

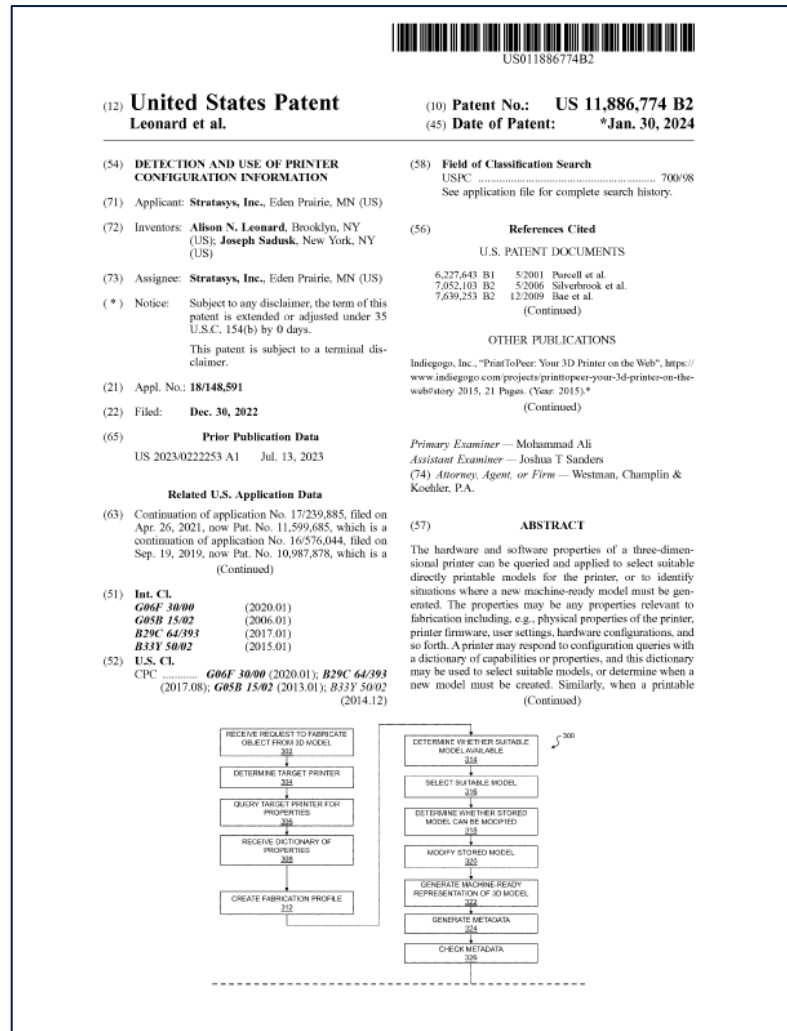
Petitioner's Demonstratives

Shenzhen TuoZhu Technology Co. Ltd. (Petitioner)
v.
Stratasys, Inc. (Patent Owner)

Case No. IPR2025-00611
Patent No. 11,886,774



FISH.



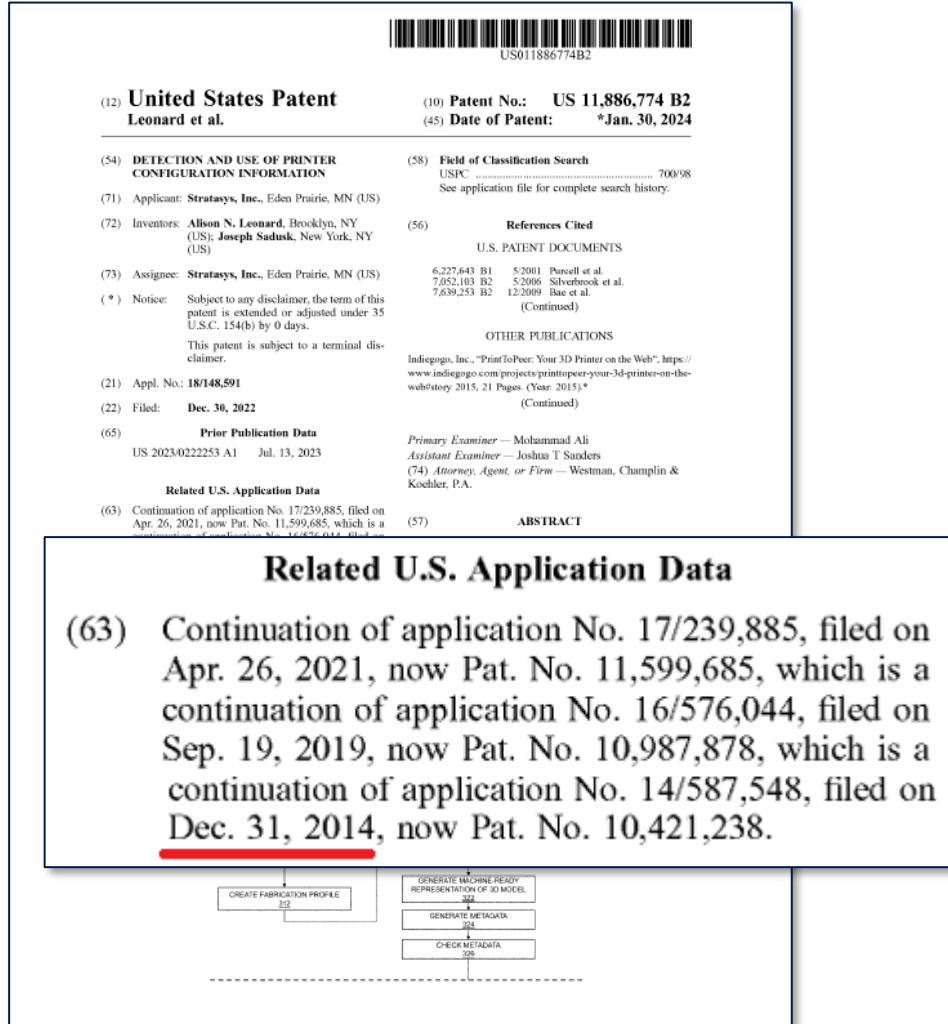
- Challenged claims 1-10, 12-13, 19-20
- All challenged claims are disputed

Ground	Claims	Basis for Rejection (35 U.S.C. § 103)
1A	1-5, 9-10, 12-13, 20	Douglas and Mark
1B	6-7, 9-10	Douglas, Mark and Dahlin
1C	8	Douglas, Mark and Batchelder
1D	19	Douglas, Mark and Pax
2A	1-5, 9-10, 12-13	Hamilton and Evans (with/without KISSlicer)
2B	6-7, 19	Hamilton, Evans and Pax (with/without KISSlicer)
2C	19	Hamilton, Evans, Pax, and Pettis (with/without KISSlicer)
2D	8	Hamilton, Evans and Batchelder (with/without KISSlicer)
2E	20	Hamilton, Evans and Wang (with/without KISSlicer)

Douglas-Mark Grounds

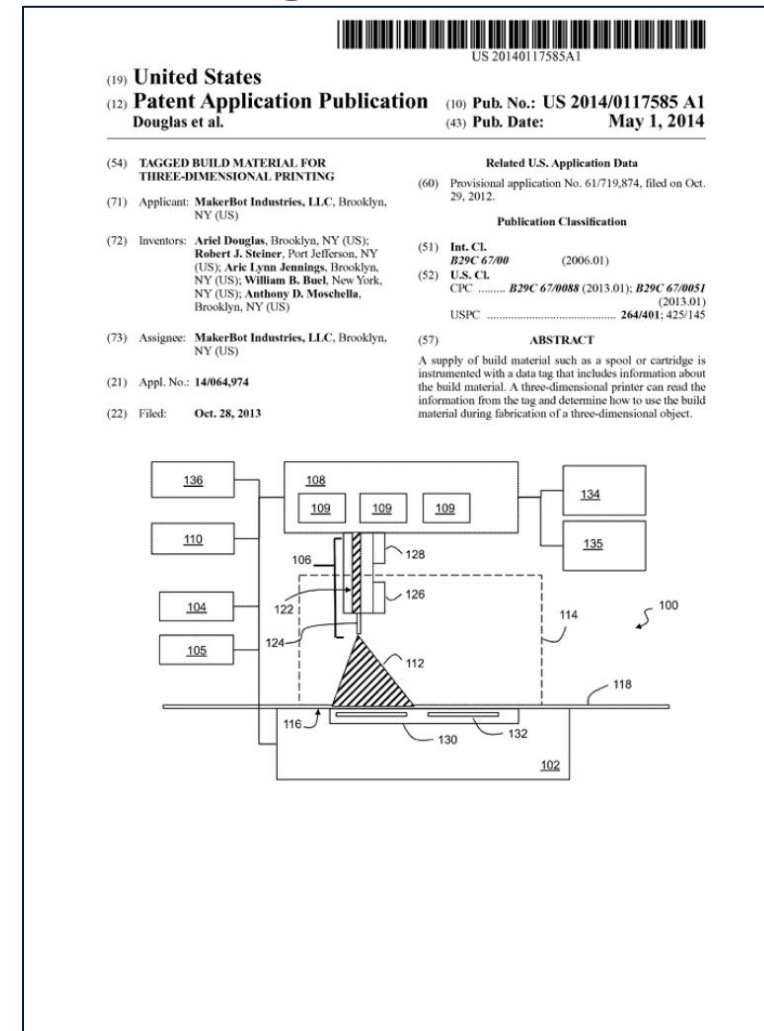
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Pet. 2

Douglas



Pet. 2

Douglas-Mark Grounds

The '774 patent

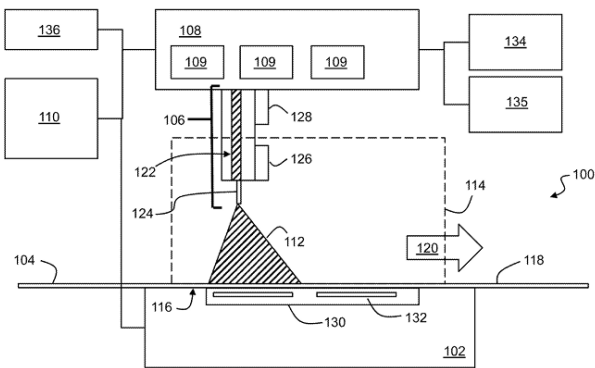


FIG. 1

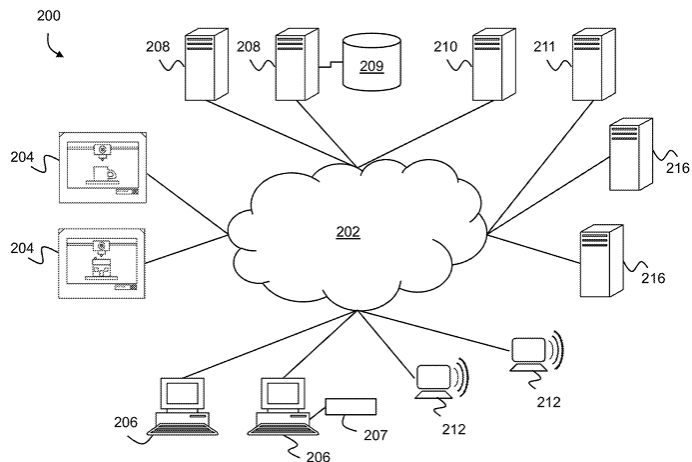


FIG. 2

Douglas

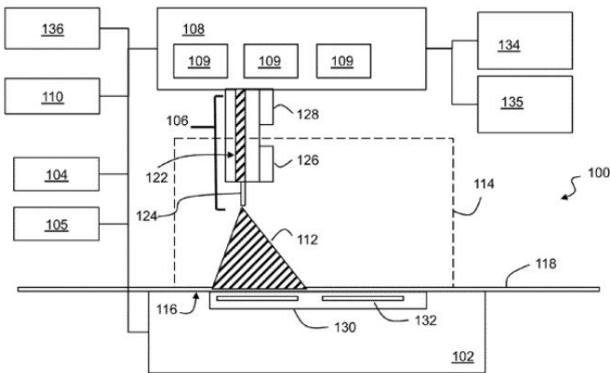


Fig. 1

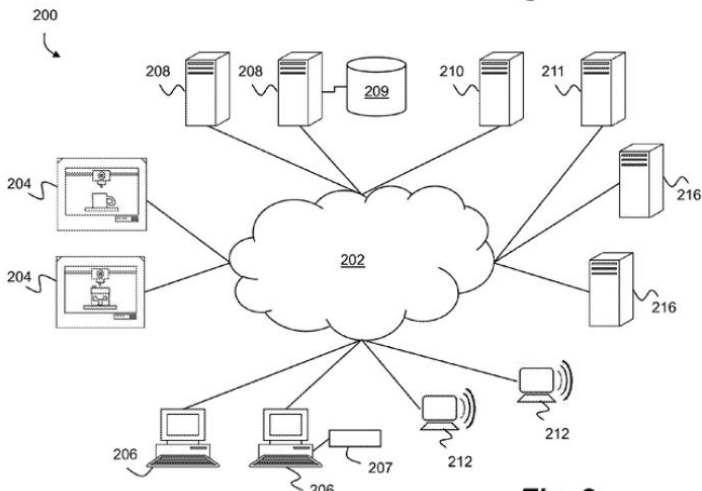


Fig. 2

Douglas-Mark Grounds

The '774 patent

target printer, and so forth. In a machine-ready representation such as g-code, this may include a simple search and substitution of suitable instruction steps. For example, any

resource, or any combination of these. Processing the three-dimensional model may include generating g-code, which is commonly used for three-dimensional printers, or any other suitable printer-executable description of the object based upon the three-dimensional model. Processing the three-

Inst. Dec., 11;
EX1001, 25:33-34, 26:3-7

DECLARATION OF DR. MICHAEL HICKNER

1. A POSITA would have combined Douglas and Mark

40. A POSITA would have been motivated to implement Douglas' system in a manner that employs Mark's teaching of a full featured slicer and toolpath generator configured to process (e.g., slice) a 3D model into layers and generate toolpath instructions (e.g., G-code) according to operational parameters that reflect the fabrication capability of the 3D printer, including Mark's use of operational parameters arranged as a configuration file, a rule set or parameter database and Mark's express teaching of transmitting the generated G-code to a printer, such as the printer selected by Douglas. EX-1005, ¶¶[0032], [0072]-[0073], [0097]-[0099], FIGS. 2, 6; EX-1006, 1:25, 48-61; 11:4-13:3. A POSITA would have been motivated to combine Douglas and Mark for at least the following reasons.

