

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SHENZHEN TUOZHU TECHNOLOGY CO., LTD.,
Petitioner,

v.

STRATASYS, INC.,
Patent Owner.

IPR2025-00611
Patent 11,886,774 B2

Before MITCHELL G. WEATHERLY, CHRISTOPHER L. OGDEN, and
BRIAN D. RANGE, *Administrative Patent Judges*.

OGDEN, *Administrative Patent Judge*.

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

I. INTRODUCTION

Petitioner Shenzhen Tuo Zhu Technology Co., Ltd. (“Petitioner”)¹ filed a Petition (Paper 2, “Pet.”) under 35 U.S.C. §§ 311–319 requesting *inter partes* review of claims 1–10, 12, 13, 19, and 20 of U.S. Patent No. 11,886,774 B2 (Ex. 1001, “the ’774 patent”). Patent Owner Stratasys, Inc. (“Patent Owner”) filed a Preliminary Response (Paper 8, “Prelim. Resp.”).²

Under the authority delegated to us under 37 C.F.R. § 42.4(a),³ we may institute an *inter partes* review when “the information presented in the petition . . . and any response . . . shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” 35 U.S.C. § 314(a); *see also* 37 C.F.R. § 42.108(c). Applying that standard, we institute an *inter partes* review of all the challenged claims of the ’774 patent based on all grounds set forth in the

¹ Petitioner identifies itself; Bambulab Limited; Shanghai Lunkuo Technology Co., Ltd.; Tuo Zhu Technology Limited; and Bambulab USA Inc. as potential real parties in interest. Pet. 89.

² Patent Owner identifies itself and Stratasys Ltd. as the real parties in interest. Paper 3, 2.

³ By regulation, “[t]he Board institutes the trial on behalf of the Director [of the United States Patent and Trademark Office].” 37 C.F.R. § 42.4(a). However, then-Acting Director Coke Morgan Stewart personally considered Patent Owner’s request for denial of institution on discretionary grounds. Declining this request, she referred the matter to us to determine whether to institute trial based on “the merits and other non-discretionary considerations, as appropriate.” Paper 10, 3–4.

Petition for the reasons explained below. This is a preliminary decision, and we will base our final written decision on the full trial record.

II. BACKGROUND

A. THE '774 PATENT (EX. 1001)

The '774 patent describes a method of querying a target 3D printer for configuration information and receiving a dictionary of such information, which is used to create a fabrication profile for generating a 3D object. Ex. 1001, code (57), 21:19–24:22. Then, the system generates a machine-ready representation of the 3D model. *Id.* at 24:23–25:12.

The target 3D printer's "configuration information" (also called "properties") includes "information, capabilities, features, functions, configurations, data, and the like relevant to the fabrication of an object." Ex. 1001, 19:15–17. For example, it may include "a hardware configuration of the target printer, a software configuration, a user setting or preference, or a firmware configuration of the target printer." *Id.* at 19:22–25; *see also id.* at 1:28–30; *id.* at 19:26–21–18 (describing various other examples of configuration information).

The "dictionary of configuration information" received from the target 3D printer "may be a list or collection of the properties, or may be otherwise configured to organize the properties of the printer, e.g., for readability and use by a print server, slicing engine, user, other resource, or the like." Ex. 1001, 21:24–28.

The "fabrication profile" can include "information for generating machine-ready representations for the target printer," and may "include[] the dictionary" or "may also or instead be a profile used to determine which

machine-ready representation is available or suitable for a target printer.” *Id.* at 23:40–52.

The “machine-ready representation” can be a “model of the three[-]dimensional model of the object that is executable by a target printer to fabricate the object.” *Id.* at 24:27–29.

B. CHALLENGED CLAIMS AND GROUNDS

Independent claim 1 is as follows:

- [1.pre] 1. A method comprising:
 - [1.1] receiving a request to fabricate an object from a three-dimensional model;
 - [1.2] determining a target printer to fabricate the object;
 - [1.3] querying the target printer for configuration information of the target printer relevant to creation of a printable model for fabrication of the object on the target printer;
 - [1.4] receiving, from the target printer, a dictionary of configuration information containing one or more properties from the target printer that affect fabrication capabilities of the target printer;
 - [1.5] creating a fabrication profile based on the one or more properties; and
 - [1.6] generating a machine-ready representation of the three-dimensional model executable by the target printer to fabricate the object.

Ex. 1001, 35:18–32 (Petitioner’s reference numbers and formatting added);
accord Pet. v.

