd., 929 F.3d 1363, 1371–72 (Fed. Cir. 2019)

RepRap Article, RepRap Video, and KISSlicer Are Not Printed Publications

- Ground 1 and Ground 2B therefore fail additionally because least because *RepRap Article* and *RepRap Video* are not printed publications.
- Grounds 2A and 2B fail because KISSlicer is not a printed publication.

<u>Ground</u>	<u>Claims</u>	<u>Basis for Rejection</u>
1	1, 2, 5-7, 9, 16, 17	§103 – Obvious based on Leavitt (EX1004) in view of RepRap Article (EX1005) and RepRap Video (EX1006)
2A	1, 2, 6, 7, 9, 16, 17	§103 – Obvious based on Priedeman (EX1007) view of KISSlicer (EX1010)
2B	5	§103 – Obvious based on Priedeman in view of KISSlicer, RepRap Article and RepRap Video
3	1, 2, 6, 7, 9	§102 – Anticipated by Boyer (EX1008)

Pet., 1

Overview of Argument

- I. Overview of the '713 Patent
- II. Overview of the Purported Prior Art
- III. The Challenged Claims were Reduced to Practice before September 2012
- IV. RepRap Article, RepRap Video, and Boyer Are Not Prior Art
- V. RepRap Article, RepRap Video, and KISSlicer Are Not Printed Publications
- VI. The “Purge Tower” of the '713 Patent Must Be a Separate Structure
- VII. The Challenged Claims are Patentable Under Ground 1
- VIII. The Challenged Claims are Patentable Under Ground 2A
- IX. Claim 5 is Patentable Under Ground 2B
- X. The Challenged Claims are Patentable Under Ground 3

The “Purge Tower” of the ’713 Patent Must Be a Separate Structure

- “[W]here a claim lists elements separately, the clear implication of the claim language is that those elements are distinct components of the patented invention.”
 - *Regeneron Pharms., Inc. v. Mylan Pharms. Inc.*, 130 F.4th 1372, 1379 (Fed. Cir. 2025)

1. A method for printing a **three-dimensional part** with an additive manufacturing system, the method comprising:
printing layers of the three-dimensional part and of a **support structure** for the three-dimensional part from multiple print heads or deposition lines using a layer-based, additive manufacturing technique;
switching the print heads or deposition line between stand-by modes and operating modes in-between the printing of the layers of the three-dimensional part and the support structure;
performing a purge operation for each print head or deposition line switched to the operating mode, the purge operation comprising printing at least one **purge tower** in a layer-by-layer manner, wherein the layers of the at least one purge tower are printed from the print head or deposition line switched to the operating mode.

The “Purge Tower” of the ’713 Patent Must Be a Separate Structure

- The specification describes a “purge tower” that is a distinct structure for purge operations, separate from the part, and which may be disposed.
 - EX1001, 8:27-34.

After the print operation is complete, the resulting 3D part **32** and support structure **22** may be removed from chamber **30**, and support structure **22** may be removed from 3D part **20**. Purge tower **24** itself may be then recycled or otherwise discarded as desired. 3D part **20** may then undergo one or more additional post-processing steps.

As shown in FIG. 1, and further shown in FIGS. 3A and 3B, purge tower **24** may be printed at any suitable free location on build substrate **44** (i.e., at any location in the x-y build plane not occupied by 3D part **20** or support structure **22**). As discussed further below, each layer of purge tower **24** is printed by either the part material or by the support material depending on when print heads **18** switch between their operating modes and their stand-by modes and perform the purge operations.

The “Purge Tower” of the '713 Patent Must Be a Separate Structure

- Petitioner’s expert confirmed that a POSITA would understand the “purge tower” is a “separate physical object” from the three-dimensional part.
 - EX2016 at 64:1-9

Q And what is the difference between a part and a purge tower?

A I mean, as described in '713, so denoted by 20, that's the part. And in general the part is something that a POSITA, if a POSITA is performing this operation, that's the desired component that one would take and use. And the purge tower is a separate physical object as denoted in the figure in the patent.

The “Purge Tower” of the ’713 Patent Must Be a Separate Structure

- A POSITA would understand that the purge tower needs to be separate from the part to accomplish its fundamental purpose.
 - EX2013 (Osswald Decl.), ¶¶140-141.

140. A POSITA would understand that if the purge tower was not a separate and distinct structure from the three-dimensional part and support structure, it would fail to accomplish its fundamental purpose of allowing a purge operation to occur while mitigating issues inherent in conventional purge operations. A POSITA reading the ’713 Patent would not consider entrapping the purge tower within a part. The purpose of purging is to expel potentially degraded material from the nozzle so that fresh material can be used in manufacturing. Incorporating the purge tower into the part’s structure would undermine this function, and in tall parts could create a purge tower of such height that it risks collapse. That is especially true in the case of

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- VI. The “Purge Tower” of the '713 Patent Must Be a Separate Structure
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- VIII. The Challenged Claims are Patentable Under Ground 2A
- IX. Claim 5 is Patentable Under Ground 2B
- X. The Challenged Claims are Patentable Under Ground 3

The Challenged Claims are Patentable Under Ground 1

- Ground 1 combines *Leavitt* with *RepRap Article* and *RepRap Video*, challenging claims 1, 2, 5-7, 9, 16, and 17.
- Ground 1 fails on the merits, even if *RepRap Article* and *RepRap Video* are considered

<u>Ground</u>	<u>Claims</u>	<u>Basis for Rejection</u>
1	1, 2, 5-7, 9, 16, 17	§103 – Obvious based on Leavitt (EX1004) in view of RepRap Article (EX1005) and RepRap Video (EX1006)
2A	1, 2, 6, 7, 9, 16, 17	§103 – Obvious based on Priedeman (EX1007) view of KISSlicer (EX1010)
2B	5	§103 – Obvious based on Priedeman in view of KISSlicer, RepRap Article and RepRap Video
3	1, 2, 6, 7, 9	§102 – Anticipated by Boyer (EX1008)

Pet., 1

The Challenged Claims are Patentable Under Ground 1

- Petitioner fails to establish a motivation to combine *Leavitt* with *RepRap Video* and *RepRap Article*.
- MTC #1**: Petitioner contends (Pet., 12-13):

(establishing a “consistent flow of plastic”); EX1003, ¶53. Based on Leavitt’s teaching, it was clear that the material at the nozzle tip of the idle liquefier pump would have an inconsistent texture (especially if a portion slightly oozed, [0032] (“may potentially ooze”)), and a POSITA would have recognized from each of RepRap Article and RepRap Video that the “priming” of such material into the suggested purge tower would have advantageously avoided uneven deposition or defects imposed upon the 3D part. EX1003, ¶53.