EX1003, ¶40; Pet. 8

Douglas

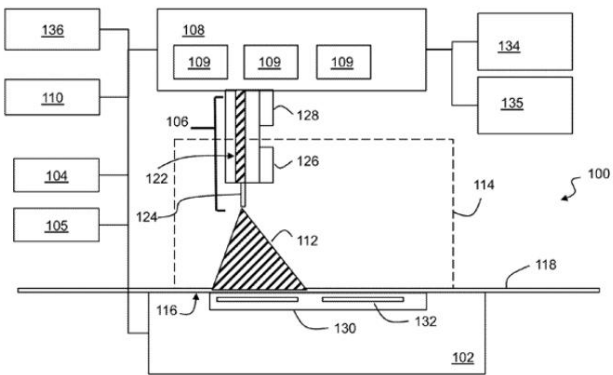


Fig. 1

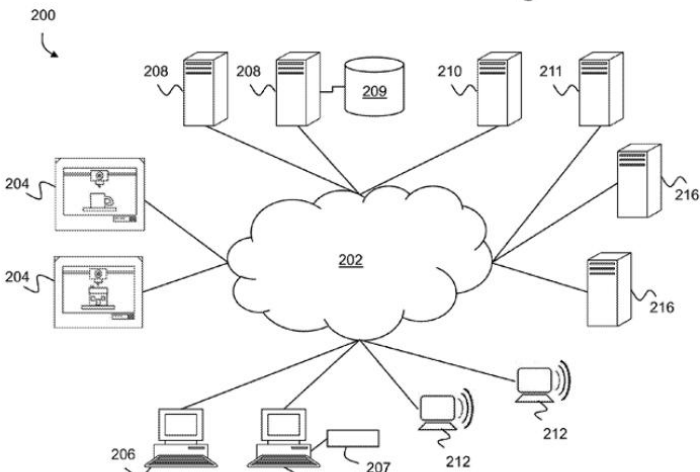


Fig. 2

Grounds 1A-1D: Limitations [1.2]- [1.3]

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Limitations [1.2]-[1.3]

- 1. A method comprising:
 - receiving a request to fabricate an object from a three-dimensional model;
 - determining a target printer to fabricate the object;
 - 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;
 - 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;
 - creating a fabrication profile based on the one or more properties; and generating a machine-ready representation of the three-dimensional model executable by the target printer to fabricate the object.



PETITION FOR INTER PARTES REVIEW

[1.2]

Douglas discloses that its “print server 208” can “automatically select one of the three-dimensional printers 204 for a user-submitted print job...for fabricating an object.” EX-1005, ¶¶[0032], [0038]-[0043], [0073], FIG.2. The “print server 208” would “*determine[] a target printer to fabricate the object*” by “automatically select[ing]” a printer. EX-1005, ¶¶[0032], [0038]-[0043], [0073]; EX-1003, ¶49.

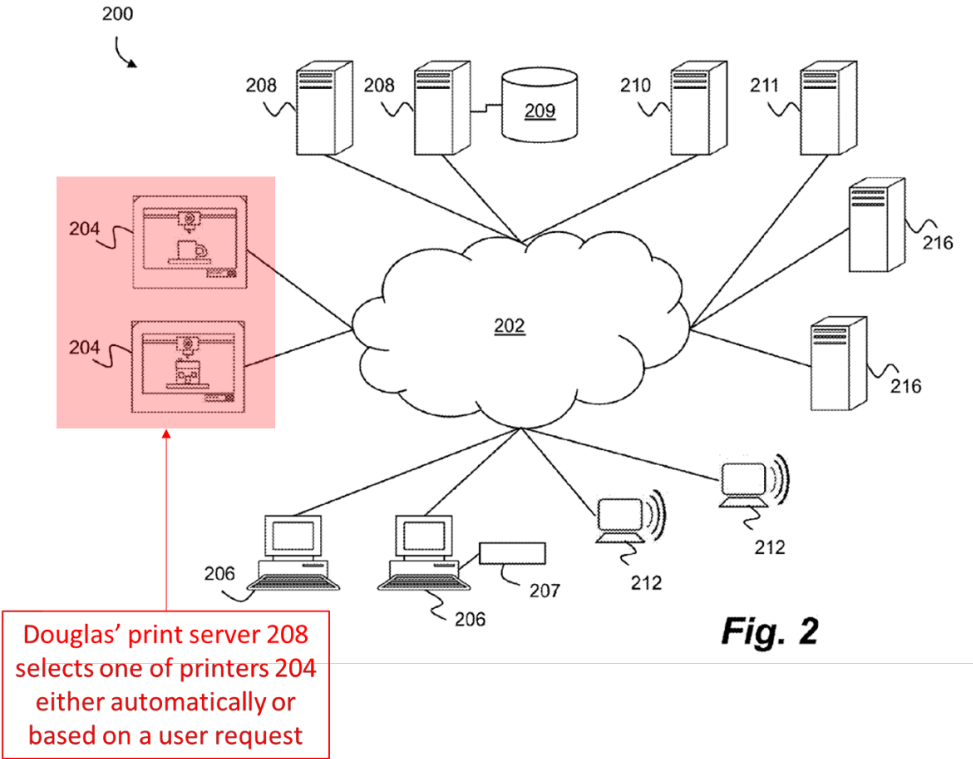


Fig. 2

Limitations [1.2]-[1.3]

PATENT OWNER'S PRELIMINARY RESPONSE

printer. *See id.* at 13-14. However, 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. *See Pet.* at 13. Contrary to Petitioner's conclusory assertion that the print server's request for information is for the target printer, *Douglas* discloses that a print server may request information from a printer to be used "as an input to a process on the print server for allocating print requests to various three-dimensional printers." EX1005 at [0074]. Thus,

POPR, 12-13

FISH.

DECISION

Granting Institution of *Inter Partes* Review

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).

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.

Inst. Dec., 13-14

Limitations [1.2]-[1.3]

Precedent: *Interactive Gift Express, Inc. v. CompuServe Inc.*

“Unless the steps of a method actually recite an order, the steps are not ordinarily construed to require one. See *Loral Fairchild Corp. v. Sony Corp.*, 181 F.3d 1313, 1322, 50 U.S.P.Q.2D (BNA) 1865, 1870 (Fed. Cir. 1999) (stating that “not every process claim is limited to the performance of its steps in the order written”). . . . In this case, nothing in the claim or the specification directly or implicitly requires such a narrow construction.

Looking at the claim language, there is no reason why **step one's "providing"** of information to the IMM must occur before **step four's "receiving"** the request reproduction code." . . . Logically, information could be sent after a request is made. **In the specification, two embodiments are disclosed which operate in real-time and send information after a request is made."**

Claim 1 (from *Interactive Gift*):

1. A method for reproducing information in material objects utilizing information manufacturing machines located at point of sale locations, comprising the steps of:

providing from a source remotely located with respect to the information manufacturing machine the information to be reproduced to the information manufacturing machine, each information being uniquely identified by a catalog code;

providing a request reproduction code including a catalog code uniquely identifying the information to be reproduced to the information manufacturing machine requesting to reproduce certain information identified by the catalog code in a material object;

providing an authorization code at the information manufacturing machine authorizing the reproduction of the information identified by the catalog code included in the request reproduction code; and

receiving the request reproduction code and the authorization code at the information manufacturing machine and reproducing in a material object the information identified by the catalog code included in the request reproduction code in response to the authorization code authorizing such reproduction.

Inst. Dec., 14

Limitations [1.2]-[1.3]

Precedent: *Altiris, Inc. v. Symantec Corp.*

“Unless the steps of a method actually recite an order, the steps are not ordinarily construed to require one.

Beginning with the claim language, it neither grammatically nor logically indicates that the **"setting" step** must occur in a particular order compared to the other steps.

Looking next to the written description, it clearly only discusses a single **"preferred" embodiment** in which the "setting" step occurs after the "testing" step and before the "booting normally" step. **Nowhere, however, is there any statement that this order is important, any disclaimer of any other order of steps, or any prosecution history** indicating a surrender of any other order of steps.”

Claim 1 (from *Altiris*):

... the method comprising:

- testing automatically for automation boot sequence data, said test including **reading a boot selection flag** and comparing said boot selection flag with a known flag setting;

- transferring control of said computer system to automation code, if said testing automatically step indicates an automation boot sequence;

- executing a control process for said means for connecting said digital computer system to an external source of commands, if said testing automatically step indicates an automation boot sequence;
- performing said external commands, if said testing automatically step indicates an automation boot sequence;

- setting said boot selection flag**; and

- booting normally, if said testing automatically step indicates a normal boot sequence.

Limitations [1.2]-[1.3]

Not Precedential: *TALtech Ltd. v. Esquel Apparel, Inc.*

“Even if claim 18 were not invalid for failing to satisfy the best mode requirement, we agree with the district court that Esquel has not infringed it. Claim 18 of the '779 Patent is a method claim depending on claim 1, adding a requirement that step (e) of claim 1 is performed before step (c). **Generally, there is no presumption of order, and so a claim with many steps can be infringed by an accused process performing the claimed steps in any order.** However, we will find that the claim requires an ordering of steps when the claim language, as a matter of logic or grammar, requires that the steps be performed in the order written, or the specification directly or implicitly requires such a narrow construction. *Altiris, Inc. v. Symantec Corp.*, 318 F.3d 1363, 1369-70 (Fed. Cir. 2003) ... The district court found that steps (d) and (e) **of claim 18** must be performed after step (b). ... The district court found that Esquel's method practices neither the "placing" limitation of step (b), nor the "folding" limitation of step (e). **TAL has not challenged these factual findings on appeal.**”

Claims 1, 17, and 18 (from TALtech):

1. A method of manufacturing a smooth garment seam between first and second garment components comprising the steps:

...

- (b) placing a bonding element having at least a thermal adhesive component along the seam such that a lower surface of the bonding element abuts an upper surface of the first garment component;
- (c) sewing the first and second garment components and the bonding element together by a first set stitch running along the seam;
- (d) folding the first garment component over the bonding element such that the upper surface of the first garment component is folded over and abuts an upper surface of the bonding element;
- (e) folding a portion of the second garment component such that a lower surface of the second garment component abuts the lower surface of the bonding element;

....

17. A method of manufacturing a smooth seam **as defined in claim 1** and further comprising the step of: sewing an additional stitch along the seam such that the additional stitch traverses through the bonding element

18. A method of manufacturing a smooth seam **as defined in claim 17** wherein: step (e) is performed **prior to** step (c) and the first and the additional stitch are sewn simultaneously.

Limitations [1.2]-[1.3]

Limitations [1.2] and [1.3] are not required to be performed in order

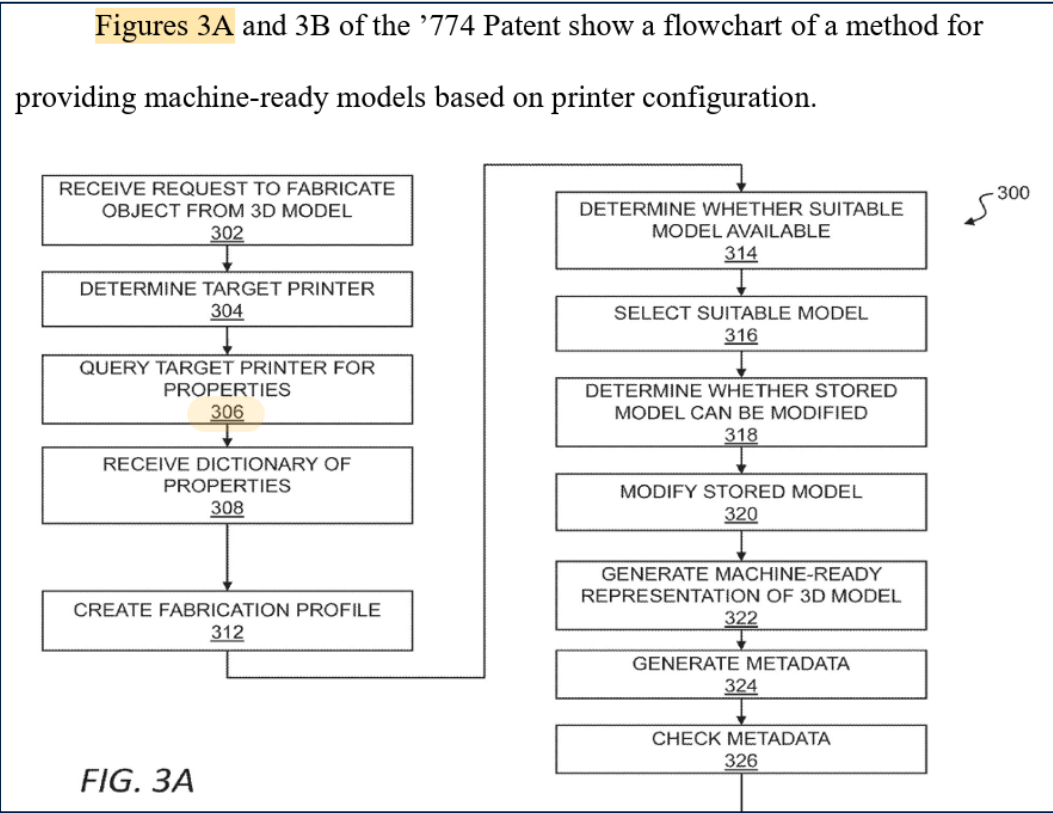
PATENT OWNER’S RESPONSE

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19

As shown in step 306, the method 300 may include querying the target printer for one or more properties relevant to fabrication of the object. The query may be initiated by the requester, the print server, or another resource in a system utilizing the method 300. The query may request specific properties of the target printer, or the query may be a general query for properties or information relevant to fabrication of an object on the target printer. In one aspect, numerous queries are sent to numerous printers, e.g., for use in selecting one or more of the printers as the target printer. In another aspect, the query is 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.

EX1001, 19:1-14; Inst. Dec., 14-15; Rep., 1



POR, 5

Limitations [1.2]-[1.3]

Limitations [1.2] and [1.3] are not required to be performed in order

PATENT OWNER’S RESPONSE

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19

As shown in step 306, the method 300 may include querying the target printer for one or more properties relevant to fabrication of the object. The query may be initiated by the requester, the print server, or another resource in a system utilizing the method 300. The query may request specific properties of the target printer, or the query may be a general query for properties or information relevant to fabrication of an object on the target printer. In one aspect, numerous queries are sent to numerous printers, e.g., for use in selecting one or more of the printers as the target printer. In another aspect, the query is 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.

EX1001, 19:1-14; Inst. Dec., 14-15; Rep., 1

claims those embodiments. One such embodiment refers to querying multiple printers, which is not reflected in claim 1, which only claims querying the target printer of the '774 Patent. EX1001 at 19:8-10. The query of the other described

Precedent: *Oatey Co. v. IPS Corp.*

POR, 14

We normally do not interpret claim terms in a way that excludes embodiments disclosed in the specification. *E.g.*, *Verizon Servs. Corp. v. Vonage Holdings Corp.*, 503 F.3d 1295, 1305 (Fed. Cir. 2007) (rejecting proposed claim interpretation that would exclude disclosed examples in the specification); *Invitrogen Corp. v. Biocrest Mfg., L.P.*, 327 F.3d 1364, 1369 (Fed. Cir. 2003) (finding district court's claim construction erroneously excluded an embodiment described in an example in the specification, where the prosecution history showed no such disavowal of claim scope)

There is no issue in this case of disclaimer or estoppel during prosecution At least where claims can reasonably to interpreted to include a specific embodiment, it is incorrect to construe the claims to exclude that embodiment, absent probative evidence on the contrary.

Rep., 1-2

Limitations [1.2]-[1.3]

Limitations [1.2] and [1.3] are not required to be performed in order

US 11,886,774 B2

As shown in step 304, the method 300 may include determining a target printer to fabricate the object. Determining the target printer may include identifying a selected printer in the request. The selected printer may have been manually selected by a user, e.g., the requester. It will be understood that any selection or input provided by a user discussed herein may be done through a graphical user interface (GUI) included as part of the systems described herein, e.g., a GUI on the target printer, a GUI on a computer connected to the target printer, a GUI on a mobile device, and so on. Determining the target printer may also or instead include selecting the target printer at a remote print server based on one or more selection criteria. The selection criteria may include any criteria that provides for selection of the target printer, e.g., a logical, logistically convenient, or practical selection of the target printer. The selection criteria may include information related to the three-dimensional model (or an aspect thereof, e.g., metadata included therein), the object to be fabricated (e.g., the size, shape, color, material, and so forth), a print queue, a prioritization, a location of the printer or requester, a timeline, printer attributes (e.g., capabilities, properties, features, functions, and the like), and so forth. The target printer may be any of the printers as described herein, or another endpoint, component, machine, or resource. In one aspect, the target printer may include more than one printer.