Petitioner argues nine grounds for *inter partes* review, as summarized in the following table (*see* Pet. 1–2):

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
1–5, 9, 10, 12, 13, 20	103	Douglas, ⁴ Mark ⁵
6, 7, 9, 10	103	Douglas, Mark, Dahlin ⁶
8	103	Douglas, Mark, Batchelder ⁷
19	103	Douglas, Mark, Pax ⁸
1–5, 9, 10, 12, 13	103	Hamilton, ⁹ Evans, ¹⁰ KISSlicer ¹¹
6, 7, 19	103	Hamilton, Evans, Pax, KISSlicer
19	103	Hamilton, Evans, Pax, Pettis, ¹² KISSlicer
8	103	Hamilton, Evans, Batchelder, KISSlicer
20	103	Hamilton, Evans, Batchelder, KISSlicer

C. DECLARATORY TESTIMONY

Petitioner submits a declaration by Dr. Michael Hickner. Ex. 1003; *see also* Ex. 1004 (Dr. Hickner’s curriculum vitae). Patent Owner does not submit expert declaratory testimony at this stage.

⁴ Douglas et al., US 2014/0117585 A1, published May 1, 2014 (Ex. 1005).

⁵ Mark et al., US 9,694,544 B2, published Jul. 4, 2017 (Ex. 1006).

⁶ Dahlin et al., EP 1 087 862 B1, published July 29, 1999 (Ex. 1008).

⁷ Batchelder et al., US 2014/0127524 A1, published May 8, 2014 (Ex. 1007).

⁸ Pax, WO 2014/039825 A2, published Mar. 13, 2014 (Ex. 1013).

⁹ Hamilton et al., US 2014/0236773 A1, published Aug. 21, 2014 (Ex. 1010).

¹⁰ Brian Evans, *Practical 3D Printers: The Science and Art of 3D Printing* (2012) (Ex. 1011).

¹¹ KISSlicer Quick-Start Guide (2012), available at <http://archive.org> as an archive of <http://www.kisslicer.com/download.html> (accessed Feb. 15, 2012) (Ex. 1012).

¹² Pettis et al., US 2013/0329258 A1, published Dec. 12, 2013 (Ex. 1009).

D. RELATED PROCEEDINGS

As related matters, the parties identify *Stratasys, Inc. v. Shenzhen TuoZhu Technology Co. Ltd.*, No. 2:24-cv-00644, -00645 (E.D. Tex. filed Aug. 8, 2024; consolidated); *BambuLab USA, Inc. et al. v. Stratasys, Inc.*, 1:24-cv-01511 (W.D. Tex. filed Dec. 9, 2024; terminated May 5, 2025). Pet. 90; Paper 3, 2.

III. GROUNDS OF THE PETITION

For the reasons below, we determine that Petitioner has demonstrated a reasonable likelihood that it would prevail in showing that at least one of the challenged claims of the '774 patent is unpatentable under a ground set forth in the Petition.

A. LEVEL OF ORDINARY SKILL IN THE ART

The level of ordinary skill in the pertinent art at the time of the invention is a factor in how we construe patent claims. *See Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–13 (Fed. Cir. 2005) (en banc). It is also one of the factors we consider when determining whether a patent claim is obvious over the prior art. *See Graham v. John Deere Co. of Kan. City*, 383 U.S. 1, 17–18 (1966).

To assess the level of ordinary skill, we construct a hypothetical “person of ordinary skill in the art,” from whose vantage point we assess obviousness and claim interpretation. *See In re Rouffet*, 149 F.3d 1350, 1357 (Fed. Cir. 1998). This legal construct “presumes that all prior art references in the field of the invention are available to this hypothetical skilled artisan.” *Id.* (citing *In re Carlson*, 983 F.2d 1032, 1038 (Fed. Cir. 1993)).

Petitioner argues that a person of ordinary skill in the art would have had “a bachelor’s degree in Mechanical Engineering, Computer Engineering, Electrical Engineering, or a comparable field and at least two years of experience related to 3D printers and software including remote control of rapid fabrication systems.” Pet. 3 (citing Ex. 1003 ¶¶ 19–21).

Patent Owner argues that a person of ordinary skill in the art would have had “a bachelor’s degree in Mechanical Engineering, Computer Engineering, Electrical Engineering, Chemical Engineering, Materials Science, or a comparable field and at least two years of experience related to 3D printing.” Prelim. Resp. 9.

The parties agree that experience could substitute for a degree, and vice versa. Pet. 3 (citing Ex. 1003 ¶¶ 19–21); Prelim. Resp. 9.

The parties’ proposed levels of ordinary skill are substantially similar. Although we discern no difference in the outcome of this decision from choosing one over the other, we adopt Petitioner’s proposal for this decision. Only Petitioner’s proposed level is supported by testimonial evidence on the preliminary record, and it appears to be consistent with the problems addressed in the ’774 patent. *See* Ex. 1001, 1:16–52. Therefore, we adopt Petitioner’s proposal for this decision.