The Challenged Claims are Patentable Under Ground 1

- **MTC #1 Rebuttal:**

- **First**, Leavitt never describes issues with “an inconsistent texture” or “uneven deposition.” EX2013, ¶¶87-88.
- **Second**, Leavitt’s z-offset toggling already addresses contact from “ooze” on an idle nozzle. EX1004 ¶32; EX2013 ¶¶87-88, 91-92.

in 3D object 20. While extrusion head 18 is disposed in the build state, residual amounts of support material may potentially ooze from support liquefier pump 32. However, positioning support tip 68 higher than build tip 54 by raised offset distance 74 reduces the risk that the residual support material comes into contact with the layer of 3D object 20 being formed.

The Challenged Claims are Patentable Under Ground 1

- Petitioner’s “reduce the risk even further” rationale is hindsight and fails to identify a recognized problem in Leavitt that RepRap purportedly solves.
 - Sur-Reply, 13-14
- Even assuming an undisclosed defect in Leavitt, Petitioner identifies no disclosure that RepRap’s parking space would even remove such external ooze.
 - Reply, 19-20.

The Challenged Claims are Patentable Under Ground 1

- **MTC #2:** Petitioner contends (Pet., 13):

Second, printing a purge tower on the build substrate next to the 3D part (as suggested by RepRap) would have beneficially allowed Leavitt's extruder head to prime such material and prepare the deposition line for operating mode in a prompt and efficient manner and with limited additional movement. EX1003, ¶54. Because the suggested purge tower is close to the 3D part on the build substrate, Leavitt's extrusion head 18 would not need to travel as far to perform the purge operation, thereby providing a time savings as compared to other purging procedures involving, for example, a purge bucket located outside the periphery of the build substrate. EX1003, ¶54.

The Challenged Claims are Patentable Under Ground 1

- **MTC #2 Rebuttal:** RepRap's teaches away from applying RepRap's parking space to Leavitt's numerous toggles—"slows down the print substantially."
 - EX1005 at 1; EX1004, ¶24.

The technique works the best for printing a few layers of color, for example a colored text on the top and bottom of the object. It essentially eliminates the discoloration due to the plastic leaking, but because of the time needed to adjust the temperatures it slows down the print substantially when there are a lot of layers requiring extruder switching.

[0024] For even a single 3D object and corresponding support structure (e.g., 3D object 20 and support structure 22), extrusion head 18 toggles between the build state and the support state numerous times. This number is multiplied when fabricating large quantities of 3D objects and support structures in a rapid manufacturing process. Because the toggling of extrusion head 18 involves mechanical movements of

The Challenged Claims are Patentable Under Ground 1

- **MTC #3:** Petitioner contends (Pet., 13-14):

Third, a POSITA would have understood that implementing Leavitt's system with RepRap Article's suggestion to lower the temperature of an idle extruder would provide an improved approach for preventing the idle extruder from leaking oozed material while positioned over the 3D part. EX1003, ¶55. For

The Challenged Claims are Patentable Under Ground 1

- **MTC #3 Rebuttal:**
 - **First**, a POSITA would not equate Leavitt’s “ooze” with uncontrolled leakage.
 - EX2013, ¶192.

“dripping” of “oozed material.” A POSITA would have understood that polymers melts would not “leak” or “drip” from the extruder head onto the part because of their high viscosity and surface tension. A POSITA would recognize that inertial effects contributing to flow are negligible in polymer melt behavior. In my textbook *Understanding Polymer Processing*¹, which is used in a required undergraduate plastics processing course, I emphasize that inertial effects can be disregarded in nearly all polymer processing operations. The ’713 Patent itself acknowledges that

The Challenged Claims are Patentable Under Ground 1

- **MTC #3 Rebuttal:**
 - **Second**, Leavitt's toggling of the extruders already addresses the "ooze" issue.
 - EX1004, ¶32.

in 3D object 20. While extrusion head 18 is disposed in the build state, residual amounts of support material may potentially ooze from support liquefier pump 32. However, positioning support tip 68 higher than build tip 54 by raised offset distance 74 reduces the risk that the residual support material comes into contact with the layer of 3D object 20 being formed.

The Challenged Claims are Patentable Under Ground 1

- **MTC #4:** Petitioner contends (Pet., 14):

Fourth, a POSITA would have applied RepRap Video's teaching to print a purge tower on the substrate to Leavitt's system for using extruder head 18 to print a three-dimensional part and a support structure on a substrate because doing so would provide an efficient way to concentrate waste material for rapid disposal in the compact purge tower. EX1003, ¶56. Because RepRap's purge tower can be the same size or smaller than the 3D object, RepRap discloses a way to gather waste material in one place on the substrate so that the waste material can be rapidly collected (for disposal) when the 3D part is collected too. EX1003, ¶56.¹

The Challenged Claims are Patentable Under Ground 1

- **MTC #4 Rebuttal:**
 - ***First***, Petitioner identifies no deficiency in Leavitt regarding disposal of waste material.
 - Pet. at 14.
 - ***Second***, Petitioner ignores that using a purge bucket would already accomplish the purported motivation to “concentrate waste material for rapid disposal.”
 - Pet. at 14; see EX1001 at 4:42-45, 4:62–5:3 (describing use of purge buckets in the art).

The Challenged Claims are Patentable Under Ground 1

- The record confirms that the Leavitt-RepRap combination does not teach element 1[c].

performing a purge operation for each print head or deposition line switched to the operating mode, the purge operation comprising printing at least one purge tower in a layer-by-layer manner, wherein the layers of the at least one purge tower are printed from the print head or deposition line switched to the operating mode.

Cl. 1[c]

The Challenged Claims are Patentable Under Ground 1

- *RepRap Article* describes a dual-purpose “parking space,” not a purge tower printed layer-by-layer from the deposition line switched to operating mode.
 - EX1005, 1.

The technique being used with the current generation of the RepRap X2 printers (S/N: 020*) is to print a “parking space” besides the actual object. That “parking space” serves two purposes, one is to plug the nozzles while the temperature changes and the other is to “prime” the extruders (i.e. establish the consistent flow of plastic) before printing the actual object after the temperature change.

- *RepRap Video* is blurry, disjointed, and provides no confirmation that the parking space is printed layer-by-layer from the deposition line switched to operating mode.
 - EX1006.