EX1001, 18:42-67; Rep., 5

PATENT OWNER'S RESPONSE

claims those embodiments. One such embodiment refers to querying multiple printers, which is not reflected in claim 1, which only claims querying the target printer of the '774 Patent. EX1001 at 19:8-10. The query of the other described

POR, 14

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It will be appreciated that the methods and systems described above are set forth by way of example and not of limitation. Numerous variations, additions, omissions, and other modifications will be apparent to one of ordinary skill in the art. In addition, the order or presentation of method steps in the description and drawings above is not intended to require this order of performing the recited steps unless a particular order is expressly required or otherwise clear from the context. Thus, while particular embodiments have been shown and described, it will be apparent to those skilled in the art that various changes and modifications in form and details may be made therein without departing from the spirit and scope of this disclosure and are intended to form a part of the invention as defined by the following claims, which are to be interpreted in the broadest sense allowable by law.

EX1001, 35:1-16

Limitations [1.2]-[1.3]

The POR cites to Douglas [0074], which is an “aspect” of what “may” occur
Douglas et al.

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19

As shown in step 306, the method 300 may include querying the target printer for one or more properties relevant to fabrication of the object. The query may be initiated by the requester, the print server, or another resource in a system utilizing the method 300. The query may request 5 specific properties of the target printer, or the query may be a general query for properties or information relevant to fabrication of an object on the target printer. In one aspect, numerous queries are sent to numerous printers, e.g., for use in selecting one or more of the printers as the target printer. 10 In another aspect, the query is 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.

EX1001, 19:1-14; Inst. Dec., 14-15; Rep., 1

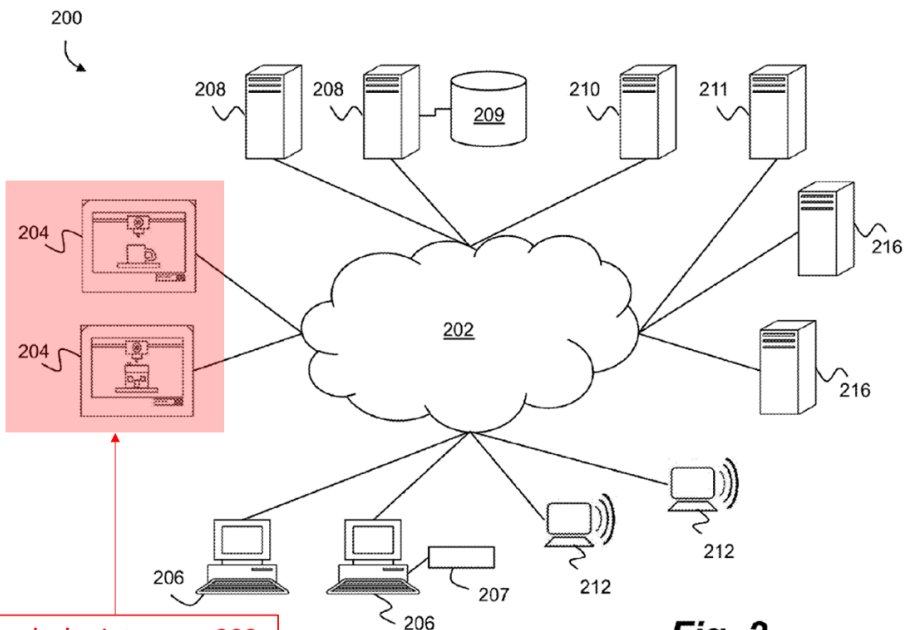
[0074] As another non-limiting example, the three-dimensional printer 306 may be configured to use other network entities to determine the operational parameters for the fabrication of the object 314. If a print job is received, the three-dimensional printer 306 may transmit the data tag 304 data for all of the connected supplies 302 to one or more of the remote sources for determination of operational parameters for the connected supplies. The one or more remote source may determine the operational parameters for the connected supplies 302 and transmit the operational parameters back to the three-dimensional printer 306. The operational parameters may then be combined with the three-dimensional printer 306 print job information for the fabrication of the object 314. In another aspect, a print server 208 may request build material information from one or more supplies coupled to a three-dimensional printer, and may store this information and make this information available to users of the print server, or as an input to a process on the print server for allocating print requests to various three-dimensional printers. More generally, data available from data tags 304 on supplies 302 may be used within the networked three-dimensional printing environment 200 to facilitate the distribution and execution of print requests in any desired manner.

EX1005, [0074]; Inst. Dec., 13, POR, 15-16, Rep. 4

Limitations [1.2]-[1.3]

Even if limitations [1.2]-[1.3] must be performed in order, the Petition cited to examples in Douglas that provide such an order of steps

Douglas et al.



Douglas' print server 208 selects one of printers 204 either automatically or based on a user request

Fig. 2

Pet., 11-13

as contemplated herein. Each client device 206 generally provides a user interface, which may include a graphical user interface, a text or command line interface, a voice-controlled interface, and/or a gesture-based interface to control operation of remote three-dimensional printers 204. The user interface may be maintained by a locally executing application on one of the client devices 206 that receives data and status information from, e.g., the printers 204 and print servers 208 concerning pending or executing print jobs. The user interface may create a suitable display on the client device 206 for user interaction. In other embodiments, the user interface may be remotely served and presented on one of the client devices 206, such as where a print server 208 or one of the three-dimensional printers 204 includes a web server that provides information through one or more web pages or the like that can be displayed within a web browser or similar client executing on one of the client devices 206. In one aspect, the user interface may include a voice controlled interface that receives spoken commands from a user and/or provides spoken feedback to the user.

[0038] The print server 208 may more generally provide a variety of management functions. For example, the print server 204 may store a location of a predetermined alternative three-dimensional printer to execute a print job from a remote user in the event of a failure by the one of the plurality of three-dimensional printers 204. In another aspect, the print server 208 may maintain exclusive control over at least one of the plurality of three-dimensional printers 204, such that other users and/or print servers cannot control the printer. In another aspect, the print server 208 may submit a print job to a first available one of the plurality of three-dimensional printers 204.

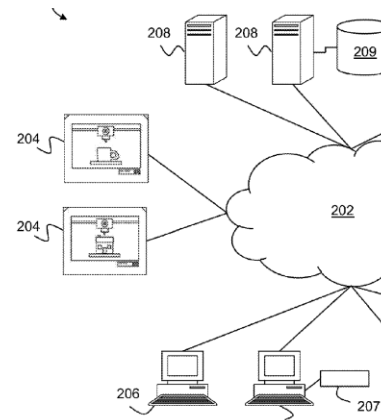
[0040] A print server 208 may maintain print queues for participating three-dimensional printers 204. This approach may advantageously alleviate backlogs at individual printers 204, which may have limited memory capacity for pending print jobs. More generally, a print server 208 may, by communicating with multiple three-dimensional printers 204, obtain a view of utilization of multiple networked resources that permits a more efficient allocation of print jobs than would be possible through simple point-to-point communications among users and printers. Print queues may also be published by a print server 208 so that users can view pending queues for a variety of different three-dimensional printers 204 prior to selecting a resource for a print job. In one aspect,

Limitations [1.2]-[1.3]

Even if limitations [1.2]-[1.3] must be performed in order, the Petition cited to examples in Douglas that provide such an order of steps
Douglas et al.

as contemplated herein. Each client device 206 generally provides a user interface, which may include a graphical user interface, a text or command line interface, a voice-controlled interface, and/or a gesture-based interface to control operation of remote three-dimensional printers 204. The user interface may be maintained by a locally executing application on one of the client devices 206 that receives data and status information from, e.g., the printers 204 and print servers 208 concerning pending or executing print jobs. The user interface may create a suitable display on the client device 206 for user interaction. In other embodiments, the user interface may be remotely served and presented on one of the client devices 206, such as where a print server 208 or one of the three-dimensional printers 204 includes a web server that provides information through one or more web pages or the like that can be displayed within a web browser or similar client executing on one of the client devices 206. In one aspect, the user interface may include a voice controlled interface that receives spoken commands from a user and/or provides spoken feedback to the user.

EX1005, [0030], [0043], [0073], Pet., 11-14; EX1003, ¶¶ 48-51



[0043] In another aspect, a print server 208 may provide a virtual workspace for a user. In this virtual workspace, a user may search local or remote databases of printable objects, save objects of interest (or links thereto), manage pending prints, specify preferences for receiving status updates (e.g., by electronic mail or SMS text), manage subscriptions to content, search for new subscription sources, and so forth. In one aspect, the virtual workspace may be, or may include, web-based design tools or a web-based design interface that permits a user to create and modify models. In one aspect, the virtual workspace may be deployed on the web, while permitting direct fabrication of a model developed within that environment on a user-specified one of the three-dimensional printers 204, thus enabling a web-based design environment that is directly coupled to one or more fabrication resources.

[0073] As a non-limiting example, a remote client device 206 may request an object 314 be printed on the network connected three-dimensional printer 306. The three-dimensional printer 306 may have one or more supplies 302, containing build material 312, connected to one or more couplings 308. The client device 206 may request the three-dimensional printer 306 to transmit the data tag 304 data for one or more of the connected supplies 302 for the determination of operational parameters for at least one of the connected supplies 302. The client device 206 may select which of the one or more supplies 302 to use in fabricating the object 314, determine the operational parameters for the selected supply 302, and transmit the operational parameters back to the three-dimensional printer 306 for fabrication of the object 314.

Limitations [1.2]-[1.3]

Patent Owner argued that the request cannot identify the target printer

PATENT OWNER'S RESPONSE

To the extent Petitioner relies on the disclosure of *Douglas* that “a remote client device 206 may request an object 314 be printed on the network connected three-dimensional printer 306” (EX1005, ¶[0073]) as disclosure of selecting a target printer prior to querying the target printer, this disclosure also fails to teach performing the steps of claim 1. If a received request already identifies the printer, there is no need for “determining a target printer” as recited in claim element [1.2].

Further, Petitioner argues that it is the “print server 208” or “printer server 208” of *Douglas* that performs steps of claim 1, such as determining a target printer and querying the target printer for configuration information. *See, e.g.*, Pet. at 12-13; *see also id.* at 21. The disclosure of paragraph 73 of *Douglas* is explicitly that “remote client device 206” performs the actions described in that paragraph.

EX1005, ¶[0073]. The petition never refers to such a “remote client device,” and

POR, 16

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As shown in step 304, the method 300 may include determining a target printer to fabricate the object. Determining the target printer may include identifying a selected printer in the request. The selected printer may have been manually selected by a user, e.g., the requester. It will be understood that any selection or input provided by a user discussed herein may be done through a graphical user interface (GUI) included as part of the systems described herein, e.g., a GUI on the target printer, a GUI on a computer connected to the target printer, a GUI on a mobile device, and so on. Determining the target printer may include selecting the target printer based on one or more selection criteria. The selection criteria may include any criteria that provides for selection of the target printer, e.g., a logical, logistically convenient, or practical selection of the target printer. The selection criteria may include information related to the three-dimensional model (or an aspect thereof, e.g., metadata included therein), the object to be fabricated (e.g., the size, shape, color, material, and so forth), a print queue, a prioritization, a location of the printer or requester, a timeline, printer attributes (e.g., capabilities, properties, features, functions, and the like), and so forth. The target printer may be any of the printers as described herein, or another endpoint, component, machine, or resource. In one aspect, the target printer may include more than one printer.

EX1001, 18:42-67; Rep., 5

DECLARATION OF DR. MICHAEL HICKNER

[1.2] determining a target printer to fabricate the object;

49. Douglas discloses that its “print server 208” can “automatically select one of the three-dimensional printers 204 for a user-submitted print job, or may permit a user to specify a single printer, or a group of preferred printers, for fabricating an object” (“determining a target printer to fabricate the object”). EX-1005, ¶¶[0032], [0038]-[0043], [0073], FIG. 2. For example, print server 208 can host a “virtual workspace” that allows a user to “direct fabrication of a model developed within that environment on a user-specified one of the three-dimensional printers 204.” EX-1005, ¶[0043]. In either case, the “print server 208” would “determine[] a target printer” by “automatically select[ing]” a printer or identifying the user-selected printer. EX-1005, ¶¶[0032], [0038]-[0039], [0043], [0073].

EX1003, ¶49; Pet., 12

Intel Corp. v. PACT XPP Schweiz AG, 61 F.4th 1373, 1379 1379-81 (Fed. Cir. 2023) (“a person of ordinary creativity, not an automaton”)

Grounds 1A-1D: Limitation [1.4]

FISH.

Limitation [1.4]

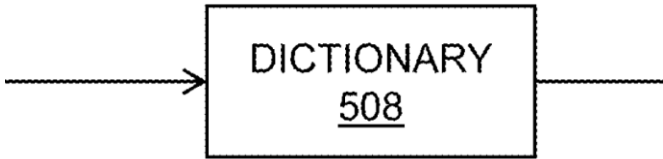
1. A method comprising:
receiving a request to fabricate an object from a three-dimensional model;
determining a target printer to fabricate the object;
querying the target printer for configuration information of the target printer relevant to creation of a printable model for fabrication of the object on the target printer;
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;
creating a fabrication profile based on the one or more properties; and generating a machine-ready representation of the three-dimensional model executable by the target printer to fabricate the object.

Limitation [1.4]

The '774 patent broadly uses the term “dictionary”

US 11,886,774 B2

As shown in step 308, the method 300 may include receiving a dictionary of the one or more properties from the target printer. The dictionary may thus include properties of a printer, e.g., the target printer. The properties included in the dictionary may include any as described herein or otherwise known in the art. The dictionary 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. The information included in the dictionary may be relevant to slicing a three-dimensional model to create a machine-ready representation for the printer. The dictionary may include information or rules related to the properties. The dictionary may define the hardware, software, firmware, printing capabilities, printing rules, and so forth, for the printer. The dictionary may include encrypted, protected, or hashed data. One skilled in the art will recognize that there are numerous ways to create and code such a dictionary as described herein. Some examples of the manner of information and data that may be included in the dictionary are included below.



In general, the dictionary may be provided in any suitable format. The dictionary may for example be formed as a vector of binary flags or other attributes that form a description of properties included therein. The dictionary may also, where appropriate, include scalar quantities for certain properties.

One skilled in the art will recognize that the dictionary may include properties of a printer, and information pertaining to the properties of the printer, at any desired level of granularity according to, e.g., the data storage and processing capabilities of the components being used in a system implementing the method 300. In general, the dictionary may include any information pertinent to generating or choosing a machine-ready representation of a three-dimensional model of an object for a printer in fabricating that object. This information may be provided automatically by a printer or print server, or inputted manually by a user, e.g., using a GUI or the like where a user can enter or select properties pertaining to their printer.

Limitation [1.4]

Douglas' data tag stores printer properties and provides a "dictionary"

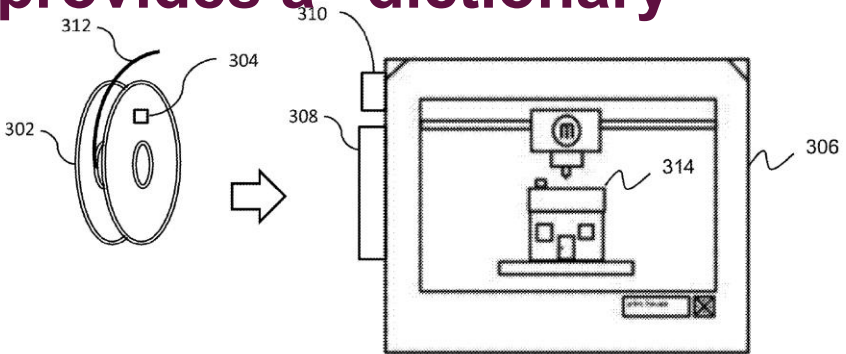
Douglas et al.