B. CLAIM CONSTRUCTION

In an IPR, we construe a patent claim “using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. 282(b).” 37 C.F.R. § 42.100(b). This generally includes “construing the claim in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in

the art and the prosecution history pertaining to the patent.” *Id.* The ordinary and customary meaning of a claim term “is its meaning to the ordinary artisan after reading the entire patent,” and “as of the effective filing date of the patent application.” *Phillips*, 415 F.3d at 1313, 1321.

Neither Petitioner nor Patent Owner argues that we need to construe any claim terms explicitly. *See* Pet. 2–3; Prelim. Resp. 9. However, the parties’ positions depend on interpreting the claim language in a particular way, and we discuss the relevant claim language below in the context of the parties’ arguments regarding the prior art. *See Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019) (“The Board is required to construe ‘only those terms . . . that are in controversy, and only to the extent necessary to resolve the controversy.’” (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

C. GROUNDS BASED ON DOUGLAS AND MARK

Because Patent Owner does not separately challenge Petitioner’s arguments on a claim-by-claim basis, we focus on claim 1 for our decision of whether to institute an IPR. *See* Prelim. Resp. 12–35. Petitioner argues claim 1 is unpatentable under 35 U.S.C. § 103 as obvious over Douglas and Mark. *See* Pet. 4–23.

A claim is unpatentable under § 103 “if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains.” 35 U.S.C. § 103; *see KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). When a ground in a petition is based on a

combination of references, we consider “whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue.” *KSR*, 550 U.S. at 418 (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)).

We base our obviousness inquiry on factual considerations including (1) the scope and content of the prior art, (2) any differences between the claimed subject matter and the prior art, (3) the level of skill in the art, and (4) any objective indicia of obviousness or non-obviousness that may be in evidence. *See Graham*, 383 U.S. at 17–18.

Considering the above principles, we determine that Petitioner has shown a reasonable likelihood that claim 1 would have been obvious over Douglas and Mark for the reasons explained below.

1. Overview of Douglas

Douglas describes a system in which a 3D printer reads a data tag on a spool or cartridge containing a build material, the tag containing information about the build material. Ex. 1005, code (57). Using that information, the printer will “determine how to use the build material during fabrication of a three-dimensional object.” *Id.*

Douglas’s system is part of a networked environment as depicted in Figure 2, reproduced below:

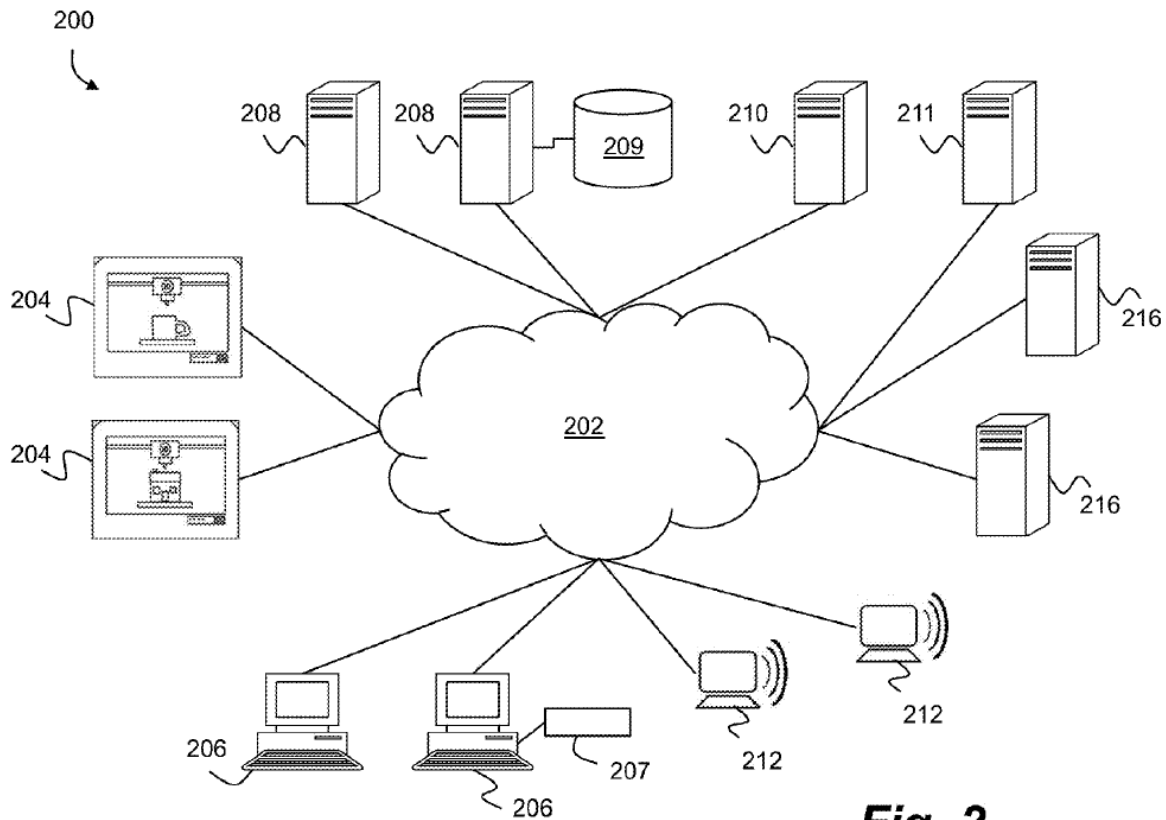


Fig. 2

Figure 2 shows “networked three-dimensional printing environment” 200, which includes data network 202 interconnecting various devices including client devices 206, print server 208 and 3D printers 204. Ex. 1005 ¶ 26. Client devices 206 “initiate, manage, monitor, [and] otherwise interact with print jobs at the three-dimensional printers 204.” *Id.* ¶ 30.

Print servers 208 include processing circuitry to “perform a variety of processing tasks related to management of networked printing.” *Id.* ¶ 32. For example, print server 208 may “communicate periodically with three-dimensional printers 204 in order to obtain status information concerning, e.g., availability of printers and/or the status of particular print jobs.” *Id.* Print servers 208 may select a particular 3D printer (204) automatically or in response to a user request. *Id.*

Spools of build material may include a data tag that “characterize[s] at least one property of the build material,” including any “characteristic information appropriate for a three-dimensional printer.” Ex. 1005 ¶ 64; *see also id.* ¶ 94 (the tag may include information about mechanical, structural, or thermal properties of the build material). A 3D printer “may transmit the data tag . . . data to one of the remote sources configured for determination of . . . operational parameters and the appropriate remote source may transmit the determined operational parameters back to the three-dimensional printer . . . for fabrication of the object.” *Id.* ¶ 72. Such a remote source may include print server 208. *Id.* ¶ 74. The “operational parameters” can include information such as “an extruder temperature, a feed rate, a build platform temperature,” or any other “parameter that can be controlled by the three-dimensional printer.” *Id.* ¶¶ 65, 97.

2. *Overview of Mark*

Mark describes a method of slicing the 3D geometry of an object to be printed in a 3D printer, so that a fill tool can follow a toolpath to build the object layer-by-layer. Ex. 1006, code (57). The “toolpaths are used to create an instruction file for actuation, conventionally called a ‘G-code’^[13] file, which is sent to the 3D printer.” *Id.* at 12:15–17. This “G-code” file includes “all starting and finishing times, control or command variables (e.g., speed for a motor, current for a heater), and the like, to arrange the actuator instructions sufficient for a job to complete.” *Id.* at 12:20–23.

¹³ According to the ’774 patent, “g-code” was known in the prior art as a “machine-ready representation” of a 3D model. *See* Ex. 1001, 25:33–34.

The process of creating toolpaths may include using a set of rules and parameters, stored in a database or a configuration file, “that control path planning for each layer.” Ex. 1006, 17:24–58, Figs. 20, 21.

3. *Preamble (1.pre)*

The preamble of claim 1 recites “[a] method.” Ex. 1001, 35:18.

Petitioner argues that Douglas discloses a method. Pet. 10–11 (citing Ex. 1005 ¶¶ 11–15, Figs. 1, 6, claims 18–21; Ex. 1003 ¶ 47).

Patent Owner does not specifically address this argument. *See* Prelim. Resp. Without determining whether the preamble is limiting, we find Petitioner’s argument sufficiently persuasive at this stage, for the reasons set forth in the Petition.

4. *Limitation 1.1*

Limitation 1.1 recites “receiving a request to fabricate an object from a three-dimensional model.” Ex. 1001, 35:19–20.

Petitioner argues that Douglas’s print servers 208 receives print jobs from client devices 206, which are requests to fabricate objects from 3D models. Pet. 11–12 (citing Ex. 1005 ¶¶ 30–46, 52, Fig. 2; Ex. 1001, 18:10–41; Ex. 1003 ¶ 48).

Patent Owner does not specifically address this argument. *See* Prelim. Resp. We find Petitioner’s argument for limitation 1.1 sufficiently persuasive at this stage, for the reasons set forth in the Petition.

5. *Limitations 1.2 and 1.3*

Limitations 1.2 and 1.3 recite “determining a target printer to fabricate the object; [and] querying the target printer for configuration information of

the target printer relevant to creation of a printable model for fabrication of the object on the target printer.” Ex. 1001, 35:21–24.