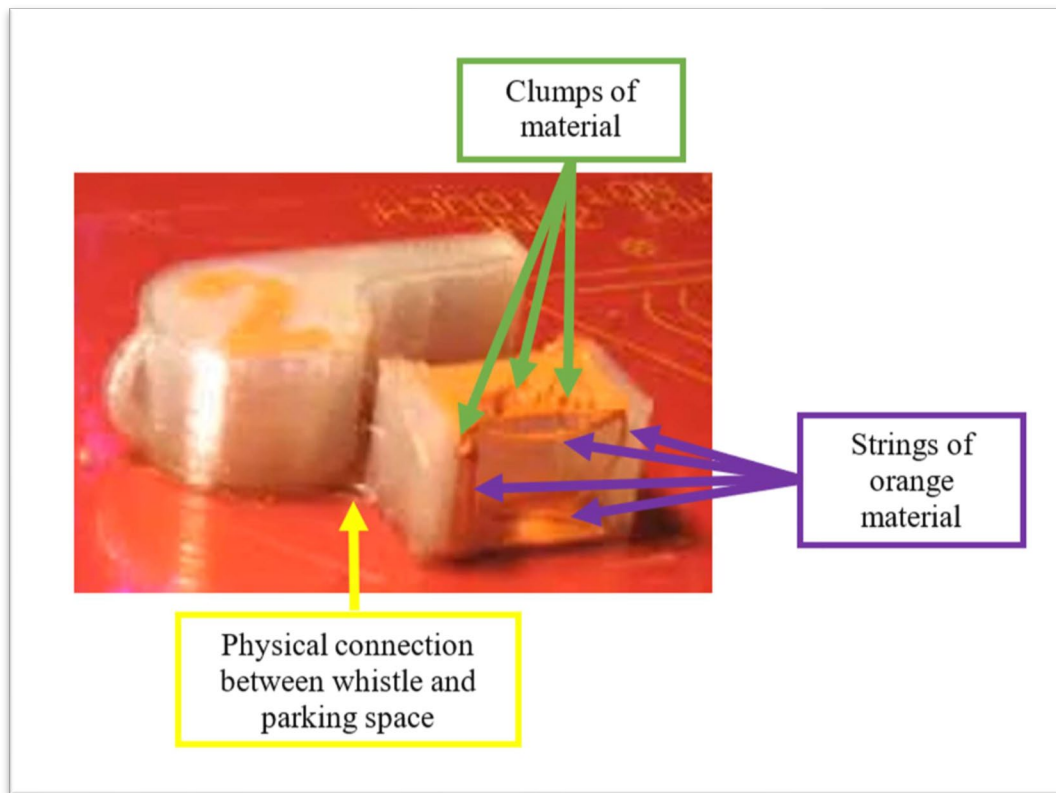
The Challenged Claims are Patentable Under Ground 1

- *RepRap Article* describes a dual-purpose “parking space,” not a purge tower printed layer-by-layer from the deposition line switched to operating mode.
 - EX2013, ¶197.

space serves two purposes. EX1005 at 1. The *RepRap Article* describes that one purpose is to plug the nozzles while the temperature changes to address “plastic leaking from the idle extruder” and the other purpose is to “prime” both extruders to “establish the consistent flow of plastic” “before printing the actual object after the temperature change.” *Id.* As a result, a POSITA would understand that *RepRap*’s parking space includes, at any given point, leakage from one plugged nozzle/extruder and material extruded from both nozzles/extruders.

The Challenged Claims are Patentable Under Ground 1

- In addition to the various clumps and strings of material, evidencing a lack of layer-by-layer printing, the “parking space” is also physically connected to the printed part.



Pet., 1

The Challenged Claims are Patentable Under Ground 1

- Claims 16 and 17 are patentable for the same reasons discussed for claim 1.

16. A method for printing a three-dimensional part with an additive manufacturing system, the method comprising: (a)

printing a first layer of a support structure from a support material for the three-dimensional part; (b) printing a first layer of a purge tower from a part material; (c) printing a first layer of the three-dimensional part on at least a portion of the first layer of the support structure from the part material after printing the first layer of the purge tower; (d) printing a second layer of the purge tower from the support material; and (e) printing a second layer of the support structure on at least a portion of the first layer of the three-dimensional part from the support material after printing the second layer of the purge tower.

17. The method of claim 16, and further comprising repeating steps (b)-(e) for at least a portion of the three-dimensional part and support structure.

The Challenged Claims are Patentable Under Ground 1

- Additionally, Petitioner fails to address that RepRap teaches away from the specific alternating switching and layering called for by claims 16 and 17.
 - EX1005, 1; EX1004, ¶24

The technique works the best for printing a few layers of color, for example a colored text on the top and bottom of the object. It essentially eliminates the discoloration due to the plastic leaking, but because of the time needed to adjust the temperatures it slows down the print substantially when there are a lot of layers requiring extruder switching.

[0024] For even a single 3D object and corresponding support structure (e.g., 3D object **20** and support structure **22**), extrusion head **18** toggles between the build state and the support state numerous times. This number is multiplied when fabricating large quantities of 3D objects and support structures in a rapid manufacturing process. Because the toggling of extrusion head **18** involves mechanical movements of

The Challenged Claims are Patentable Under Ground 1

- Claim 5 requires the purge tower's cross-sectional area to reduce with height along the z-axis.
 - EX1001, cl. 5.

5. The method of claim 1, wherein the at least one purge tower has a cross-sectional area that reduces in height along an axis that is perpendicular to a build plane.

- Petitioner's argument that claim 5 is fulfilled by a reduction "at any point," even if the area later increases is unsupported claim construction.

Claim 5 is met by any disclosure of a purge tower for which at any point along the vertical axis the cross-sectional area of the purge tower reduces. EX1023, ¶¶40; EX1003, ¶¶95-97. The fact that RepRap's parking space later increases in cross-sectional area after earlier decreasing in cross-sectional area is irrelevant.