[0063] The data tag 304 may be any device or combination of devices suitable for storing data relating to the build material 312. This may, for example, include a radio frequency identification (RFID) tag such as an active or passive RFID tag, an optically-identifiable tag such as a bar code, quick read (QR) code, or the like, a magnetically-identifiable tag such as a magnetic swipe strip, or any other tag that can be automati-

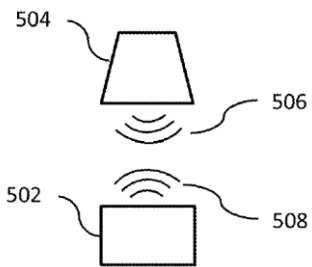
[0094] Types of data that may be usefully stored by the data tag are described above. Without limiting the generality of the foregoing, the data may include information about mechanical or structural properties of the build material, thermal properties of the build material (including phase change data), aesthetic properties of the build material, or any other properties useful for determining operational parameters. Other data that is not necessarily specifically tied to operational parameters may also be included, such as an amount of material in the container (which may be an initial amount when shipped, or a measured amount using active circuitry as described above), an expiration date, a brand name, and so

[0064] The tag sensor 310 may be communicatively associated with the three-dimensional printer 306 and the tag sensor 310 may be configured to automatically read data from the data tag 304 regarding the supply 302 of build material 312. The data may characterize at least one property of the build material 312. For example, characteristic data stored on the data tag 304 may include at least one of a material identification number, a build material type, a build material diameter, an extruder temperature requirement, a build material melting temperature, a build material color, a build material color lot number, a cost per unit of build material, a build material density, a build material tensile strength, a build material viscosity, a build material recycle code, a build material expiration date, or other characteristic information appropriate for a three-dimensional printer. In another aspect, the data tag 304 may encode a unique identifier for the supply 302, which can be used by the three-dimensional printer 306, e.g., in combination with a remote network resource, to determine properties of the build material 312 from which to further determine operational parameters for a fabrication process using the build material 312.

1002 may broadcast 508 the requested data to the RFID tag sensor 504. Once all the data has been received by the RFID tag sensor 504, the RFID tag sensor 504 may transmit the data to the controller 110 as discussed above.



[0072] As described in FIG. 2, the three-dimensional printer 306 may be included in the networked three-dimensional printing environment 200. In an embodiment, as part of the networked environment 200, the three-dimensional printer system 300 may print an object 314 for a remote client device 206 using the network remote sources. In this embodiment, the determination of operational parameters may be performed by the client device 206 or one of the other remote sources such as a printer server 208, content source 210, web server 211, or other resource 216. The three-dimensional printer 306 may transmit the data tag 304 data to one of the remote sources configured for determination of the operational parameters and the appropriate remote source may transmit the determined operational parameters back to the three-dimensional printer 306 for fabrication of the object 314.



FISH.

Limitation [1.4]

Nowhere does claim 1 recite that the dictionary must be transmitted according to a particular “format”/“organization”

1. A method comprising:
receiving a request to fabricate an object from a three-dimensional model;
determining a target printer to fabricate the object;
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;
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;
creating a fabrication profile based on the one or more properties; and generating a machine-ready representation of the three-dimensional model
executable by the target printer to fabricate the object.

PATENT OWNER’S RESPONSE

Douglas simply discloses, for example, that “data concerning a type of build material” can be provided to a controller without explaining how the data is provided. EX1005, at ¶[0063]; *see also id.* at ¶[0064]. In fact, Petitioner’s expert admits that *Douglas* does not talk about “any, well, way to – method to transmit that information.” EX2015 at 21:9-12 (emphasis added). Thus, *Douglas* does not

**Transcript of Michael A. Hickner,
Ph.D.**

3 A I'm not exactly sure what you mean in
4 terms of "how."
5 Can you be a little bit more specific
6 in that question?
7 Q Does Douglas describe the format in
8 which the information is provided and received?
9 A So Douglas is broad in that it doesn't
10 talk about any specific file format or any --
11 well, way to -- method to transmit that
12 information.

POR, 18-19, EX2015, 21:3-12



EX1001, 22:37-48; Rep. 7

SuperGuide Corp. v. DirecTV Enterprises, Inc., 358 F.3d 870, 874-875 (Fed. Cir. 2004) (“The written description, however, is not a substitute for, nor can it be used to rewrite, the chosen claim language. ‘Specifications teach. Claims claim.’”).

Grounds 1A-1D: Limitation [1.5]

FISH.

Limitation [1.5]

1. A method comprising:
receiving a request to fabricate an object from a three-dimensional model;
determining a target printer to fabricate the object;
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;
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;
creating a fabrication profile based on the one or more properties; and generating a machine-ready representation of the three-dimensional model executable by the target printer to fabricate the object.

Limitation [1.5]

Douglas discloses or suggests a fabrication profile

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As shown in step 312, the method 300 may include creating a fabrication profile based on the one or more properties. The fabrication profile may be created by the target printer, a print server, an external resource, or another component of a system implementing the method 300. The fabrication profile may be the basis for the generation of a machine-ready representation of the three-dimensional model that is executable on the target printer, and thus the fabrication profile may include information for generating machine-ready representations for the target printer. The

EX1001, 23:32-41

Douglas et al.

[0074] As another non-limiting example, the three-dimensional printer 306 may be configured to use other network entities to determine the operational parameters for the fabrication of the object 314. If a print job is received, the three-dimensional printer 306 may transmit the data tag 304 data for all of the connected supplies 302 to one or more of the remote sources for determination of operational parameters for the connected supplies. The one or more remote source may determine the operational parameters for the connected supplies 302 and transmit the operational parameters back to the three-dimensional printer 306. The operational parameters may then be combined with the three-dimensional printer 306 print job information for the fabrication of the object 314. In another aspect, a print server 208 may request build material information from one or more supplies coupled to a three-dimensional printer, and may store this information and make this information available to users of the print server, or as an input to a process on the print server for allocating print requests to various three-dimensional printers. More generally, data available from data tags 304 on supplies 302 may be used within the networked three-dimensional printing environment 200 to facilitate the distribution and execution of print requests in any desired manner.

EX1005, [0074]; EX1003, ¶54; Pet. 15-16; Rep. 11

DECLARATION OF DR. MICHAEL HICKNER

55. Douglas makes it clear that “the operational parameter(s)” are used in “fabricating an object ... to control operation of a three-dimensional printer,” consistent with the ’774 patent’s disclosure that “[t]he fabrication profile may be the basis for the generation of a machine-ready representation” that “contains instructions that can be directly executed on the target printer” to control the target printer “for fabrication of the object.” EX-1005, ¶¶[0064]-[0066], [0069], [0077], [0097], [0099]; EX-1001, 23:34-41.

EX1003, ¶55; Pet. 16

DECISION

Granting Institution of *Inter Partes* Review

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.

Limitation [1.5]

Douglas discloses or suggests a fabrication profile

DECLARATION OF DR. MICHAEL HICKNER

[0077], [0097], [0099]; EX-1001, 23:50-52. A POSITA would have also recognized and found obvious that the accumulation of operational parameters constitutes a “profile,” or that a “profile” would have been created based on Douglas’ operational parameter(s) for a collection/accumulation of information/parameters related to the printer for better data transmission and efficiency because Douglas describes there can be “a variety of [operational] parameters” which would be transmitted to the 3D printer. EX-1005, ¶¶[0073], [0097]. By compiling them together in a profile as a collection/accumulation of parameters, it would have facilitated the data transmission and improve the printing efficiency. Douglas also discloses that the various operational parameters can be configured as “default operational parameters that a user can override if further customization of a fabrication process is desired” or be automatically created “without [a user’ manually] specifying various configuration details.” EX-1005, ¶[0073], [0097], [0099]. By compiling them together in a profile as a collection/accumulation of parameters, it would have facilitated data compilation, organization, and storage to improve user experience with the options of loading default or automatically

EX1003, ¶56; Pet. 17-18



PATENT OWNER’S RESPONSE

supporting evidence. Petitioner cites to paragraphs 73, 97, and 99 of *Douglas* but none of those disclosures discuss “better data transmission and printing efficiency” or “data compilation, organization, and storage and improve [sic] user experience.” See EX1005, ¶¶[0073], [0097], [0099]. Petitioner’s expert also admits that, in relation to paragraph 73, he “didn’t perform that analysis of better or more efficient data transmission.” EX2015 at 27:5-8; EX2014, ¶89.

Thus, Petitioner fails to provide any source for this rationale, which appears

POR, 21

Rembrandt Diagnostics, LP v. Alere, Inc., 76 F.4th 1376, 1386 and 1381 (Fed. Cir. 2023) (affirming the Board’s decision that relied upon “**credible expert testimony**” for the articulated reasoning to combine)). Reply, 11

Intel Corp. v. PACT XPP Schweiz AG, 61 F.4th 1373, 1379-80 (Fed Cir. 2023) (“motivations known in a particular field to improve technology provide a motivation to combine prior art references **even absent any hint of suggestion in the references themselves**”).

Limitation [1.5]

The Douglas-Mark combination provides a fabrication profile

DECLARATION OF DR. MICHAEL HICKNER

FIGS.5-7, 20 and 21. Accordingly, a POSITA would have recognized and found obvious to organize Douglas’ operational parameters into a “profile” (e.g., in a more explicit form of a configuration file, a rule set or parameter database as taught by Mark) 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 as shown in Marks’ FIGS. 10 and FIGS. 20 and/or 21 (rule sets and data structures. EX-1005, ¶¶[0065]-[0066]; EX-1006, 11:33-65, 13:4-19, 17: 34-44, 53-58, FIGS. 5-7, 9-10, 21-22.

EX1003, ¶59; Pet. 18-19

Allied Erecting & Dismantling Co. v. Genesis Attachments, LLC, 825 F.3d 1373, 1381 (Fed Cir. 2016) (“The test for obviousness is **not** whether the features of a secondary reference may be bodily incorporated,” and refuting a flawed “teaching away” theory).

Rep., 11



PATENT OWNER’S PRELIMINARY RESPONSE

toolpaths/G-code.” Pet. at 19. But Petitioner ignores the teachings of *Douglas* that Petitioner relies upon in which the operational parameters are sent to the printer rather than being used to generate toolpaths. See EX1005, ¶[0073] (“transmit the

POPR, 18

DECISION

Granting Institution of *Inter Partes* Review

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.

Inst. Dec., 19

PATENT OWNER’S RESPONSE

toolpaths/G-code.” Pet. at 19. But Petitioner ignores the teachings of *Douglas* that Petitioner relies upon in which the operational parameters are sent to the printer rather than being used to generate toolpaths, so there would be no need to

POR, 22 fr.com | 29

Limitation [1.5]

Patent Owner misinterprets the Douglas-Mark combination

PATENT OWNER’S RESPONSE

Third, Petitioner’s assertions that the combination teaches creating a fabrication profile ignores the teachings of the references themselves. *See* Pet. at 17-19. Petitioner asserts that organizing “Douglas’ operational parameters into a ‘profile’” would “facilitate[] the use of these parameters for the generation of toolpaths/G-code.” Pet. at 19. But Petitioner ignores the teachings of *Douglas* that Petitioner relies upon in which the operational parameters are sent to the printer rather than being used to generate toolpaths, so there would be no need to “facilitate[] the use of these parameters for the generation of toolpaths/G-code,” as Petitioner asserts. *See* EX1005, ¶[0073] (“transmit the operational parameters back to the three-dimensional printer 306 for fabrication of the object 314”) (cited by Pet. at 15, 17). There is no explanation of why a profile would be created using the

POR, 22

DECLARATION OF DR. MICHAEL HICKNER

40. A POSITA would have been motivated to implement Douglas’ system in a manner that employs Mark’s teaching of a full featured slicer and toolpath generator configured to process (e.g., slice) a 3D model into layers and generate toolpath instructions (e.g., G-code) according to operational parameters that reflect the fabrication capability of the 3D printer, including Mark’s use of operational parameters arranged as a configuration file, a rule set or parameter database and Mark’s express teaching of transmitting the generated G-code to a printer, such as the printer selected by Douglas. EX-1005, ¶[0032], [0072]-[0073], [0097]-[0099], FIGS. 2, 6; EX-1006, 1:25, 48-61; 11:4-13:3. A PC motivated to combine Douglas and Mark for at least the following reasons: EX1003, ¶40; Pet. 8

Douglas et al.

the three-dimensional printer 306. The operational parameters may then be combined with the three-dimensional printer 306 print job information for the fabrication of the object 314. In another aspect, a print server 208 may request

supplies 302. The operational parameters determined by the three-dimensional printer 306 and the remote resource may be combined into a single set of operational parameters by either the three-dimensional printer 306 or the remote source.

EX1005, [0074]-[0075]; Rep. 11, Pet. 15-16, 36

Hamilton-Evans Grounds

FISH.

Evans and KISSlicer are Prior Art

FISH.

Evans and KISSlicer are Prior Art

Prior to Institution, the Petition provided notice and evidence

**PETITION FOR *INTER PARTES* REVIEW OF UNITED STATES PATENT
NO. 11,886,774 PURSUANT TO 35 U.S.C. §§ 311–319, 37 C.F.R. § 42**

The '774 patent claims priority to multiple applications, the earliest of which was filed December 31, 2014 (“Critical Date”). EX-1001, Cover. Each reference asserted in this Petition qualifies as prior art even if the Critical Date were the priority date of the '774 Patent (which Petitioner does not concede).