Petitioner argues that in Douglas’s system, print server 208 can automatically select one of 3D printers 204 within networked environment 200 as a target printer. Pet. 12–13 (citing Ex. 1005 ¶¶ 32, 38–43, 73, Fig. 2; Ex. 1003 ¶ 49). Petitioner also contends that print server 208 requests the target 3D printer to transmit tag data relating to properties such as build material type, which is relevant to creating a printable model for fabricating the object. Pet. 13–14 (citing Ex. 1005 ¶¶ 2, 32, 64, 72–73, 94, Figs. 2, 6; Ex. 1001, 22:56–23:5; Ex. 1003 ¶¶ 50–51).

In response, Patent Owner argues that “Petitioner fails to explain how the print server determines a target printer to fabricate the object and then requests from the target printer configuration information of the target printer.” Prelim. Resp. 12. According to Patent Owner, Douglas’s print server “determines the target printer . . . after requesting information” from printers only as an input for the print server’s process for allocating print requests to all available 3D printers. *Id.* at 13 (citing Ex. 1005 ¶ 74).

At this stage, we find Petitioner’s arguments sufficiently persuasive. Patent Owner is correct that Douglas discloses that a 3D printer’s “build material information” may be stored for later use “as an input to a process on the print server for allocating print requests to various three-dimensional printers.” Ex. 1005 ¶ 74. But in another embodiment, Douglas discloses that remote client device 206 receives a request to print an object on a particular 3D printer within the network (“printer 306” as depicted in Figure 3 of Douglas), and then client device 206 requests printer 306 to transmit its tag data so that client device 206 can determine what operational parameters to

send back to printer 306. *Id.* ¶¶ 60, 73. In this embodiment, it appears that the step of selecting printer 306 as the target printer (limitation 1.2) occurs before querying printer 306 for configuration information (limitation 1.3).

Douglas also discloses that print server 208 may automatically select a target printer using “any number of criteria . . . such as geographical proximity, printing capabilities, current print queue, fees (if any) for use of a particular three-dimensional printer 204, and so forth.” Ex. 1005 ¶ 32. These criteria do not necessarily include, or depend on, the 3D printer’s tag data obtained in limitation 1.3.

In addition, it is not clear, based on the preliminary record, that claim 1 imposes an ordering such that the step reflected in limitation 1.2 must be performed before the step reflected in limitation 1.3. *See* Ex. 1001, 35:21–24. *See Interactive Gift Exp., Inc. v. Compuserve Inc.*, 256 F.3d 1323, 1342 (Fed. Cir. 2001) (“Unless the steps of a method actually recite an order, the steps are not ordinarily construed to require one.” (citing *Loral Fairchild Corp. v. Sony Corp.*, 181 F.3d 1313, 1322 (Fed. Cir. 1999))). One might regard a “target printer” as any printer that is ultimately selected for fabricating the object, and such a printer could send its configuration information either before or after that determination is made in limitation 1.2.

We note that the ’774 patent discloses embodiments in which “numerous queries are sent to numerous printers, e.g., for use in selecting one or more of the printers as the target printer,” or “sent to a printer that is not necessarily the target printer as described herein, e.g., when the query or information received from a response to the query is used for the selection of the target printer.” Ex. 1001, 19:9–14. These embodiments appear to suggest

that after queries are sent to several printers, one of which might be the target printer (limitation 1.3), and it is determined that one of these printers is the target printer based on the received configuration information (limitation 1.2). We invite the parties to address this claim-construction issue at trial.

For the above reasons, we determine that Petitioner has sufficiently shown, at this stage, that Douglas discloses limitations 1.2 and 1.3.

6. *Limitation 1.4*

Limitation 1.4 recites “receiving, from the target printer, a dictionary of configuration information containing one or more properties from the target printer that affect fabrication capabilities of the target printer.” Ex. 1001, 35:25–28.

Petitioner argues that, according to the ’774 patent, the recited dictionary of configuration information “may be a list or collection of properties, or may be otherwise configured to organize the properties of the printer.” Pet. 14 (citing Ex. 1001, 21:24–26). According to that disclosure, Petitioner argues that Douglas’s tag data received from printer 204 is a “dictionary” of configuration information as recited in limitation 1.4, given that the tag data includes information about build material characteristics. Pet. 14–15 (citing Ex. 1005 ¶¶ 19, 32, 62–64, 72–73, 97, Figs. 2, 6; Ex. 1003 ¶¶ 52–53).