The Challenged Claims are Patentable Under Ground 1

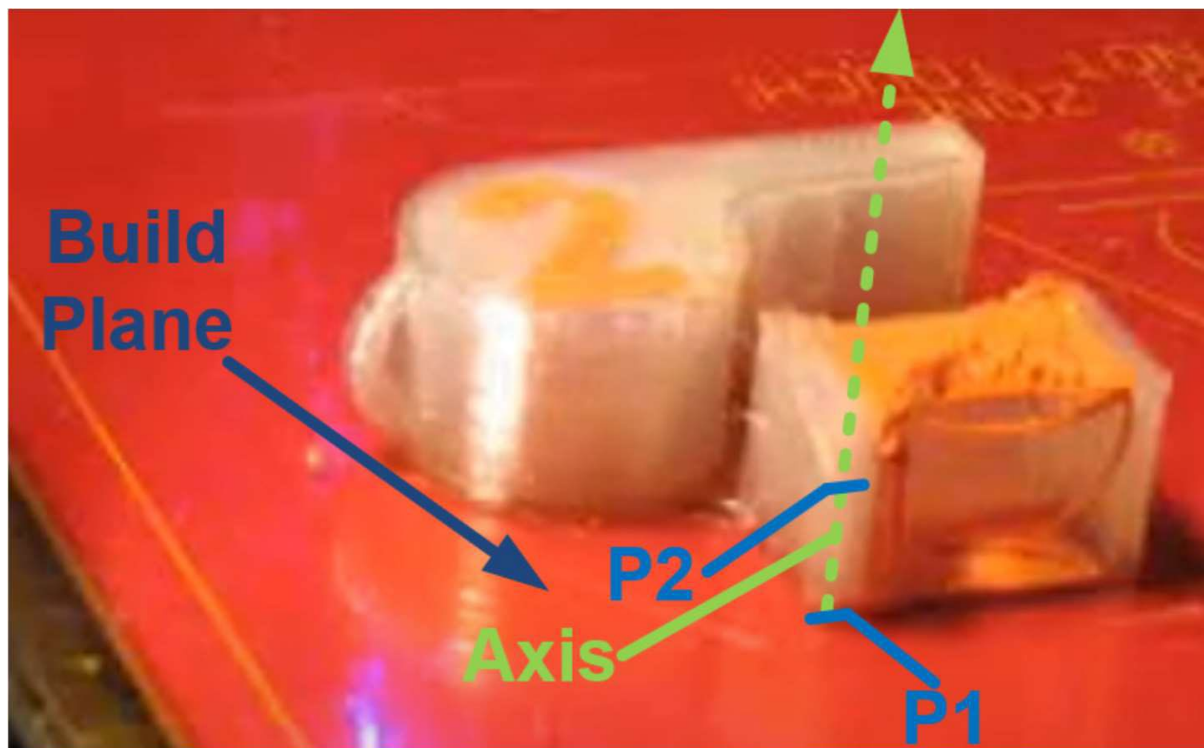
- Petitioner's belated claim construction argument is contradicted by the specification.
 - EX1001, 9:61-10:3.

As mentioned above, each layer **24a** of purge tower **24** is preferably printed along the same tool path **58**. However, in situations in which purge tower **24** will be printed high enough that its height is substantially greater than its cross-sectional area, it can be beneficial to print the lower layers **24a** of purge tower **24** with larger cross-sectional areas, with walls that slope or taper to small cross-sectional areas at the higher layers. This preferably prevents to the portion of

purge tower **24** from wobbling during the printing operation, which can otherwise impair the printing of subsequent layers.

The Challenged Claims are Patentable Under Ground 1

- Petitioner's own evidence demonstrates that RepRap does not disclose the limitation of claim 5
 - Pet., 31 (showing parking space that is falling apart at higher layers).



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- VIII. The Challenged Claims are Patentable Under Ground 2A**
- IX. Claim 5 is Patentable Under Ground 2B
- X. The Challenged Claims are Patentable Under Ground 3

The Challenged Claims are Patentable Under Ground 2A

- Ground 2A combines *Priedeman* and *KISSlicer*, challenging claims 1, 2, 6, 7, 9, 16, and 17.

<u>Ground</u>	<u>Claims</u>	<u>Basis for Rejection</u>
1	1, 2, 5-7, 9, 16, 17	§103 – Obvious based on Leavitt (EX1004) in view of RepRap Article (EX1005) and RepRap Video (EX1006)
2A	1, 2, 6, 7, 9, 16, 17	§103 – Obvious based on Priedeman (EX1007) view of KISSlicer (EX1010)
2B	5	§103 – Obvious based on Priedeman in view of KISSlicer, RepRap Article and RepRap Video
3	1, 2, 6, 7, 9	§102 – Anticipated by Boyer (EX1008)

Pet., 1

The Challenged Claims are Patentable Under Ground 2A

- The *Priedeman+KISSlicer* combination does not teach the purge tower of claim 1 or claim 16.
- KISSlicer’s “wipe pillar” is a tip-cleaning feature used to “reduce[] hairing,” not a purge tower printed layer-by-layer upon switching a print head or deposition line to operating mode.
 - EX1010 at 9.

Wipe pillar

The wipe pillar is a cylinder printed before every layer to clean the extruder tip. It reduces hairing and it is extremely important in dual head prints. Can be switched off, or the position with respect to the main part can be chosen.

The Challenged Claims are Patentable Under Ground 2A

- The '713 Patent distinguishes "tip wipe operation" from "purge operation."
 - EX1001, 4:46-62, 9:47-59.

When each print head is brought to its operating mode, it preferably undergoes a purge operation prior to printing the next layer. As discussed in Turley et al., U.S. Pat. No. 7,744,364, a purge operation conventionally involves moving the given print head to a purge station, where it extrudes a strand of the part or support material into a purge bucket, optionally followed by a tip wipe operation.

Optionally, as shown, stop vertex **64** may alternatively function as another corner vertex, and tool path **58** may be directed across the top of layer **24a**, such as illustrated by tool path segment **58f** to a subsequent stop vertex **66** located outside of purge tower **24**. However, when following tool path segment **58f**, controller **46** preferably directs the print head **18** not to extrude any material. Instead, the movement of the print head along tool path segment **58f** (or any other similar tool path segment) allows nozzle **18e** of the print head **18** to wipe along perimeter wall **52** at tool path segment **58c**. As such, purge tower **24** may also function as a tip wipe device, which further precludes the need for a separate purge station.

The Challenged Claims are Patentable Under Ground 2A

- A POSITA would understand that in dual-extruder prints, the wipe pillar would be printed **after** the part before that extruder goes idle.
 - EX2013, ¶119.

different location. *See, e.g.*, EX1013 at 19. Hairing occurs due to the cohesive forces in the polymer melt, arising from its high molecular weight, just extruded and the residue remaining at the extruder tip. These cohesive forces cause thin strands of material (i.e., hairs) to form as the extruder is moved away from the location of the print. This effect operates similarly to stretching silly putty—i.e., as the material in the extruder head is stretched away from the material just extruded, small strands of the material may be formed until the two materials completely separate. These hairs can become stuck to the extruder tip. *See* EX2016 (Hickner Dep. Tr.) at 132:16–

The Challenged Claims are Patentable Under Ground 2A

- A POSITA would understand that in dual-extruder prints, the wipe pillar would be printed **after** the part before that extruder goes idle.
 - EX2013, ¶1119.

layer” is the same as printing the wipe pillar at the conclusion of every layer. In the context of “dual head prints,” a POSITA would understand that the extruder that just completed its print operation would print its wipe pillar before the other extruder begins printing on the same layer. Doing so removes the hairs on the tip of the inactive extruder so they will not contact the build while the other active head performs its print operation. For instance, in a dual-extruder printer like that

The Challenged Claims are Patentable Under Ground 2A

- Petitioner's attempt to tie *KISSlicer*'s unrelated "Wipe[mm]" setting to the wipe pillar is unavailing.
 - Reply, 28-29.
- *KISSlicer* ties "Wipe[mm]" to start up of the **printer**, not the wipe pillar.
 - EX1010 at 9-10.

Wipe [mm]: after a warm up the printer will push (prime) this amount of filament to ensure the printer is ready.