Reference	Priority Date	Publication Date
Douglas	Oct.-29-2012	May-1-2014
Mark	Mar.-22-2013	Jul.-4-2017
Dahlin	Jan.-26-1998	Jun.-18-2008
Batchelder	Nov.-19-2009	May-8-2014
Hamilton	Apr.-16-2014	Aug.-21-2014
Evans	-	2012
KISSlicer	-	Jan.-2012
Pax	Sep.-7-2012	Mar.-13-2014
Pettis	Jun.-8-2012	Dec.-12-2013
Wang	Aug.-29-2014	Jan.-9-2018

Petition, 2

EXHIBITS	
EX-1001	U.S. Patent No. 11,886,774 to Leonard et al. (“the ’774 patent”)
EX-1002	Excerpts from the Prosecution History of the ’774 Patent (“the Prosecution History”)
EX-1003	Declaration of Dr. Michael Hickner
EX-1004	Curriculum Vitae of Dr. Michael Hickner
EX-1005	U.S. Patent Pub. No. 2014/0117585 A1 to Douglas et al. (“Douglas”)
EX-1006	U.S. Patent No. 9,694,544 to Mark et al. (“Mark”)
EX-1007	U.S. Patent Pub. No. 2014/0127524 A1 to Batchelder et al. (“Batchelder”)
EX-1008	European Patent No. 1087862B1 to Dahlin et al. (“Dahlin”)
EX-1009	U.S. Patent Pub. No. 2013/0329258 A1 to Pettis et al. (“Pettis”)
EX-1010	U.S. Patent Pub. No. 2014/0236773 A1 to Hamilton et al. (“Hamilton”)
EX-1011	<i>Practical 3D Printers, The Science and Art of 3D Printing</i> (“Evans”)
EX-1012	KISSlicer Quick-Start Guide (2012), available at https://web.archive.org/web/20121224171520/http://kisslicer.com/files/KISSlicerQuickStart.pdf#expand (“KISSlicer”)

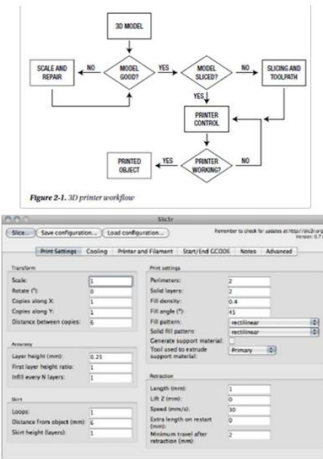
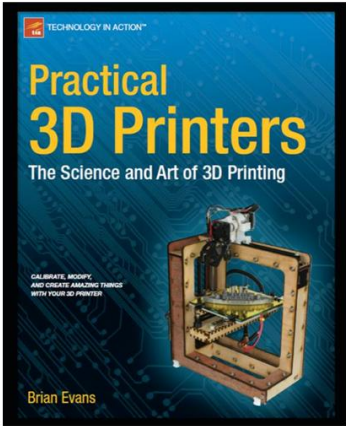
EX-1015	Declaration of Jonathan Dummer
EX-1016	Declaration of June Munford

Petition, iii-iv

Evans and KISSlicer are Prior Art

Prior to Institution, the Petition provided notice and evidence

Evans is a “how-to manual” for 3D printing that includes a “big picture of how 3D printers work” along with “specifics of a 3D printer’s toolchain.” EX-1011, 5. Included within Evans’ comprehensive disclosure is an overview of a



Evans is a comprehensive 3D printing reference, and includes an overview of various slicing programs and 3D printer control software

Petition, 43-44

Practical 3D Printers

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ISBN-13 (pbk): 978-1-4302-4392-2

ISBN-13 (electronic): 978-1-4302-4393-9

Additionally, it was well known before the Critical Date for slicing applications to generate settings/configurations based on printer capabilities. EX-1003, ¶124. For example, another publicly available slicing application, “KISSlicer,” creates “profiles” for each print that are based on printer capabilities, for example, the printer’s available materials. EX-1012, 3-11; EX-1015; EX-1003, ¶124. An example KISSlicer profile is illustrated below.

Petition, 59

Hulu, LLC, v. Sound View Innovations, LLC, IPR2018-01039, Paper 29, 18 (PTAB Dec. 20, 2019) (precedential) (“when the evidence relied on in a petition provides strong indicia that an asserted reference was publicly accessible”).

Edwards Lifesciences Corporation et al. v. Aortic Innovations, LLC, IPR2022-00193, Paper 15, 33-35, 55-59 (PTAB Apr. 25, 2022) (rejecting argument that indicia must be “identified, with particularity, in the Petition.”)

Evans and KISSlicer are Prior Art

Prior to Institution, the Petition provided notice and evidence

PATENT OWNER’S PRELIMINARY RESPONSE

¹ Exhibit 1016, Declaration of June Munford, appears to address information about Evans, but Petitioner never cites to Exhibit 1016, much less explain the import of

POPR, 22

To the extent Petitioner relies on arguments in the declaration (EX1015) that it has cited for the argument that “another publicly available slicing application, ‘KISSlicer,’ creates ‘profiles’ for each print that are based on printer capabilities,

POPR, 24

Hulu, LLC, v. Sound View Innovations, LLC, IPR2018-01039, Paper 29, 18-21 (PTAB Dec. 20, 2019) (precedential) (“if the patent owner challenges a reference’s status as a printed publication, a petitioner may submit a supporting declaration **with its reply** to further support its argument that a reference qualifies as a printed publication. See 37 C.F.R. §§ 42.2 (affidavit), 42.23. Or, if a patent owner does not challenge the reference’s status as a printed publication, the petitioner may move to submit the declaration **through the supplemental information process**. 37 C.F.R. § 42.123...”)

PETITIONER’S OPPOSITION TO PATENT OWNER’S DISCRETIONARY DENIAL BRIEF

incredulous—not only because both Evans and KISSlicer were blatantly published before the Critical Date from a cursory review of their disclosure (for example, Evans’ 2012 copyright date)—but also because Petitioner submitted evidence with the filing of the Petition that verifies the authenticity and availability of both references. See generally, EX-1015; EX-1016. Indeed, as June Munford testifies, Evans was indexed into the Penn State University library in 2012—over two years before the Critical Date. EX-1016, ¶¶7-9. Patent Owner’s arguments do not even acknowledge this evidence, let alone dispute it (nor can Patent Owner dispute the prior art status of a printed publication indexed into a university library accessible to the public—something that courts have long recognized qualifies as prior art). Paper 7, 25-28; *In re Hall*, 781 F.2d 897 (Fed. Cir. 1986) (finding that a thesis indexed into a university library qualified as prior art). Likewise, Patent Owner ignores the declaration of Jonathan Dummer—the inventor of KISSlicer—who testified that KISSlicer (his own invention) was available for free public download since 2012. EX-1015, 1-2.

Paper 9, 38

Evans and KISSlicer are Prior Art

The *Vidstream* precedent and 35 U.S.C. § 316(e) dictate what happens after trial is “instituted”

Procedural posture (refer to *VidStream*, 981 F.3d 1062-65):

1. Petition – Twitter “filed two petitions for IPR” and “cited Bradford as the primary reference.” The “Bradford book” included a “copyright page which contains the legend: **Copyright © 2011**” and “also states the **ISBN information**.”
2. POR – “VidStream, in its patent owner's response, stated that Bradford is not an available reference because it was published December 13, 2015.”
3. Reply – “Twitter filed replies with additional documents” (e.g., “obtained from the Copyright Office a copy of Bradford's Certificate of Registration”). Twitter further filed a “Declaration of ‘an expert on library cataloging and classification.’”
4. Sur-reply – “VidStream filed a sur-reply challenging the timeliness and the probative value of the supplemental information submitted by Twitter.”
5. Motion – VidStream filed a “motion to exclude.”

Key holdings (refer to *VidStream*, 981 F.3d 1065-66):

- “**When there is an established publisher** there is a presumption of public accessibility as of the publication date,” and citing to “*Kyocera Wireless Corp. v. Int'l Trade Comm'n*, 545 F.3d 1340, 1351 (Fed. Cir. 2008) (finding public accessibility when the reference was contained in a book sold to the public).”
- The Federal Circuit affirmed that Board should, after the PTAB trial, consider all evidence “**as a whole**” to assess indicia of publication.

Rep., 25

In re Magnum Oil Tools Int'l, Ltd., 829 F.3d, 1364, 1377 (Fed. Cir. 2016):

“The petitioner continues to bear the burden of proving unpatentability after institution, and must do so by a preponderance of the evidence at trial. See 35 U.S.C. § 316(e). And, the Board has ***an obligation to assess the question*** anew after trial ***based on the totality of the record***.”

Evans and KISSlicer are Prior Art

The Board invited a trial; Patent Owner declined to develop the record

PATENT OWNER’S PRELIMINARY RESPONSE

D. Evans Is Not Prior Art

Petitioner fails to present any argument or cite any evidence as to why *Evans* is prior art. As such, Petitioners bare assertion that *Evans* has a publication date of “2012” is unsupported and insufficient. *See* Pet. at 2.

Further, like the other references asserted in the Petition, there is no explanation of how *Evans* qualifies as prior art. For example, Petitioner fails to identify if the reference qualifies under any sub-section of 35 U.S.C. § 102. *See id.*

It is Petitioner’s burden to establish *Evans* as prior art by presenting its arguments and providing citations to evidence. The petition must identify “in writing and with particularity, each claim challenged, the grounds on which the challenge to each claim is based, and the evidence that supports the grounds for the challenge to each claim.” 35 U.S.C. § 312(a)(3); *see also* 37 C.F.R. § 42.22 (The

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PATENT OWNER’S RESPONSE

F. Evans Is Not Prior Art

Petitioner fails to present any argument or cite any evidence as to why *Evans* is prior art. As such, Petitioners bare assertion that *Evans* has a publication date of “2012” is unsupported and insufficient. *See* Pet. at 2.

Further, like the other references asserted in the Petition, there is no explanation of how *Evans* qualifies as prior art. For example, Petitioner fails to identify if the reference qualifies under any sub-section of 35 U.S.C. § 102. *See id.*

It is Petitioner’s burden to establish *Evans* as prior art by presenting its arguments and providing citations to evidence. The petition must identify “in writing and with particularity, each claim challenged, the grounds on which the challenge to each claim is based, and the evidence that supports the grounds for the challenge to each claim.” 35 U.S.C. § 312(a)(3); *see also* 37 C.F.R. § 42.22 (The

POR, 35

Patent Owner declined to depose Ms. Munford

Evans and KISSlicer are Prior Art

The Board invited a trial; Patent Owner declined to develop the record

PATENT OWNER’S PRELIMINARY RESPONSE

E. **KISSlicer Is Not Prior Art**

Petitioner has also failed to show that *KISSlicer* in Ground 2A (*Hamilton* and *Evans*, with or without *KISSlicer*) is a printed publication. Like the *Evans* reference discussed above, the Petition is devoid of any argument to support a conclusory assertion that *KISSlicer* is a printed publication with a publication date of “Jan.-2012.” *See* Pet. at 2.

Further, like *Evans* and the other references asserted in the Petition, there is no explanation of how *KISSlicer* qualifies as prior art. For example, Petitioner fails to identify if the reference qualifies under any sub-section of 35 U.S.C. § 102. *See id.*

It is Petitioner’s burden to establish that *KISSlicer* as prior art by presenting its arguments and providing citations to evidence. *See* 35 U.S.C. § 312(a)(3) (the petition must identify “in writing and with particularity, each claim challenged, the grounds on which the challenge to each claim is based, and the evidence that supports the grounds for the challenge to each claim”); 37 C.F.R. § 42.22 (Petition

POPR, 23

PATENT OWNER’S RESPONSE

G. **KISSlicer Is Not Prior Art**

Petitioner has also failed to show that *KISSlicer* in Ground 2A (*Hamilton* and *Evans*, with or without *KISSlicer*) is a printed publication. Like the *Evans* reference discussed above, the Petition is devoid of any argument to support a conclusory assertion that *KISSlicer* is a printed publication with a publication date of “Jan.-2012.” *See* Pet. at 2.

Further, like *Evans* and the other references asserted in the Petition, there is no explanation of how *KISSlicer* qualifies as prior art. For example, Petitioner fails to identify if the reference qualifies under any sub-section of 35 U.S.C. § 102. *See id.*

It is Petitioner’s burden to establish that *KISSlicer* is prior art by presenting its arguments and providing citations to evidence. *See* 35 U.S.C. § 312(a)(3) (the petition must identify “in writing and with particularity, each claim challenged, the grounds on which the challenge to each claim is based, and the evidence that supports the grounds for the challenge to each claim”); 37 C.F.R. § 42.22 (Petition

POR, 37

Patent Owner declined to depose Mr. Dummer



Evans and KISSlicer are Prior Art

There is no dispute Evans has indicia of public availability

PETITION FOR *INTER PARTES* REVIEW OF UNITED STATES PATENT
NO. 11,886,774 PURSUANT TO 35 U.S.C. §§ 311–319, 37 C.F.R. § 42

Evans is a “how-to manual” for 3D printing that includes a “big picture of how 3D printers work” along with “specifics of a 3D printer’s toolchain.” EX-1011, 5. Included within Evans’ comprehensive disclosure is an overview of a

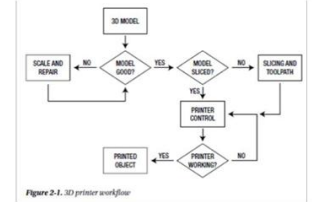
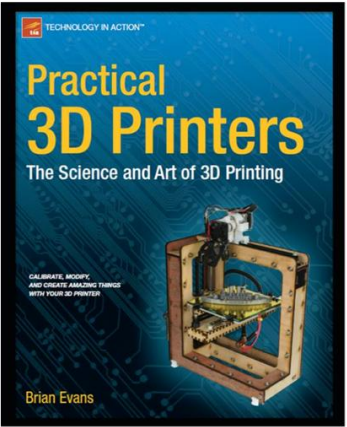
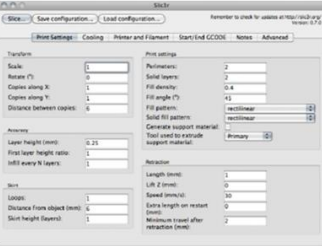


Figure 2-1. 3D printer workflow



Evans is a comprehensive 3D printing reference, and includes an overview of various slicing programs and 3D printer control software

Petition, 43-44



Evans

Practical 3D Printers
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Munford testimony

9. The 008 field of the MARC record in Appendix EVANS01 indicates the date of record creation. The 008 field of Appendix EVANS01 indicates the Penn State University Library first acquired Practical 3D Printers: Science and Art of 3D Printing as of October 4, 2012. Considering this information, it is my determination that Practical 3D Printers: Science and Art of 3D Printing was made available to the public shortly after its initial acquisition as of October 4, 2012.

EX1016, ¶9; Paper 9, 38; Inst. Dec., 23, Rep., 25

Evans and KISSlicer are Prior Art

There is no dispute KISSlicer has indica of public availability

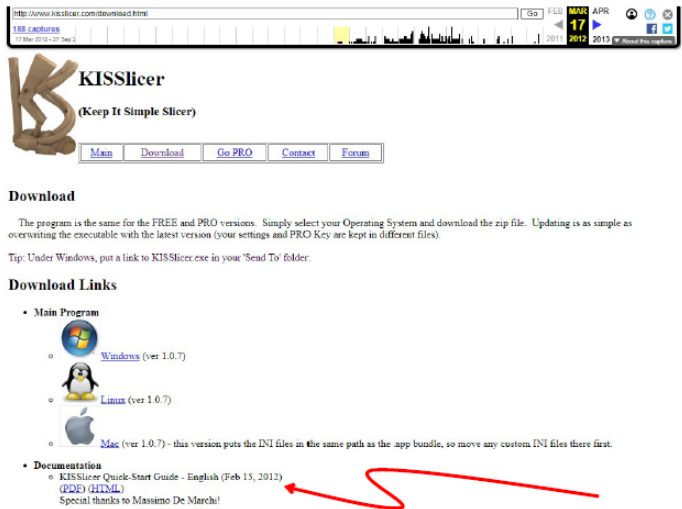
**PETITION FOR *INTER PARTES* REVIEW OF UNITED STATES PATENT
NO. 11,886,774 PURSUANT TO 35 U.S.C. §§ 311–319, 37 C.F.R. § 42**

EXHIBITS	
EX-1001	U.S. Patent No. 11,886,774 to Leonard et al. (“the ’774 patent”)
EX-1002	Excerpts from the Prosecution History of the ’774 Patent (“the Prosecution History”)
EX-1003	Declaration of Dr. Michael Hickner
EX-1004	Curriculum Vitae of Dr. Michael Hickner
EX-1005	U.S. Patent Pub. No. 2014/0117585 A1 to Douglas et al. (“Douglas”)
EX-1006	U.S. Patent No. 9,694,544 to Mark et al. (“Mark”)
EX-1007	U.S. Patent Pub. No. 2014/0127524 A1 to Batchelder et al. (“Batchelder”)
EX-1008	European Patent No. 1087862B1 to Dahlin et al. (“Dahlin”)
EX-1009	U.S. Patent Pub. No. 2013/0329258 A1 to Pettis et al. (“Pettis”)
EX-1010	U.S. Patent Pub. No. 2014/0236773 A1 to Hamilton et al. (“Hamilton”)
EX-1011	<i>Practical 3D Printers, The Science and Art of 3D Printing</i> (“Evans”)
EX-1012	KISSlicer Quick-Start Guide (2012), available at https://web.archive.org/web/20121224171520/http://kisslicer.com/files/KISSlicerQuickStart.pdf#expand (“KISSlicer”)

Petition, iii

Dummer testimony

2. Since January 2012, the KISSlicer software has been available in both free and pro versions at the www.kisslicer.com website, which became popular to many in the 3D printing field by early 2012. See Appendix A, p. 1. The free version was and still is freely available and does not require any login credentials or payment to access. Additionally, the website also provided free access for users to also download the “KISSlicer Quick-Start Guide” (Appendix B), which was publicly accessible by interested users no later than February 2012—a fact that is corroborated by the archived version of the www.kisslicer.com website:



See Appendix A, p. 1 (“February 15, 2012”). I have personal knowledge that, throughout February 2012, members of the public interested in 3D printing were able to find, access, and download the KISSlicer software and Quick-Start Guide from www.kisslicer.com using publicly

EX1015, ¶2; Pet., 59 (citing EX1015); Inst. Dec. 23, Rep. 26

Evans and KISSlicer are Prior Art

Consistent with *VidStream*, Petitioner cited additional evidence in the Reply

Evans

Copyright

Registration Number / Date:
TX0007663753 / 2013-01-30

Type of Work:
Text

Title:
Practical 3D Printers.