In response, Patent Owner argues that Petitioner improperly relies on expert testimony to fill in details as to how Douglas’s tag data constitutes a dictionary of configuration information. Prelim. Resp. 13–14 (citing *Arendi S.A.R.L. v. Apple Inc.*, 832 F.3d 1355, 1361 (Fed. Cir. 2016); 35 U.S.C. § 311(b)). Patent Owner contends that Douglas only discloses that “data

concerning a type of build material’ can be provided to a controller without explaining how the data is provided.” *Id.* at 15 (quoting Ex. 1005 ¶ 63) (citing Ex. 1005 ¶ 64). Thus, according to Patent Owner, “Douglas does not teach how its data is provided from the printer and received by the print server and thus does not teach receiving a dictionary of configuration information containing one or more properties from the target printer that affect fabrication capabilities of the target printer.” *Id.*

At this stage, we find Petitioner’s argument sufficiently persuasive. Petitioner relies not just on expert testimony, but on the disclosure of Douglas and a claim-construction argument based on the ’774 patent. *See* Pet. 14–15. The ’774 patent disclosure appears to describe a “dictionary” in broad terms, including “a list or collection of properties,” or properties organized “for readability and use by a print server, slicing engine, user, or resource, or the like.” Ex. 1001, 21:24–28; *see also id.* at 22:37–38 (“In general, the dictionary may be provided in any suitable format.”); *id.* at 22:43–46 (“[T]he dictionary may include properties of a printer, and information pertaining to the properties of the printer, at any desired level of granularity . . .”).

Based on the preliminary evidence, Douglas discloses that a target printer sends a collection of properties relevant to creating a printable model for fabricating the object on the target printer. The data tag “characterize[s] at least one property of the build material,” including any “characteristic information appropriate for a three-dimensional printer.” Ex. 1005 ¶ 64. For example, this may include information about mechanical, structural, or thermal properties of the build material. *Id.* ¶ 94. Claim 1 does not appear to meaningfully restrict the *form* of this collection of properties.

Thus, we determine that Petitioner has sufficiently shown, at this stage, that Douglas discloses limitation 1.4.

7. *Limitation 1.5*

Limitation 1.5 recites “creating a fabrication profile based on the one or more properties [received from the target printer].” Ex. 1001, 35:29–30.

Petitioner identifies the recited “fabrication profile” with the “operational parameters” disclosed in Douglas. *See* Pet. 15–17. Petitioner argues that Douglas’s “operational parameters” are based on the received tag data (i.e., the recited “dictionary of configuration information”) and are used as a profile for fabrication the object. Pet. 16–17 (citing Ex. 1005 ¶¶ 64–69, 73, 77, 97, 99; Ex. 1001, 23:34–41, 23:50–52; Ex. 1003 ¶¶ 55–56).

According to Petitioner, a person of ordinary skill in the art “would have recognized and found obvious that determining operational parameters for fabrication of the object would have been ‘creating a fabrication profile’ as these operational parameters are used ‘for a fabrication process using the build material . . .’ and ‘for the fabrication of the object . . .’” Pet. 15 (citing Ex. 1005 ¶¶ 64, 74; Ex. 1003 ¶ 54).

In addition, Petitioner argues that Mark’s “G-code” file is a fabrication profile created from the operational parameters in Mark’s configuration file. Pet. 17–19 (citing Ex. 1005 ¶¶ 65–66; Ex. 1006, 17:34–44, 11:33–65, 13:4–19, 17:53–58, Figs. 5–7, 20, 21; Ex. 1001, 23:58–67; Ex. 1003 ¶ 57). According to Petitioner, a person of ordinary skill in the art would have had reason “to organize Douglas’ operational parameters into a ‘profile,’” such as Mark teaches, “at least because organizing these parameters in such a data structure facilitates the use of these parameters for the generation of toolpaths/G-code, and provide better storage and computational efficiency,

and allow easier rendering of such operational parameters for user view in a user interface.” Pet. 19 (citing Ex. 1005 ¶¶ 65–66, Figs. 10, 20, 21; Ex. 1006, 11:33–65, 13:4–19, 17:34–44, 17:53–58, Figs. 5–7, 9, 10, 21, 22; Ex. 1003 ¶¶ 58–59); *see also* Pet. 8–10 (citing Ex. 1003 ¶¶ 40–46) (arguing reasons why a person of ordinary skill in the art would have combined Douglas’s system with Mark’s slicer and tool-path generator).

In response, Patent Owner characterizes Petitioner’s argument as improper hindsight because “[t]here is no evidence cited or explanation provided that using operational parameters in a fabrication process creates a fabrication profile,” or that the alleged benefits identified by Petitioner would materialize. Prelim Resp. 16–19. Patent Owner also argues that in Douglas, “the operational parameters are sent to the printer rather than being used to generate toolpaths,” and Petitioner has not explained why a person of ordinary skill in the art would further modify Douglas to organize the operational parameters into a fabrication profile. *Id.* at 18–19 (citing Ex. 1005 ¶ 73).

Patent Owner also contends that a person of ordinary skill in the art would not have combined Douglas with Mark because (1) Douglas only sends operational parameters to the printer, and (2) Mark only receives G-code, not operational parameters. Prelim. Resp. 19–20 (citing Ex. 1006, Figs. 5, 20). Thus, “any parameters viewed according to Mark are not and do not correspond to one or more properties that are from the target printer and that affect fabrication capabilities of the target printer, and any parameters according to Douglas are not viewed but rather are sent to the printer.” *Id.* at 20.