Wipe pillar

The wipe pillar is a cylinder printed before every layer to clean the extruder tip. It reduces hairing and it is extremely important in dual head prints. Can be switched off, or the position with respect to the main part can be chosen.

Destring, Suck/Prime: sets the mm of filament to be sucked and pushed forward (prime) if destring option is on.

The Challenged Claims are Patentable Under Ground 2A

- Petitioner’s attempt to tie *KISSlicer*’s unrelated “Wipe[mm]” setting to the wipe pillar is unavailing.
 - EX2013, ¶120.

“destring” suck/prime setting to address “oozing”). In other words, a POSITA would understand that the priming of the “Wipe” setting happens only once at the beginning of the print “after warm up” of the printer. There is no teaching in *KISSlicer* that the priming after warm-up of the printer is related to switching a particular print head or deposition line to an operating mode, nor is there any teaching that a wipe pillar is printed in relation to warming up the printer. *See* Pet. at 50. In fact, as discussed

The Challenged Claims are Patentable Under Ground 2A

- Claim 6 which requires terminating the purge tower at the highest layer of the material change.

6. The method of claim 1, wherein the at least one purge tower is stopped at a highest layer at which there is a material change for the printed layers of the three-dimensional part and support structure.

- However, KISSlicer specifically teaches to print a wipe pillar “**every layer**,” agnostic to any material changes.
 - EX1010, 9.

Wipe pillar

The wipe pillar is a cylinder printed before **every layer** to clean the extruder tip. It reduces hairing and it is extremely important in dual head prints. Can be switched off, or the position with respect to the main part can be chosen.

The Challenged Claims are Patentable Under Ground 2A

- Petitioner mischaracterize *KISSlicer's* "layer" as "everything that is printed by the extruder after it comes online and until the extruder goes idle again."
 - Reply, 39-40.

EX1023, ¶52. Indeed, the entire mass of material printed by an extruder in one online session would form a "layer" on the part, and KISSlicer explains clearly that the wipe pillar is printed in a purge operation before every layer.

- KISSlicer*, however, uses "layer" in the ordinary additive-manufacturing sense, referring to a single print layer.
 - EX1010, 9-10.

Layer thickness [mm]: Thickness (along Z) of the single print layer

Stacked layers (Pro only): Sets the number of external layers to be printed before printing a cumulative infill layer. For instance stacked layers = 2 means the sparse infill will be printed every second layer, with the required material do fill the double thickness gap. It allows to print the exterior with finer layers, while speeding things up while printing the infill.

First layer: sets the temperature of the first layer, usually a little bit higher to better stick to the bed

Overview of Argument

- I. Overview of the '713 Patent
- II. Overview of the Purported Prior Art
- III. The Challenged Claims were Reduced to Practice before September 2012
- IV. RepRap Article, RepRap Video, and Boyer Are Not Prior Art
- V. RepRap Article, RepRap Video, and KISSlicer Are Not Printed Publications
- VI. The “Purge Tower” of the '713 Patent Must Be a Separate Structure
- VII. The Challenged Claims are Patentable Under Ground 1
- VIII. The Challenged Claims are Patentable Under Ground 2A
- IX. Claim 5 is Patentable Under Ground 2B
- X. The Challenged Claims are Patentable Under Ground 3

Claim 5 is Patentable Under Ground 2B

- Ground 2B adds *RepRap Article* and *RepRap Video* to the Priedeman-KISSlicer combination of Ground 2A in order to challenge claim 5.

<u>Ground</u>	<u>Claims</u>	<u>Basis for Rejection</u>
1	1, 2, 5-7, 9, 16, 17	§103 – Obvious based on Leavitt (EX1004) in view of RepRap Article (EX1005) and RepRap Video (EX1006)
2A	1, 2, 6, 7, 9, 16, 17	§103 – Obvious based on Priedeman (EX1007) view of KISSlicer (EX1010)
2B	5	§103 – Obvious based on Priedeman in view of KISSlicer, RepRap Article and RepRap Video
3	1, 2, 6, 7, 9	§102 – Anticipated by Boyer (EX1008)

Pet., 1

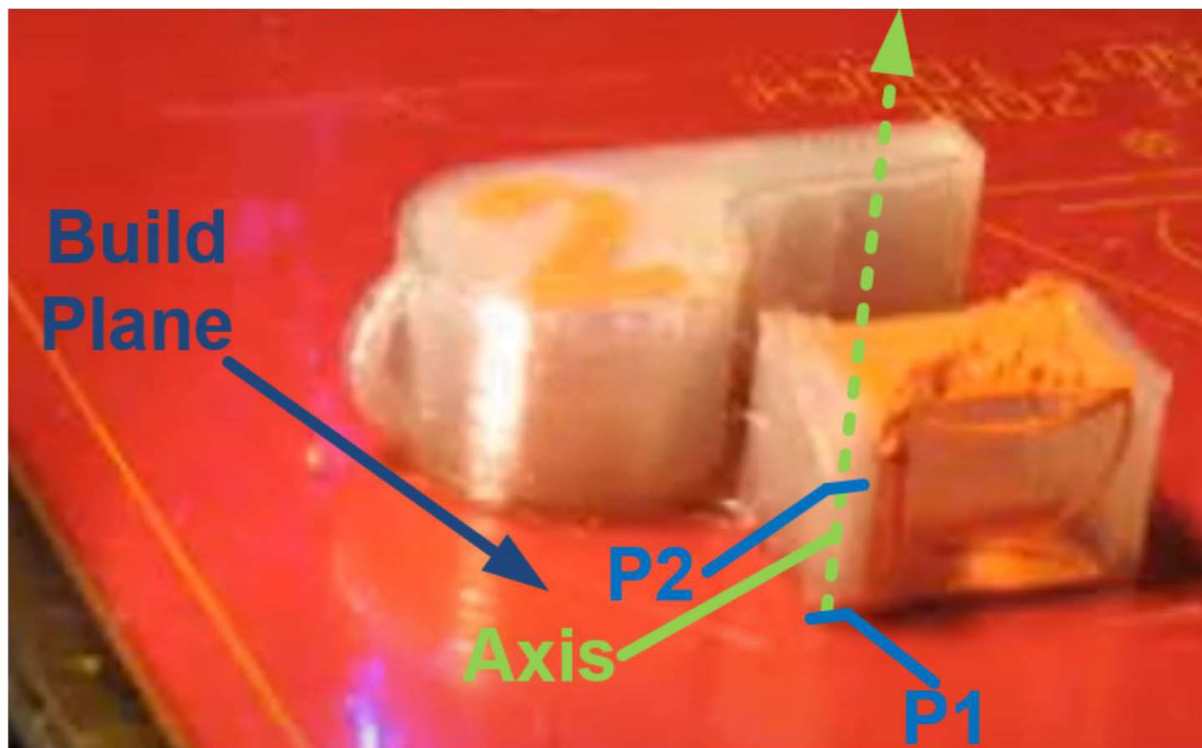
Claim 5 is Patentable Under Ground 2B

- As discussed for Ground 1, RepRap does not teach claim 5's limitation.
- Petitioner attempts to dilute claim 5 by asserting "there is no requirement ... that the purge tower never again increase in cross-sectional area."
 - Reply, 31-32.
- Petitioner's proposed motivation ("to provide a more stable and less top-heavy purge tower") undercuts Petitioner's argument that claim is satisfied merely by any reduction of cross-sectional area (regardless of increases).