Application Title:
Practical 3D Printers.

Date of Creation:
2012

Date of Publication:
2012-08-28

Copyright Claimant:
Brian Evans. Address: 233 Spring Street, New York, NY, 10013, United States.

Authorship on Application:
Brian Evans; Domicile: not known; Citizenship: not known. Authorship: text.

ISBN:
978-1-4302-4392-2

Description:
Book, 305 p.

Nation of First Publication:
United States

Names:
[Evans, Brian](#)

USCO Catalog Link:
https://publicrecords.copyright.gov/detailed-record/voyager_26050706

EX1042, 1; Rep. 25-26

KISSlicer

Kisslicer pre-release 1.0.8

By ghagen
April 11, 2012 in UltiMaker Cura

ghagen
Dormant
0
7 posts

Posted April 11, 2012 · Kisslicer pre-release 1.0.8

Kisslicer has a pre-release of its software on the Kisslicer forum.
<http://kisslicer.com/forum/index.php?topic=88.0>

KISSlicer

By menno
March 16, 2012 in UltiMaker Cura

menno
Dormant
0
2 posts

Posted March 16, 2012 · KISSlicer

Introducing KISSlicer

Posted by lonesock
Andrew Diehl
Re: Introducing KISSlicer
February 11, 2012 06:49PM
Sun,
I've been using pronterface to upload gcode to my printer from kisslicer and have had no problems.
Can you toggle the axis with the manual controls?
Edited 2 time(s). Last edit at 02/11/2012 06:57PM by Andrew Diehl.
www.Fablicator.com

Registered: 14 years ago
Posts: 581

EX1044, 1; EX1045, 1; EX1046, 1; Rep. 26

Rembrandt Diagnostics, LP v. Alere, Inc., 76 F.4th 1376, 1384 (Fed. Cir. 2023):

“In fact, the introduction of **new evidence in the course of the trial is to be expected in [IPR] trial proceedings and permissible** as long as the opposing party is given notice of the evidence and an opportunity to respond to it.”

FISH

(internal quotations omitted, and citing to *Apple Inc. v. Andrea Electronics Corp.*, 949 F.3d 697, 706 (Fed. Cir. 2020)).

Rep., 11

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Grounds 2A-2E: Limitation [1.1]

FISH.

Limitation [1.1]

1. A method comprising:
receiving a request to fabricate an object from a three-dimensional model;
determining a target printer to fabricate the object;
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;
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;
creating a fabrication profile based on the one or more properties; and generating a machine-ready representation of the three-dimensional model executable by the target printer to fabricate the object.

Limitation [1.1]

Hamilton provides a “three-dimensional model”

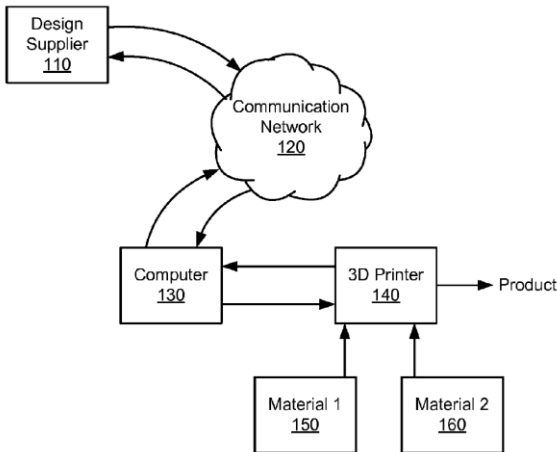
Hamilton et al.

Designs for the printer will consist of 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. If the requirements found in the design are met by the printer, the user is allowed to purchase the design. If the requirements in the design are not met by the printer the user will not be allowed to purchase the design.

[0020] Turning to FIG. 2, a block diagram of the process in which a product is printed from the user’s side. The user first request’s a product 210. The system then waits for a response from the user to ensure that the printer is attached and ready. The system then will access the design for the requirements to print the product 230. When the design requirements are accessed it responds, to the user the material needed and the accuracy of the printer needed 240. The system will then wait for a response from the user of the material available 250. If the material available matches the design requirements 260 and the accuracy of the printer is correct it then proceeds to allow the user to provide payment for the design 270. When payment is received the system responds with sending 280 the designs to the user allowing them to print the product 290.

[0021] Turning to FIG. 3, a block diagram of the process in which a product is printed from the design supplier’s side. The system will wait until a request for a design is made 310. Once a design is requested, the system will access the design for the design requirements 320. Using these design requirements the system will query the user’s 3D printer for its accuracy and material abilities 330. The system will wait for

EX1010, [0019]-[0021]; Pet. 51-52



US 11,886,774 B2

The three-dimensional model may also or instead include any other three-dimensional surface or volumetric representation of the object, or any combination of the foregoing that is useful for describing a three-dimensional form of an object. The three-dimensional model may include a three-dimensional design created by a user, e.g., using local or online tools for three-dimensional design and modeling. The

EX1001, 18:17-23; EX1003, ¶¶116-117; Pet. 51-52

DECLARATION OF DR. MICHAEL HICKNER

117. Additionally, given that Hamilton’s system fabricates objects using a 3D printer “operable to print given designs” and “to produce a product corresponding to the product construction specification,” a POSITA would have recognized and found obvious that the design would have been of the object from a “three-dimensional model” to construct a real-world product and achieve “efficient product delivery” using the 3D printer. EX-1010, ¶¶[0004]-[0005], [0019]. This is consistent with the ’774 patent, which similarly describes that a “three-dimensional model may include a three-dimensional design created by a user, e.g., using local or online tools for three-dimensional design and modeling.” EX-1001, 18:21-23.

EX1003, ¶117; Pet. 51-52

PATENT OWNER’S RESPONSE

dimensional model. *Hamilton* does not mention the term “model” and defines what

Alivacor, Inc. v. Apple Inc., 130 F.4th 1006, 1015 (Fed. Cir. 2025) (“To restrict each reference’s teachings to the particular way ... would improperly fail to read these references for all that they disclose”).

Limitation [1.1]

Hamilton provides a “three-dimensional model”

Patent Owner deposed Dr. Hickner on this issue, and he testified why the G-code is not generated until after “the printer is known.”

18 A So what I'm saying is that Hamilton, in
19 instructions for the 3D printer, doesn't say
20 whether that includes G code or not. But the G
21 code, specifically, is generated for a specific
22 printer.

52

1 And so, because of the way the G code
2 movement works – or the way that the actuators in
3 the printer work, you know, Hamilton says
4 instructions for the 3D printer, but having G code
5 before you identify the printer, I think a POSITA
6 would understand that the G code file that you're
7 going to use to print the part, for the most
8 effective printing, that G code file needs to be
9 generated once the printer is known.

10 Q And Hamilton doesn't describe
11 generating that G code file once the printer is
12 known; is that correct?

6 A POSITA would have been motivated to
7 generate G code based on that specific printer in
8 order to get the most successful print they could,
9 based on that specific printer. Because G code is
10 specific to characteristics of a certain printer.
11 You just can't have a G code file that you could
12 use on any printer, for instance.

13 Q To clarify, you're saying that a POSITA
14 would have been motivated to, then, generate the G
15 code, but Hamilton doesn't actually instruct the
16 POSITA to do so?

17 A Hamilton does not talk about G code.

DECLARATION OF DR. MICHAEL HICKNER

117. Additionally, given that Hamilton's system fabricates objects using a 3D printer “operable to print given designs” and “to produce a product corresponding to the product construction specification,” a POSITA would have recognized and found obvious that the design would have been of the object from a “three-dimensional model” to construct a real-world product and achieve “efficient product delivery” using the 3D printer. EX-1010, ¶¶[0004]-[0005], [0019]. This is consistent with the '774 patent, which similarly describes that a “three-dimensional model may include a three-dimensional design created by a user, e.g., using local or online tools for three-dimensional design and modeling.” EX-1001, 18:21-23.

EX1003, ¶117; Pet. 51-52

Limitation [1.1]

Hamilton provides a “three-dimensional model”

Patent Owner’s expert: typical 3D printing assumes the use of a CAD “model” and a slicer software compatible with “that” printer

2 Q. What did one have to do to take an idea for a
3 print to get that ultimately printed on that MakerBot
4 machine in your lab?
5 A. Okay. So for that scenario that you're
6 describing, we -- so the idea of printing something
7 assumes that you already have a CAD, computer-aided
8 design, model generated of the thing you want to print.
9 And so on a computer that has the slicing
10 software compatible with that printer, you would run the
11 mod -- the geometry model would be imported into the
12 slicer software. The slicer software would slice it
13 into the individual layers.
14 And then in our case, we would have that
15 output file saved on a memory device which today,
16 analogous to a USB memory stick; and then we would
17 transfer that to the printer, the controller on the
18 printer, and then tell the printer to print the part.

EX1043, p. 62; Rep., 12

DECLARATION OF DR. MICHAEL HICKNER

117. Additionally, given that Hamilton’s system fabricates objects using a 3D printer “operable to print given designs” and “to produce a product corresponding to the product construction specification,” a POSITA would have recognized and found obvious that the design would have been of the object from a “three-dimensional model” to construct a real-world product and achieve “efficient product delivery” using the 3D printer. EX-1010, ¶¶[0004]-[0005], [0019]. This is consistent with the ’774 patent, which similarly describes that a “three-dimensional model may include a three-dimensional design created by a user, e.g., using local or online tools for three-dimensional design and modeling.” EX-1001, 18:21-23.

EX1003, ¶117; Pet. 51-52

Limitation [1.1]

Hamilton provides a “three-dimensional model”

2 Q. What did one have to do to take an idea for a
3 print to get that ultimately printed on that MakerBot
4 machine in your lab?
5 A. Okay. So for that scenario that you're
6 describing, we -- so the idea of printing something
7 assumes that you already have a CAD, computer-aided
8 design, model generated of the thing you want to print.
9 And so on a computer that has the slicing
10 software compatible with that printer, you would run the
11 mod -- the geometry model would be imported into the
12 slicer software. The slicer software would slice it
13 into the individual layers.
14 And then in our case, we would have that
15 output file saved on a memory device which today,
16 analogous to a USB memory stick; and then we would
17 transfer that to the printer, the controller on the
18 printer, and then tell the printer to print the part.

EX1043, p. 62; Rep., 12

Consistent with Dr.
Hickner’s original
testimony for the
Hamilton-Evans
combination

DECLARATION OF DR. MICHAEL HICKNER

106. A POSITA would have been motivated to implement Hamilton’s system in a manner that employs Evans’ explicit teaching of a slicer configured to process (e.g., slice) a 3D model into layers and generate toolpath instructions (e.g., G-code) according to a configuration profile created based on properties that reflect the fabrication capability of the 3D printer and used for the generation of the G-code, and configured to transmit the G-code to the 3D printer for execution, includes Evans’ additional examples of printer and filament properties (including user settings on the printer) in the “printer accuracy and capabilities” transmitted from the printer for the selection of a suitable printer to fabricate an object, and

EX1003, ¶106; Pet. 44-45; Rep., 19

Limitation [1.1]

Hamilton provides a “three-dimensional model”

2 Q. What did one have to do to take an idea for a
3 print to get that ultimately printed on that MakerBot
4 machine in your lab?
5 A. Okay. So for that scenario that you're
6 describing, we -- so the idea of printing something
7 assumes that you already have a CAD, computer-aided
8 design, model generated of the thing you want to print.
9 And so on a computer that has the slicing
10 software compatible with that printer, you would run the
11 mod -- the geometry model would be imported into the
12 slicer software. The slicer software would slice it
13 into the individual layers.
14 And then in our case, we would have that
15 output file saved on a memory device which today,
16 analogous to a USB memory stick; and then we would
17 transfer that to the printer, the controller on the
18 printer, and then tell the printer to print the part.

EX1043, p. 62; Rep., 12

Consistent with Dr.
Hickner's deposition
testimony

20 Q So Hamilton does not disclose a
21 three-dimensional model; is that correct?
22 A So Hamilton does talk about product
1 construction specification, a 3D printer operable
2 to produce a product corresponding to the product
3 construction specification. So in Hamilton, it
4 talks about, let's say in Figure 6, partway down
5 the flowchart, in 640, access original design for
6 part design, print-specified part. And so, this
7 printing of a part or printing a product, as in
8 Figure 4, alludes to a model to print the
9 specified part.
10 I think a POSITA would understand that
11 in order to print a specified part, as described
12 in Exhibit 1010, you need some sort of
13 three-dimensional model. That's how 3D printers
14 work.

EX2015, 46-47

back into the original design. The system must find if the part
is exists in the original design for the product 630. If the part
does not exist within the original design, the system will go
back to the beginning of the method and ask the user to input
which part needs to be reprinted. If the part does exist within
the original design, the system will then proceed to access the
original design to find how to print that specified part 640. The
system will then proceed to print the specified part 650. When
the system has finished printing the specified part, it will
notify the user. The system will then stop printing.

EX1010, [0024]

the diagram illustrating the
part that has been broken
printing the entire design
the method will end. If there
first identify that there is a
610. Then they must iden-
reprinted 620. After this,
is to be replaced into the
. The system will then go

Grounds 2A-2E: Limitations [1.2]- [1.3]

FISH.

Limitations [1.2]-[1.3]

1. A method comprising:
receiving a request to fabricate an object from a three-dimensional model;
determining a target printer to fabricate the object;
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;
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;
creating a fabrication profile based on the one or more properties; and generating a machine-ready representation of the three-dimensional model
executable by the target printer to fabricate the object.

PATENT OWNER'S RESPONSE

Petitioner's assertion that the "attached printer would have been the target printer," because the system waits for the user to ensure the printer is attached and ready (*see* Pet. 54), fails to explain why confirming that the printer is attached teaches "determining a target printer to fabricate the object." Indeed, the user in *Hamilton* does not know the requirements of the object to be fabricated when it responds to the system to ensure the printer is attached and ready. *See* EX1010 at Fig. 2 (steps 240 and 260); EX2014, ¶124.

As shown below in Figure 2 of *Hamilton*, which shows a flow chart for a method from the perspective of the user, the printer in *Hamilton* is not a target printer to fabricate the object until the print material is okay at step 260.