At this stage, we find Petitioner’s arguments persuasive and disagree with Patent Owner. Patent Owner appears to equate a “fabrication profile” with a toolpath description, but nothing in the plain language of claim 1 supports that narrow interpretation. The ’774 patent describes a “fabrication profile” broadly and states that the profile can simply “include the dictionary [of configuration information],” or be “used to determine which machine-ready representation is available or suitable for a target printer.” Ex. 1001, 23:49–52. The preliminary evidence suggests that Douglas’s “operational parameters” would count as a “fabrication profile” because it is “the basis for generation of a machine-ready representation of the three-dimensional model that is executable on the target printer.” *Id.* at 23:37–39; *see infra* Section III.C.8.

We also disagree that Petitioner’s argument is impermissible hindsight, because it is based on the disclosures in Douglas and Mark, and Petitioner has articulated a sufficiently persuasive reason to combine those references without referring to the ’774 patent itself. *See In re McLaughlin*, 443 F.2d 1392, 1395 (CCPA 1971) (an obvious rationale is not improper hindsight if it “takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made and does not include knowledge gleaned only from applicant’s disclosure”).

Finally, Petitioner appears to rely on Mark for providing a particular example of a fabrication profile, not to replace Douglas’s overall system in which the 3D printer can receive “operational parameters” rather than just G-code. *See* Pet. 8–10, 17–23; *see also* Ex. 1005 ¶ 41 (the print queue, which stores tool instructions, may be maintained locally on printers 204 or on print servers 208); *see In re Mouttet*, 686 F.3d 1322, 1332 (Fed. Cir.

2012) (“[A] determination of obviousness based on teachings from multiple references does not require an actual, physical substitution of elements.” (citing *In re Etter*, 756 F.2d 852, 859 (Fed. Cir. 1985) (en banc))).

Thus, we determine that Petitioner has sufficiently shown, at this stage, that Douglas discloses limitation 1.5.

8. *Limitation 1.6*

Limitation 1.6 recites “generating a machine-ready representation of the three-dimensional model executable by the target printer to fabricate the object.” Ex. 1001, 35:30–32.

Petitioner argues that Douglas discloses a print queue that contains “tool instructions to fabricate an object,” and a person of ordinary skill in the art would have understood these instructions to be a machine-ready representation of the three-dimensional model that the printer can use to fabricate the object. Pet. 19–21 (citing Ex. 1005 ¶¶ 40–41, 99, Fig. 6; Ex. 1001, 24:25–29; Ex. 1003 ¶¶ 60–62). Petitioner also contends that Mark discloses generating a “G-code” file, which is also a machine-ready representation, and a person of ordinary skill in the art would have had reason to use G-code tool instructions in Douglas’s system. Pet. 21–23 (citing Ex. 1006, 3:65–4:6, 11:33–65, 12:15–25, 12:49–61, 13:4–19, 17:53–58, Fig. 6; Ex. 1001, 25:33–34; Ex. 1005 ¶¶ 40–41, 65–66, 99, Figs. 2, 6; Ex. 1003 ¶¶ 63–64); *see also* Pet. 8–10 (discussion motivations to combine Douglas and Mark).

Patent Owner does not specifically address these arguments. *See* Prelim. Resp. We find Petitioner’s argument for limitation 1.6 sufficiently persuasive at this stage, for the reasons set forth in the Petition.

9. *Conclusion as to claim 1*

For the above reasons, we determine that Petitioner has shown, sufficiently at this stage, that the combination of Douglas and Mark discloses all the limitations of claim 1, and that a person of ordinary skill in the art would have had reason to combine Douglas and Mark to implement the method of claim 1.

We therefore determine that Petitioner is reasonably likely to prevail in showing that claim 1 is unpatentable under § 103 based on Douglas and Mark, and we institute an IPR on all claims and all grounds raised in the Petition. *See* 37 C.F.R. § 42.108(a). Because they are uncontested at the preliminary stage, we need not address Petitioner’s arguments as to the other claims or grounds involving Douglas and Mark.

D. OTHER CONTESTED ISSUES

Because Petitioner has shown a reasonable likelihood of prevailing with respect to claim 1 on the grounds based on Douglas and Mark, we need not address the other grounds of the Petition in detail. However, for the parties’ benefit, we provide our preliminary assessment of two disputed issues relating to the grounds based on Hamilton, Evans, and KISSlicer.

Hamilton discloses a “product delivery system” where a product is “manufactured locally using a 3D printer.” Ex. 1010, code (57). Part of the system involves “query[ing] the user’s 3D printer for its accuracy and material abilities.” Ex. 1010 ¶ 21. This includes “an indication of the material stock available to the 3D printer.” *Id.* ¶ 17.