A POSITA would have been motivated to implement KISSlicer's purge tower based on RepRap to provide a more stable and less top-heavy purge tower. EX1023, ¶¶56-57.

Claim 5 is Patentable Under Ground 2B

- Petitioner's own evidence demonstrates that RepRap's parking space is neither "stable" nor a "less top-heavy tower."
 - Pet., 31 (showing parking space that is falling apart at higher layers).



Overview of Argument

- I. Overview of the '713 Patent
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- V. RepRap Article, RepRap Video, and KISSlicer Are Not Printed Publications
- VI. The “Purge Tower” of the '713 Patent Must Be a Separate Structure
- VII. The Challenged Claims are Patentable Under Ground 1
- VIII. The Challenged Claims are Patentable Under Ground 2A
- IX. Claim 5 is Patentable Under Ground 2B
- X. The Challenged Claims are Patentable Under Ground 3

The Challenged Claims are Patentable Under Ground 3

- Ground 3 asserts *Boyer* against claims 1, 2, 6, 7, and 9.

<u>Ground</u>	<u>Claims</u>	<u>Basis for Rejection</u>
1	1, 2, 5-7, 9, 16, 17	§103 – Obvious based on Leavitt (EX1004) in view of RepRap Article (EX1005) and RepRap Video (EX1006)
2A	1, 2, 6, 7, 9, 16, 17	§103 – Obvious based on Priedeman (EX1007) view of KISSlicer (EX1010)
2B	5	§103 – Obvious based on Priedeman in view of KISSlicer, RepRap Article and RepRap Video
3	1, 2, 6, 7, 9	§102 – Anticipated by Boyer (EX1008)

Pet., 1

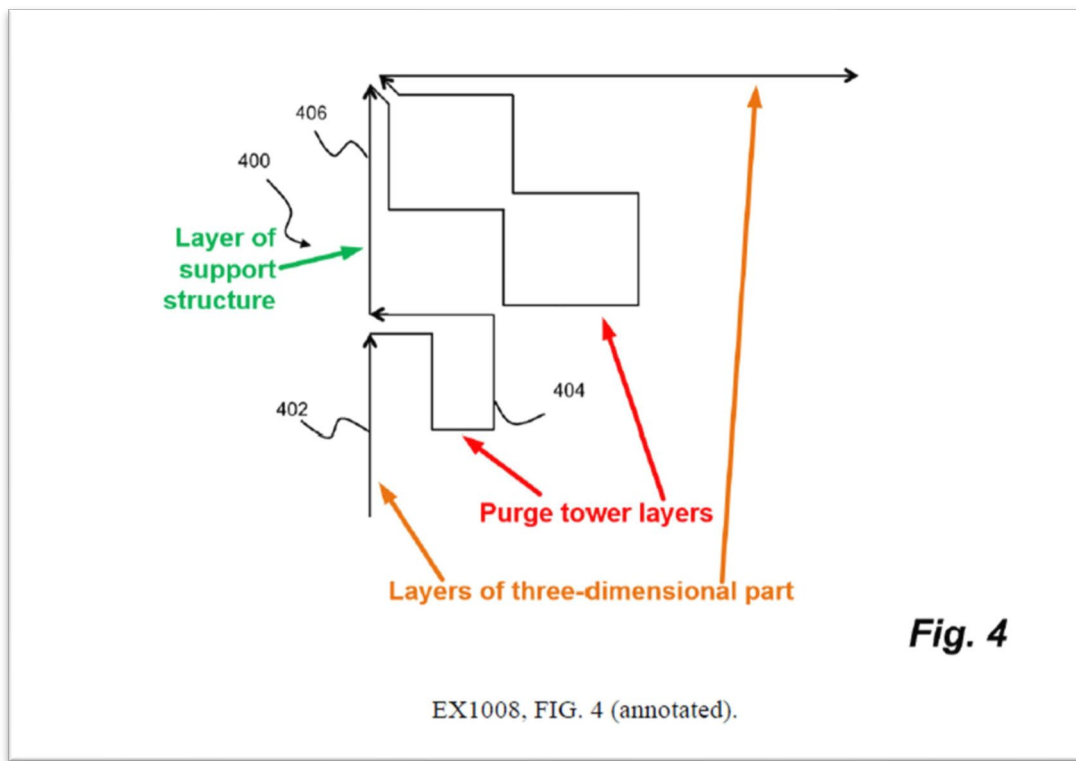
The Challenged Claims are Patentable Under Ground 3

- To establish anticipation, *Boyer* must “disclose all elements ... arranged as in the claim.”
 - *Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1369 (Fed. Cir. 2008)

Because the hallmark of anticipation is prior invention, the prior art reference—in order to anticipate under 35 U.S.C. § 102—must not only disclose all elements of the claim within the four corners of the document, but must also disclose those elements “arranged as in the claim.” *Connell v. Sears, Roebuck & Co.*, 722 F.2d 1542, 1548 (Fed.Cir.1983).⁵

The Challenged Claims are Patentable Under Ground 3

- Petitioner asserted that the tool paths in Figure 4 of *Boyer* teach claim 1.
 - Pet., 69-73.



The Challenged Claims are Patentable Under Ground 3

- Petitioner asserted that “similar” tool paths to Figure 4 of *Boyer* would be stacked to practice claim 1.
 - Pet., 73.

[1pre]-[1b]. By describing tool path 400 as a “cross-section” of a multi-material build, Boyer teaches that layers printed using a similar two-dimensional tool path can exist above and/or below FIG. 4’s cross-section. EX1008, [0018], [0024], [0032]-[0034], FIG. 4. To form a three-dimensional part, two-dimensional layers such as the one depicted in FIG. 4 are stacked on top of one another so that the transition segments of FIG. 4 correspond to *purge towers* printed in a *layer-by-layer* manner. EX1008, [0032]-[0044], FIGS. 4-5; EX1003, ¶237-238.

The Challenged Claims are Patentable Under Ground 3

- Even if similar layers “can exist” above/below a cross-section, possibility is not inherency.
 - *MEHL/Biophile Int’l Corp. v. Milgraum*, 192 F.3d 1362, 1365 (Fed. Cir. 1999)

Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing *may* result from a given set of circumstances is not sufficient. If, however, the disclosure is sufficient to show that the natural result flowing from the operation as taught would result in the performance of the questioned function, it seems to be well settled that the disclosure should be regarded as sufficient.