POR, 43

Limitations [1.2]-[1.3]

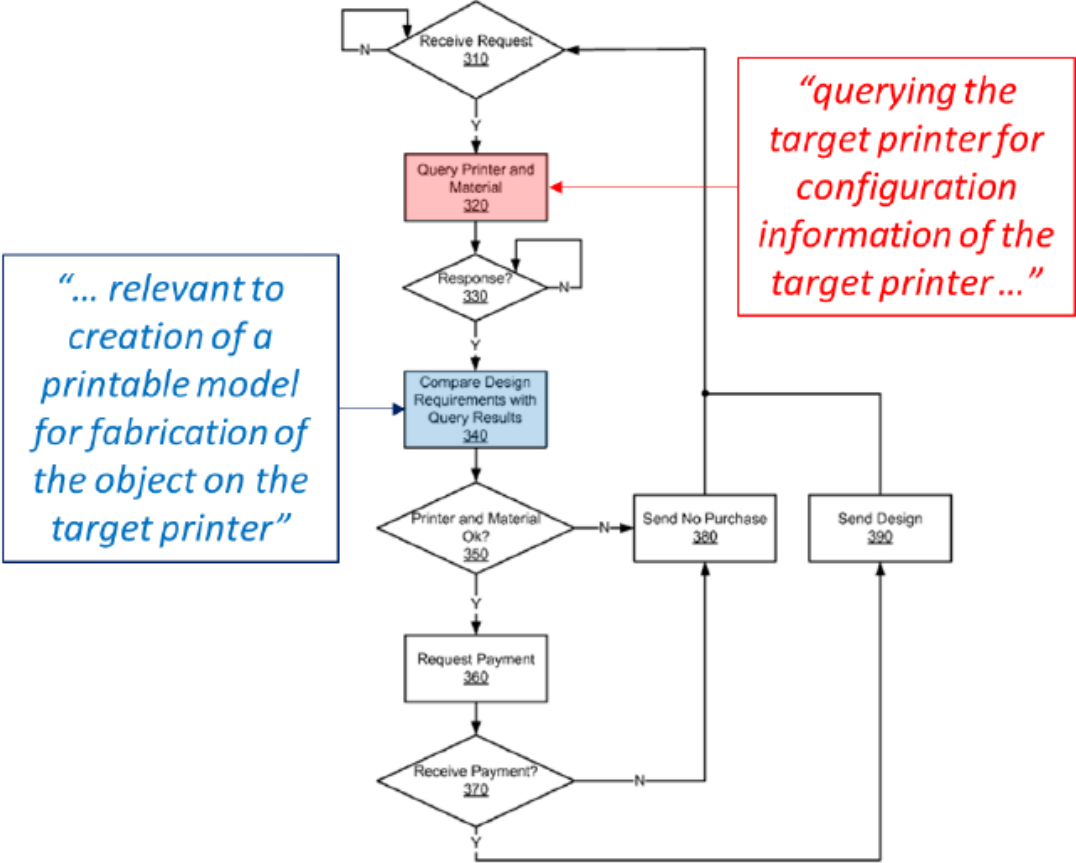


Fig. 3

EX-1010, FIG. 3.

Limitations [1.2]-[1.3]

Hamilton provides limitations [1.2]-[1.3]

DECLARATION OF DR. MICHAEL HICKNER

118. Hamilton's process of 3D printing includes querying "the user's 3D printer for its accuracy and material capabilities." EX-1010, ¶¶[0019], [0021]. FIG. 3. If the printer capabilities are compatible with the requested 3D model, the model is sent to the user's 3D printer to fabricate the model. *Id.* A POSITA would have recognized that "the user's 3D printer" would be "a target printer to fabricate the object" because the user first requests a product 210 and the system waits for a response from the user to ensure that the printer is attached and ready. EX-1010, ¶[0020]. The attached printer would have been the target printer and

119. As discussed above in [1.2], Hamilton's process of 3D printing performs a "query" of the printer to be used that includes the printer's "accuracy and material capabilities" ("querying the target printer for configuration information of the target printer"). EX-1010, ¶¶[0019]-[0021], FIG. 3; *see*

EX1003, ¶¶118-119; Pet. 54-55

Hamilton et al.

[0020] Turning to FIG. 2, a block diagram of the process in which a product is printed from the user's side. The user first request's a product 210. The system then waits for a response from the user to ensure that the printer is attached and ready. The system then will access the design for the requirements to print the product 230. When the design requirements are accessed it responds, to the user the material needed and the accuracy of the printer needed 240. The system will then wait for a response from the user of the material available 250. If

EX1010, [0020], [0021]; EX1003, ¶¶118-119; Pet. 54-55

[0021] Turning to FIG. 3, a block diagram of the process in which a product is printed from the design supplier's side. The system will wait until a request for a design is made 310. Once a design is requested, the system will access the design for the design requirements 320. Using these design requirements the system will query the user's 3D printer for its accuracy and material abilities 330. The system will wait for a response from the printer 330. The user's 3D printer will

US 11,886,774 B2

As shown in step 304, the method 300 may include determining a target printer to fabricate the object. Determining the target printer may include identifying a selected printer in the request. The selected printer may have been manually selected by a user, e.g., the requester. It will be

EX1001, 18:42-46; Rep. 4-5, 19-20

Limitations [1.2]-[1.3]

Patent Owner improperly imports features into the claims

PATENT OWNER'S RESPONSE

EX1010 at Fig. 2, [0020] (“If the material available matches the design requirements 260 and the accuracy of the printer is correct it then proceeds to allow the user to provide payment for the design 270.”). If the print material is okay and payment is provided, the user will receive the design for fabrication at step 280. Thus, the printer in *Hamilton* is not a target printer until after querying the printer because the user in *Hamilton* does not know the requirements of the design, which are compared to the query results by the supplier. See *id.* at Figs. 2-3. Accordingly, there is no teaching in *Hamilton* of determining a target printer to fabricate the object such that the target printer is then queried for configuration information. EX2014, ¶125.

POR, 44-45

US 11,886,774 B2

As shown in step 304, the method 300 may include determining a target printer to fabricate the object. Determining the target printer may include identifying a selected printer in the request. The selected printer may have been manually selected by a user, e.g., the requester. It will be

EX1001, 18:42-46; Rep. 4-5, 19-20

Grounds 2A-2E: Limitation [1.4]

FISH.

Limitation [1.4]

1. A method comprising:
receiving a request to fabricate an object from a three-dimensional model;
determining a target printer to fabricate the object;
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;
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;
creating a fabrication profile based on the one or more properties; and generating a machine-ready representation of the three-dimensional model
executable by the target printer to fabricate the object.

PATENT OWNER'S RESPONSE

printer capabilities. Pet. at 56. However, like *Douglas* in Ground 1A, Petitioner fails to explain why the accuracy and material capabilities in *Hamilton* that are sent from the printer is a collection of properties (which is what Petitioner asserts as disclosing a dictionary of configuration information). EX2014, ¶126.

POR, 45

Limitation [1.4]

Hamilton-Evans provides limitation [1.4]

DECLARATION OF DR. MICHAEL HICKNER

120. As discussed in [1.3] above, once Hamilton’s system queries the user’s printer for its capabilities, the printer “will then respond with its accuracy and material capabilities” (“*receiving, from the target printer, a dictionary of configuration information*”). As the name plainly suggests, the printer’s “accuracy and material capabilities” “*contain[] one or more properties from the target printer that affect fabrication capabilities of the target printer.*” EX-1010, ¶¶[0015]-[0021], FIG. 3; *see above*, [1.3].

122. Similar to Hamilton’s target printer’s “accuracy and material capabilities,” Evans also discloses “information about your printer and filament” (“*configuration information*” that “*affect[s] fabrication capabilities of the target printer*”) “such as filament diameter,” “extruder nozzle size,” and “layer height” is needed in order for the slicer to generate sliced layers for 3D printing. EX-1011, 43-46, 312. In the combination, as discussed above, a POSITA would

EX1003, ¶¶120, 122; Pet. 56-57

Hamilton et al.

[0021] Turning to FIG. 3, a block diagram of the process in which a product is printed from the design supplier’s side. The system will wait until a request for a design is made 310. Once a design is requested, the system will access the design for the design requirements 320. Using these design requirements the system will query the user’s 3D printer for its accuracy and material abilities 330. The system will wait for a response from the printer 330. The user’s 3D printer will then respond with its accuracy and material capabilities. The

EX1010, [0021]; EX1003, ¶120; Pet. 56

Evans

In this image, we have the bunny put back together after being sliced into layers. Each alternating band of dark and light gray is about five layers, for a total of 100 layers in the finished print. In order for the slicer to be able to generate these sliced layers, it needs some general information about your printer and filament, such as the filament diameter, extruder nozzle size, and layer height, as well as a few specific print settings for the job, such as the number of outlines to make for each layer (Figure 2-7 has two), the amount to infill each layer (Figure 2-7 is set at 100 percent), and the print speed for different parts of the model.

While not all slicers can be directly integrated with all printer control applications, and in very rare cases, the sliced G-code might not be compatible with a particular firmware, G-code is a reasonably standard code, so you can often use multiple slicers with your toolchain, depending on your circumstances. That way, when the next “greatest thing in slicers” rolls out, you’ll be able to take advantage of better quality prints simply by switching to the new slicer.

Let’s take a quick look at a couple of the major slicers that are in use today.

EX1011, 44; EX1003, ¶¶120, 122; Pet. 56-57

Limitation [1.4]

Patent Owner attempts to import features into the claims and attacks Evans in isolation

PATENT OWNER'S RESPONSE

Hamilton merely discloses that the printer sends its accuracy and material capabilities. *See, e.g.*, EX1010, ¶[0021] (“The user’s 3D printer will then respond with its accuracy and material capabilities.”). It does not teach whether those capabilities are sent and received as a collection of information, and Petitioner’s expert states that the information is sent in “some unspecified manner.” *See id.*; EX2015 at 55:10-18; EX2014, ¶127.

nozzle size, layer height) as disclosed by *Evans*. *See* Pet. at 57. But *Evans* does not teach receiving its “additional information” from the target printer. Rather, a user manually measures and enters those measurements into the software. *See* EX1011 at 67-68 (explaining how to “work[] out” the “nozzle and filament diameters” so that “you can enter these measurements” into the slicer application), 66 (explaining that the “layer height” is based on the “nozzle’s diameter”). Thus, there is no support for the rationale that adds *Evans*’s “additional information” to *Hamilton*’s accuracy and material capabilities. EX2014, ¶128.

POR, 46-47

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In general, the dictionary may be provided in any suitable format. The dictionary may for example be formed as a vector of binary flags or other attributes that form a description of properties included therein. The dictionary may also, where appropriate, include scalar quantities for certain properties.

One skilled in the art will recognize that the dictionary may include properties of a printer, and information pertaining to the properties of the printer, at any desired level of granularity according to, e.g., the data storage and processing capabilities of the components being used in a system implementing the method 300. In general, the dictionary

EX1001, 22:37-48; Rep. 7

Grounds 2A-2E: Limitation [1.5]

FISH.

Limitation [1.5]

1. A method comprising:
receiving a request to fabricate an object from a three-dimensional model;
determining a target printer to fabricate the object;
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;
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;
creating a fabrication profile based on the one or more properties; and generating a machine-ready representation of the three-dimensional model executable by the target printer to fabricate the object.

PATENT OWNER'S RESPONSE

However, Petitioner ignores the teachings of *Hamilton* in reaching its conclusions. In particular, *Hamilton* teaches that there is no need for a slicer application at all because his designs already include “instructions for the 3 D printer.” EX1010, ¶[0019]. As *Hamilton* explains, the supplier “compare[s] the

POR, 48

Limitation [1.5]

Hamilton-Evans provides limitation [1.5]

DECLARATION OF DR. MICHAEL HICKNER

124. Additionally, it was well known in the art before the Critical Date for slicing applications to generate settings/configurations based on printer capabilities. For example, another publicly available slicing application, “KISSlicer,” creates “profiles” for each print that are based on printer capabilities, for example, the printer’s available materials. EX-1012, 3-11; EX-1015. An example KISSlicer profile is illustrated below.

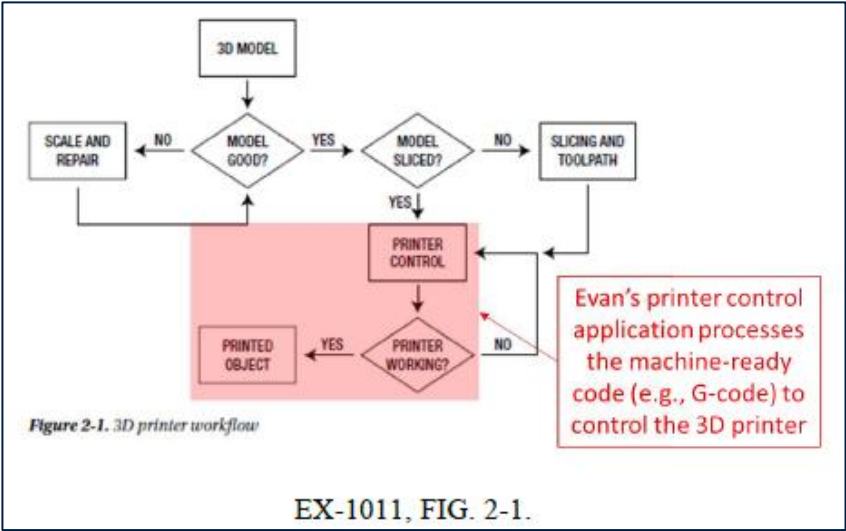
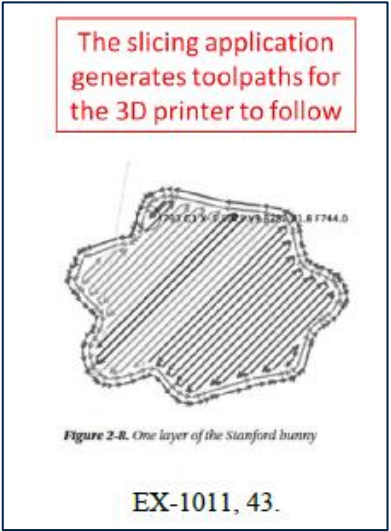
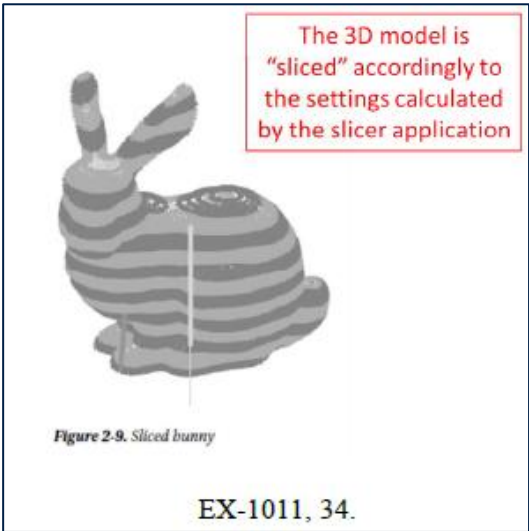
EX1003, ¶124; Pet. 56-57

Evans

Slicers

To generate the path for our printer’s extruder, we need to use a separate application called a *slicer* to take our solid 3D model and slice it into layers suitable for 3D printing. This process makes the code that tells the 3D printer where to move the extruder, when to extrude plastic, and how much plastic to extrude. These commands, or G-code, are sent from our printer control software to the firmware on our electronics, which are responsible for interpreting these codes to control the printer’s motors and heaters. To get a sense for what this toolpath looks like, we’ve sliced a bunny—not literally—using the slicer application Skeinforge to see the resulting path and direction of the extruder in Figure 2-8.