Evans is a manual for 3D printing describing a “slicer” that takes a 3D model of an object and slices it into layers suitable for printing based on various parameters. Ex. 1011, 34.¹⁴

KISSlicer is another manual describing a slicer application, which “slices” a 3D model and creates a G-code file used by the printer to fabricate a 3D object. Ex. 1012.

Among other issues raised in its Preliminary Response, Patent Owner argues that Evans and KISSlicer are not prior-art publications, and that Petitioner has failed to show that Hamilton discloses a “three-dimensional model” as recited in limitation 1.1. We address those issues below.

1. Whether Evans and KISSlicer are prior-art publications

Petitioner asserts in its Petition that Evans was published in 2012, and that KISSlicer was published in January 2012. Pet. 2. Although Petitioner does not appear to discuss the matter further in the Petition, Petitioner also submitted declaratory evidence that the documents were published in 2012. *See* Exs. 1015, 1016.

Patent Owner argues that neither Evans nor KISSlicer are prior art. Prelim. Resp. 21–25. According to Patent Owner, Petitioner has not provided any evidence in its Petition that the references are prior art and has improperly incorporated its declaratory evidence that should have been discussed in the Petition. *Id.*

¹⁴ We use the added pagination provided with Ex. 1011 rather than Evans’ original pagination.

The declaratory evidence of record appears to show that Evans was published on October 4, 2012, based on a declaration by June Ann Munford, a librarian whose testimony is based on electronic library records. Ex. 1016. Evans also includes ISBN-13 numbers and a copyright date of 2012. *See* Ex. 1011, 308.

The declaratory evidence of record also appears to show that KISSlicer was published in 2012. Although the copy of KISSlicer included as Exhibit 1012 does not have a copyright date, Petitioner has provided a declaration of Jonathan Drummer, who testifies he is the creator of KISSlicer and that Exhibit 1012 has been available on a public website since January 2012 as evidenced by a copy that archive.org captured on February 15, 2012. Ex. 1015.

However, we do not resolve, at this preliminary stage, whether Petitioner has met its initial burden of showing that Evans and KISSlicer are prior art, or whether we should disregard Petitioner's evidence under 37 C.F.R. § 42.6(a)(3) because it was not adequately discussed in the Petition. These questions are best left for trial after both parties have had an opportunity to brief the issue.

2. Limitation 1.1

For limitation 1.1, Petitioner argues that Hamilton describes requests to fabricate an object from a “three-dimensional model,” citing passages that refer to “a design.” Pet. 51–53 (citing Ex. 1010 ¶¶ 15–22, Figs. 3–4; Ex. 1003 ¶ 116). Petitioner argues that a person of ordinary skill in the art would have understood that this “design” is a three-dimensional model, and that the '774 patent states that a “three-dimensional model may include a

three-dimensional *design* created by a user.” Pet. 53 (quoting Ex. 1001, 18:21–23) (citing Ex. 1010 ¶¶ 4–5, 19; Ex. 1003 ¶ 117).

Patent Owner argues that Hamilton “does not mention the term ‘model’” and describes “designs” as only including “the necessary printer requirements for the design, information on the materials required, instructions for the 3D printer, separately numbered individual parts, and instructions for assembly of the product for the user.” Prelim. Resp. 25–26 (quoting Ex. 1010 ¶ 19).

At this stage, we find credible Dr. Hickner’s uncontested testimony that a person of ordinary skill in the art would have understood that Hamilton’s “design” includes a 3D model, since the design is used to construct a real-world product using a 3D printer. Ex. 1003 ¶ 117. We recognize that Patent Owner has not submitted rebuttal evidence at this stage, and we will consider any such evidence at trial.

IV. CONCLUSION

For the reasons set forth above, Petitioner has shown that there is a reasonable likelihood it would prevail with respect to at least one of the claims challenged in the Petition, and we institute trial on all asserted grounds and all challenged claims. *See* 37 C.F.R. § 42.108(a).

V. ORDER

It is

ORDERED that, pursuant to 35 U.S.C. § 314(a), an IPR of claims 1–10, 12, 13, 19, and 20 of the ’774 patent is instituted with respect to all the grounds set forth in the Petition; and

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FURTHER ORDERED that pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, IPR of the '774 patent commences on the entry date of this Order, and the Board hereby gives notice of the institution of a trial.

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FOR PETITIONER:

Joshua Griswold
Michael Hawkins
Baile Xie
FISH & RICHARDSON P.C.
griswold@fr.com
hawkins@fr.com
xie@fr.com

FOR PATENT OWNER:

Brian Oaks
Aashish Kapadia
Kevin Meek
Syed Fareed
MCDERMOTT WILL & EMERY LLP
boaks@mwe.com
akapadia@mwe.com
kmeek@mwe.com
sfareed@mwe.com