The Challenged Claims are Patentable Under Ground 3

- Petitioner's expert acknowledged Figure 4 is an example and there is no teaching to repeat it for multiple layers.
 - EX2016, 101:5-19; 118:17-20.

Q It's your opinion that Boyer teaches that the exact cross-section in Figure 4 is repeated for other layers.

Is that your testimony?

A So in Paragraph 34 of Boyer it states, "The representation of Figure 4 is provided for purposes of illustration only." And shown in Figure 1, denoted as 112, the three-dimensional object, a POSITA would understand that the layers of the three-dimensional object can have different cross-sections and tool paths to build up the object.

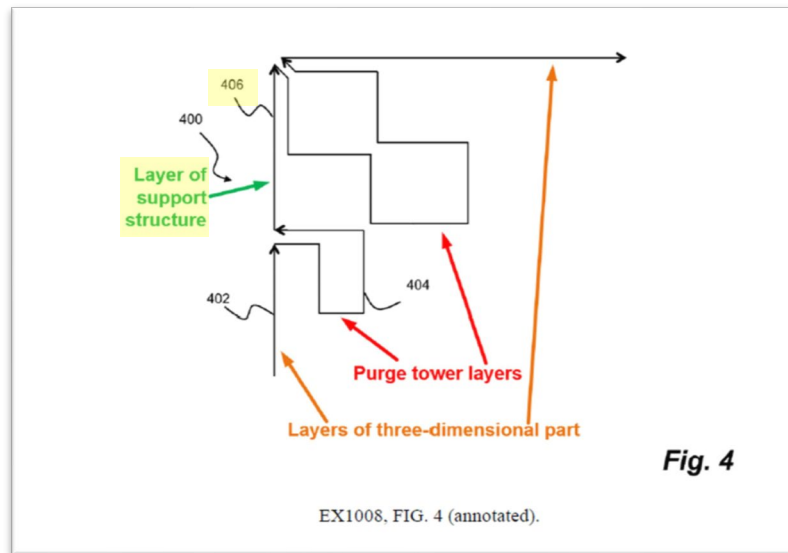
My question is a follow-on from that, that says, the transition segments associated with those segments can also be in different positions.

Correct?

A I think that's reasonable, given Figure 4 is an example. I could -- I could think about other examples. I'd have to analyze it a bit further. But -- but there are different cross-sections of three-dimensional parts. And so the arrangement of Segments 402, 404, and 406 could be different in different examples.

The Challenged Claims are Patentable Under Ground 3

- A POSITA would understand that Figure 4 does not teach a support structure, as that segment (1) is part of the main structure; and (2) would support nothing if stacked.
 - Pet., 72; EX1008 (Boyer), ¶[0032].



[0032] FIG. 4 depicts a cross section of a multi-material build. More particularly, FIG. 4 depicts a portion of a tool path using multiple build materials to obtain different colors on an exterior of an object. A first segment 402 of a tool path 400 may traverse a portion of an exterior surface of an object with a first color, such as red. The tool path 400 may then turn in toward an interior of the object and infill with a transition segment 404 between the first color and a second color, such as blue. After the transition is complete and the second color can be extruded without mixing from the first color, the tool path 400 may return to the exterior of the object and the tool path 400 may provide a third segment 406 traversing a different portion of the exterior with the second color.

The Challenged Claims are Patentable Under Ground 3

- A POSITA would understand that Figure 4 does not teach a support structure, as that segment (1) is part of the main structure; and (2) would support nothing if stacked.
 - EX2013, ¶1134.

Pet. at 72. However, a POSITA would not understand that segment 406 constitutes a “[l]ayer of support structure.” Instead, a POSITA would understand from *Boyer* itself that the exterior segments in Figure 4 (including 406) form the outside or “main structure of the object,” and that such exterior segments cannot be made from sacrificial support structures that “dissolve or break away easily.” See EX1008, ¶[0032], [0044]; see also EX1001 at 1:50-53 (“The support material adheres to the part material during fabrication, and is removable from the completed 3D part when the printing process is complete.”). A POSITA would not consider dissolving the “main structure” of a part, since doing so (1) compromises its structural integrity and (2) exposes the internal infill. As Dr. Hickner said: “a part is made of part material

The Challenged Claims are Patentable Under Ground 3

- A POSITA would understand that Figure 4 does not teach a support structure, as that segment (1) is part of the main structure; and (2) would support nothing if stacked.
 - EX2013, ¶1135.

135. Notably, if Petitioner’s position discussed below (*see infra* §X.A.2.b) is adopted—namely, that subsequent “similar” layers are printed on top of the cross-section shown in Figure 4 such that the “purge tower” is printed in a “layer-by-layer” manner—then the purported support structure 406 would serve no function as it would never contact (and thus provide no support for) the layers of the three-dimensional part. In fact, a POSITA reading *Boyer* would recognize that in a layer-

The Challenged Claims are Patentable Under Ground 3

- A POSITA would also understand that Figure 4 does not teach a purge tower, as the transition segments (1) are part of the object; and (2) would not be stacked on top on another.
 - Pet. at 72; EX1008 (Boyer), ¶[0032].

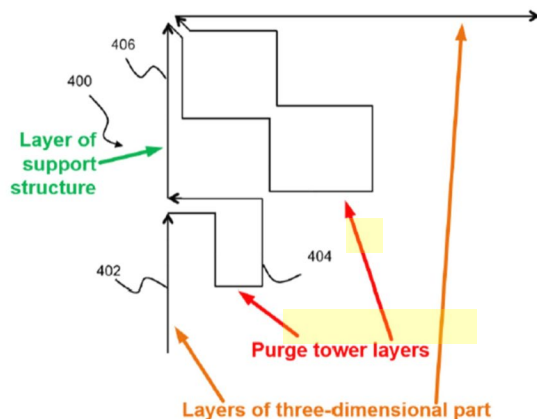


Fig. 4

EX1008, FIG. 4 (annotated).

[0032] FIG. 4 depicts a cross section of a multi-material build. More particularly, FIG. 4 depicts a portion of a tool path using multiple build materials to obtain different colors on an exterior of an object. A first segment 402 of a tool path 400 may traverse a portion of an exterior surface of an object with a first color, such as red. The tool path 400 may then turn in toward an interior of the object and infill with a transition segment 404 between the first color and a second color, such as blue. After the transition is complete and the second color can be extruded without mixing from the first color, the tool path 400 may return to the exterior of the object and the tool path 400 may provide a third segment 406 traversing a different portion of the exterior with the second color.

The Challenged Claims are Patentable Under Ground 3

- A POSITA would also understand that Figure 4 does not teach a purge tower, as the transition segments (1) are part of the object; and (2) would not be stacked on top on another.
 - EX2013 (Osswald Decl.), ¶138; EX1013 (Practical 3D Printers) at 62.

color. *Id.* A POSITA would understand that an “infill” like “transition segment 404” is used to “help[] support the sides of the model” and “provide[] enough of a structure for the model to print well and hold up,” (EX1013 at 62, 64), and that “infill” does not constitute a “purge operation.”² As such, while *Boyer* generally

The subsequent layers will be printed at the specified infill density percentage, in this case 10 percent, using one of the specified infill patterns. The infill provides enough of a structure for the model to print well and hold up, while also saving on material and overall print time. For example, this scaled-down model of a bunny printed at 100 percent infill would take 51 minutes to print; while printing the model at 10 percent infill would reduce the time to only 22 minutes. The 10 percent infill version also only uses 1.3 meters of filament as opposed to 4.3 meters with the solid print, saving you a significant amount of plastic.

The Challenged Claims are Patentable Under Ground 3

- A POSITA would also understand that Figure 4 does not teach a purge tower, as the transition segments (1) are part of the object; and (2) would not be stacked on top on another.
 - EX2013 (Osswald Decl.), ¶140.

(“there can be mixing in segment 404”). A POSITA would understand that such a transition segment, if contiguous with the three-dimensional part as shown in *Boyer*’s Figure 4 (Petitioner’s annotated version below), would adhere to the three-dimensional part and not be easily removed and disposed of. As noted above, the ‘purge tower’ shown in Figure 4, as annotated by Petitioner, would either be entrapped within the part or require removal. Breaking off such a structure would leave marks that compromise both cosmetic and structural integrity.

The Challenged Claims are Patentable Under Ground 3

- A POSITA would also understand that Figure 4 does not teach a purge tower, as the transition segments (1) are part of the object; and (2) would not be stacked on top on another.
 - EX2008 (Boyer), ¶[0033]; EX2013 (Osswald Decl.), ¶145.

[0033] The ability to position different segments, and in particular transition segments, at suitable locations along a tool path in order to achieve specific colors (or more generally build materials) at specific locations within the object depends in part on how material flows through an extrusion nozzle. To be sure, one simple approximation can rely on the

any other layers. Notably, Boyer's application involves color changes, which may occur at any location on the outer surface of a part, depending on the intended pattern. For example, in a blue surface with red polka dots, each transition from blue to red or red to blue would occur at different positions, meaning the transition segments would not align. Even with vertical outer walls, this variability creates problems, preventing layer-by-layer construction of a purge tower.

The Challenged Claims are Patentable Under Ground 3

- Petitioner's expert acknowledged Figure 4 is an example and there is no teaching to repeat it for multiple layers (i.e., no purge *towers*).
 - EX2016, 101:5-19, 118:17-20.

Q It's your opinion that Boyer teaches that the exact cross-section in Figure 4 is repeated for other layers.

Is that your testimony?

A So in Paragraph 34 of Boyer it states, "The representation of Figure 4 is provided for purposes of illustration only." And shown in Figure 1, denoted as 112, the three-dimensional object, a POSITA would understand that the layers of the three-dimensional object can have different cross-sections and tool paths to build up the object.

My question is a follow-on from that, that says, the transition segments associated with those segments can also be in different positions.

Correct?

A I think that's reasonable, given Figure 4 is an example. I could -- I could think about other examples. I'd have to analyze it a bit further. But -- but there are different cross-sections of three-dimensional parts. And so the arrangement of Segments 402, 404, and 406 could be different in different examples.

The Challenged Claims are Patentable Under Ground 3

- Even if similar layers “can exist” above/below a cross-section, possibility is not inherency.
 - *MEHL/Biophile Int'l Corp. v. Milgraum*, 192 F.3d 1362, 1365 (Fed. Cir. 1999)

Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing *may* result from a given set of circumstances is not sufficient. If, however, the disclosure is sufficient to show that the natural result flowing from the operation as taught would result in the performance of the questioned function, it seems to be well settled that the disclosure should be regarded as sufficient.

The Challenged Claims are Patentable Under Ground 3

- Petitioner tries to distance itself from its Figure 4 theory, contending that “Stratasy improperly focuses on the specific example of Boyer’s FIG. 4.”
 - Reply, 32.
- But Petitioner’s contention that various pieces of *Boyer* could be cobbled together to reach claim 1 is insufficient to establish anticipation.
 - *Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1371 (Fed. Cir. 2008)

tation marks omitted)). Thus, it is not enough that the prior art reference discloses part of the claimed invention, which an ordinary artisan might supplement to make the whole, or that it includes multiple, distinct teachings that the artisan might somehow combine to achieve the claimed invention. See *Arkley*, 455 F.2d at 587 (“[T]he [prior art] reference must clearly and unequivocally disclose the claimed [invention] or direct those skilled in the art to the [invention] without *any* need for picking, choosing, and combining various disclosures not directly related to each other by the teachings of the cited reference.”).

The Challenged Claims are Patentable Under Ground 3

- Petitioner's attempt to pivot and now rely upon Boyer's disclosure of "sacrificial material deposited outside ... the object" does not save its argument
 - Reply, 34; EX1008, ¶134.

[0034] The representation of FIG. 4 is provided for purposes of illustration only, and it will be readily appreciated that the tool path may include any number of excursions from the exterior surface, including excursions into the interior (which may follow an existing infill pattern—the geometric pattern used to fill the interior of an object—or depart from an existing infill pattern to deposit, e.g., within void spaces between infilling boundaries) or outside the exterior of the object where sacrificial build material may be extruded during transitions from one color (or material) to the next. It will

- Nothing in *Boyer* requires that any "outside-object" transition be repeated at the same x-y location across layers to create a tower.
 - EX1008, ¶¶34-40.

The Challenged Claims are Patentable Under Ground 3

- Because *Boyer* does not teach independent claim 1, the dependent claims also survive.
- Petitioner also concedes that Claim 6 is not satisfied by *Boyer*.
 - See POR, 97-99; Reply, 31-34; PO Sur-Reply, 27-28.

C. Ground 3 does not disclose claim 6's additional element

Boyer also does not disclose claim 6's requirement that "the at least one purge tower is stopped at a highest layer at which there is a material change for the printed layers of the three-dimensional part and support structure." EX2013, ¶¶146-149. Petitioner contends that "[b]ecause *Boyer* discloses that the printer deposits a transition segment in response to each material change, this means that the printer stops printing transition segments (and therefore stops printing the purge tower) at the highest layer at which there is a material change" Pet. at 75. However, a POSITA would not understand "the printer stops printing transition segments ... at the highest layer at which there is a material change" (Pet. at 75) to disclose that "*the at least one purge tower* is stopped at a highest layer at which there is a material

POR, 97