EX1011, 43; EX1003, ¶126; Pet. 60-61



EX-1011, 34, 43, FIG. 2-1; EX1003, 99-100; Pet. 60-61

Limitation [1.5]

Patent Owner's combination arguments ignore that slicers were traditionally used to generate g-code

PATENT OWNER'S RESPONSE

However, Petitioner ignores the teachings of *Hamilton* in reaching its conclusions. In particular, *Hamilton* teaches that there is no need for a slicer application at all because his designs already include “instructions for the 3 D printer.” EX1010, ¶[0019]. As *Hamilton* explains, the supplier “compare[s] the capabilities of the printer to the requirements of the design.” *Id.* at ¶[0021]. If “the requirements are met by the user’s 3D printer” and if “payment is received,” “a design is sent.” *Id.* When “the design is sent [] by the supplier,” the system “will then proceed to print the first piece of the design” followed by any additional pieces until “all parts of the design are printed and finished.” *Id.* at [0022], Fig. 4. Thus, no slicer application is run in *Hamilton*’s solution to generate machine-ready code because instructions for the 3-D printer are already included in *Hamilton*’s designs, which are only sent by the supplier of the designs if the requirements of the design are met by the user’s 3D printer. Thus, there is no motivation for using a slicer application for *Hamilton*’s solution, as *Evans* and *KISSlicer* purportedly disclose. EX2014, ¶132.

POR, 48

DECLARATION OF DR. MICHAEL HICKNER

106. A POSITA would have been motivated to implement *Hamilton*’s system in a manner that employs *Evans*’ explicit teaching of a slicer configured to process (e.g., slice) a 3D model into layers and generate toolpath instructions (e.g., G-code) according to a configuration profile created based on properties that reflect the fabrication capability of the 3D printer and used for the generation of the G-

for *Hamilton*’s system. For example, *Evans* provides a comprehensive overview of a “3D printer toolchain” which describes a detailed process of converting a 3D model into a physical object. EX-1011, 33-53. Specifically, *Evans* describes how a “slicer” can be used to process a 3D model into machine-ready code (e.g., “G-code”). EX-

EX1003, ¶¶106-107; Pet. 44-45

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*)).

DI, 19-20

Limitation [1.5]

Patent Owner's declarant corroborates that slicers were traditionally used to generate machine-ready code

And so the term "slice" refers to generating the printing instructions to produce each of those individual layers in sequence. And so that's the process of what a slicer does.

Q. And is that something that is specific to the J750?

A. No. 3D printers, in general, use slicers to prepare the files for printing.

EX1043, 59:6-13; Rep. 12

Limitation [1.5]

Patent Owner’s arguments are non-responsive to the combination of Hamilton-Evans-KISSlicer

PATENT OWNER’S RESPONSE

must manually measure the nozzle and filament diameters and enter them along with the layer height into the software, and *KISSlicer* simply shows a dialog for the user to enter material settings. EX1011 at 66-68; EX1012, 3. Thus, there is no disclosure that a fabrication profile is created based on one or more properties from the target printer. EX2014, ¶133.

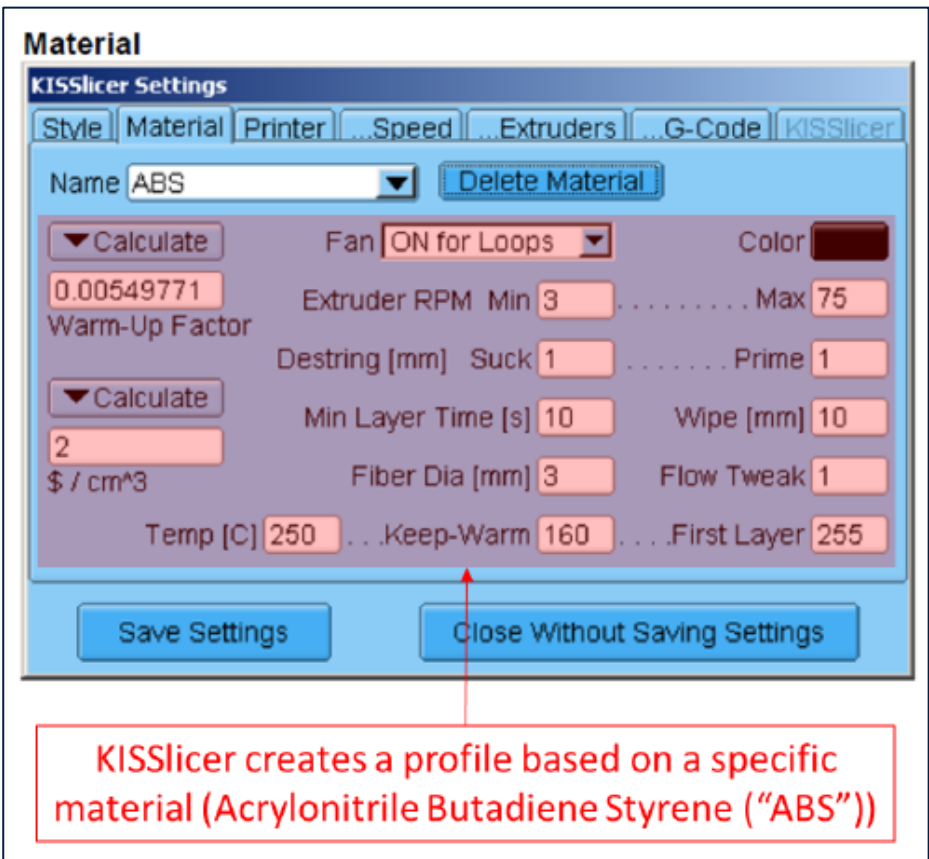
POR, 49

DECLARATION OF DR. MICHAEL HICKNER

124. Additionally, it was well known in the art before the Critical Date for slicing applications to generate settings/configurations based on printer capabilities. For example, another publicly available slicing application, “KISSlicer,” creates “profiles” for each print that are based on printer capabilities, for example, the printer’s available materials. EX-1012, 3-11; EX-1015. An example KISSlicer profile is illustrated below.

EX1003, ¶124; Pet. 59

KISSlicer



EX1012, 2; EX1003, ¶124; Pet. 59

Grounds 2A-2E: Limitation [1.6]

FISH.

Limitation [1.6]

1. A method comprising:
receiving a request to fabricate an object from a three-dimensional model;
determining a target printer to fabricate the object;
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;
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;
creating a fabrication profile based on the one or more properties; and generating a machine-ready representation of the three-dimensional model
executable by the target printer to fabricate the object.

PATENT OWNER'S RESPONSE

claim element [1.6]. Pet. at 60. However, like with claim elements [1.1] and [1.5], petitioner ignores the teachings of Hamilton. Hamilton explains that its designs already include printer instructions. These designs exist before the printer is

POR, 49

Limitation [1.6]

Hamilton-Evans provides limitation [1.6]

DECLARATION OF DR. MICHAEL HICKNER

126. Evans discloses that the process of slicing the model “generate[s] a set of commands for the 3D printer to follow” (e.g., “G-code”) (“*generating a machine-ready representation of the three-dimensional model*”). EX-1011, 34, 43, 62, 70-71. Evans also discloses that, once G-code has been generated by the slicer, this code is used to fabricate the object defined by the code. EX-1011, 34-35, 70-71. Specifically, Evans discloses that a “printer control” application

EX1003, ¶126; Pet. 60-61

113. Incorporating Evans’ teachings into Hamilton would have been predictable and foreseeable with a reasonable expectation of success because, as Evans notes, using slicing applications to generate machine-ready code (e.g., “G-code”) has “been around for a while.” EX-1011, 34. Slicers such as Slic3r and KISSlicer were well known and commonly used before the Critical Date. EX-1012, 3-4; EX-1015. In fact, most early print engine software was generated by slicer routines and was not coded by hand. Early adopters of 3D printing nearly all used

EX1003, ¶113; Pet. 48

Evans

Slicing and Toolpath

If our model is good, then we are ready to process the model for printing. Because our 3D printers print by laying down successive layers of filament, one layer at a time, we need to slice the model into these layers and generate the toolpath that tells the extruder where to go and when to extrude plastic. This process is called slicing. It will involve one of several applications called slicers that generate a set of commands for the 3D printer to follow, called G-Code. This is an instruction set that’s been around for a while and appropriated for use with our 3D printers. We can slice a model by launching the slicing application independently, but we can usually launch this application through our printer control.

EX1011, 34; EX1003, ¶126; Pet. 60-61

Slicers

To generate the path for our printer’s extruder, we need to use a separate application called a *slicer* to take our solid 3D model and slice it into layers suitable for 3D printing. This process makes the code that tells the 3D printer where to move the extruder, when to extrude plastic, and how much plastic to extrude. These commands, or G-code, are sent from our printer control software to the firmware on our electronics, which are responsible for interpreting these codes to control the printer’s motors and heaters. To get a sense for what this toolpath looks like, we’ve sliced a bunny—not literally—using the slicer application Skeinforge to see the resulting path and direction of the extruder in Figure 2-8.

EX1011, 43; EX1003, ¶126; Pet. 60-61

Limitation [1.6]

Dr. Cormier's testimony to the contrary is conclusory

PATENT OWNER'S RESPONSE

claim element [1.6]. Pet. at 60. However, like with claim elements [1.1] and [1.5], petitioner ignores the teachings of Hamilton. Hamilton explains that its designs already include printer instructions. These designs exist before the printer is identified or queried, and thus bear no relation to the fabrication profile of element [1.5]. There is therefore no need for a slicer or slicing. Additionally, Petitioner's

POR, 49-50

DECLARATION OF DR. DENIS R. CORMIER

claim element [1.6]. Pet. at 60. However, like with claim elements [1.1] and [1.5], petitioner ignores the teachings of Hamilton. Hamilton explains that its designs already include printer instructions. These designs exist before the printer is identified or queried, and thus bear no relation to the fabrication profile of element [1.5]. There is therefore no need for a slicer or slicing. Additionally, Petitioner's

EX2014, ¶135

Dependent Claims

FISH.

Ground 2A-2E: Dependent Claims

Patent Owner does not raise specific arguments for most dependent claims in Grounds 2A-2E

PATENT OWNER'S RESPONSE

6. Dependent Claims

For the reasons described above, the *Hamilton-Evans* combination, with or without KISSlicer, fails to teach or suggest claim 1. Thus, Ground 2A additionally fails to teach or suggest claims 2-5, 9-10, and 12-13 of the '774 Patent. EX2014, ¶136.

I. Ground 2B Does Not Render the Challenged Claims Unpatentable

Ground 2B adds *Pax* to the combination of Ground 2A, and challenges claims 6, 7, and 19. Ground 2B does not independently challenge claim 1, upon which all other challenged claims depend, and therefore is defective for at least the same reasons as Ground 2A. Ground 2D has the following additional defects.

EX2014, ¶137

J. Ground 2C Does Not Render the Challenged Claims Unpatentable

Ground 2B adds *Pettis* to the combination of Ground 2B to challenge claim 19. Ground 2B also does not independently challenge claim 1, upon which all other challenged claims depend, and therefore is defective for at least the same reasons as Ground 2A. EX2014, ¶137.

POR, 50

Claim 6

FISH.

Claim 6

6. The method of claim 4 wherein the hardware configuration includes an automatically detected hardware reconfiguration.

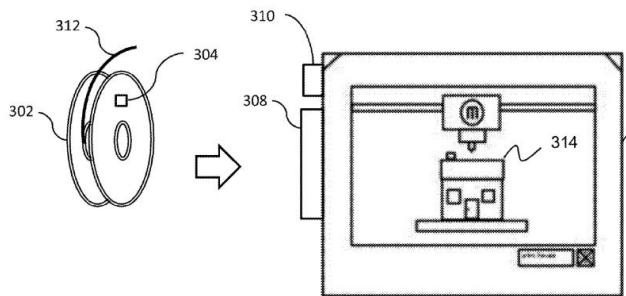
Douglas-Mark-Dahlin Renders Claim 6 Obvious

The prior art discloses automatically detecting hardware reconfigurations

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The hardware configuration may include an automatically detected hardware reconfiguration or a manually specified hardware reconfiguration. For example, if a user has provided a new or replacement component on their printer, the user can manually update the hardware configuration associated with the printer to reflect the new component, e.g., through a GUI or the like. Alternatively, the printer (or another component of the system, e.g., the print server) can automatically detect that a new component is being utilized, and update the hardware configuration accordingly. In this manner, the hardware configuration may be continuously monitored and updated. When a hardware reconfiguration occurs to the printer, the printer (or another component of the system, e.g., the print server) can send a notification or the like to users, e.g., users that are connected to the printer through a network. The notification may include a notice of the new component, and may include an action that the user must perform to request or receive the hardware reconfiguration. If users are not connected to other components of the system, they may receive the hardware reconfiguration when they connect to the system components through a network or the like.

EX1001, 19:46-55; EX1003, ¶184; Pet. 32-33



FISH.

Douglas et al.

[0062] The supply 302 may include a data tag 304 that stores data providing information on characteristics of the build material 312. Once the supply 302 is coupled to the three-dimensional printer 306, the data tag 304 may be automatically read by a tag sensor 310 on the three-dimensional printer 306.

[0063] The data tag 304 may be any device or combination of devices suitable for storing data relating to the build material 312. This may, for example, include a radio frequency identification (RFID) tag such as an active or passive RFID tag, an optically-identifiable tag such as a bar code, quick read (QR) code, or the like, a magnetically-identifiable tag such as a magnetic swipe strip, or any other tag that can be automatically detected and correlated by the controller 110 to identify information for the build material 312 in the supply 302. The

[0094] Types of data that may be usefully stored by the data tag are described above. Without limiting the generality of the foregoing, the data may include information about mechanical or structural properties of the build material, thermal properties of the build material (including phase change data), aesthetic properties of the build material, or any other properties useful for determining operational parameters. Other data that is not necessarily specifically tied to operational parameters may also be included, such as an amount of material in the container (which may be an initial amount when shipped, or a measured amount using active circuitry as described above), an expiration date, a brand name, and so forth, as well as data indirectly related to build material properties such as a unique identifier for the build material or the container. By way of non-limiting examples, the property characteristic encoded on the data tag may include a material identification number, a type of the build material, a diameter

EX1005, [0062]-[0063], [0094]; EX1003, ¶185; Pet. 4, 30-31; Rep. 14

DAHLIN

[0007] The object of the present invention is to provide a filament spool, and a filament supplied rapid prototyping system that comprises a circuit for monitoring data concerning the filament on the filament spool. Specifically, the object of the present invention is to provide data regarding the type and amount of filament on the spool, and to notify the operator if the type of filament does not match the type of material identified by object specification data or if the amount of filament on the spool is insufficient to create a desired object. The spool of the

[0023] CPU 92 receives the modeling filament data from IO card 94. At the outset of a job, the CPU 92 will calculate whether a spool 42 or 56 contains enough filament to complete the job. Operator notification is then provided via touch screen display 21, stating either that the filament is adequate to complete the job, or that the filament spool will need replacement and reloading during the process. Also at the outset of a job, the CPU verifies that the modeling filament material on the spool is the same material specified in object data. If these materials are not the same, an operator notification is provided via touch screen display 21, providing the operator an opportunity to switch spools.

EX1008, [0007], [0023]; EX1003, ¶185; Pet. 32-33; Rep. 15-16

Douglas-Mark-Dahlin Renders Claim 6 Obvious

Patent Owner’s strawman attack sidesteps the resulting combination

PATENT OWNER’S RESPONSE

The disclosure of *Dahlin*, as cited by Petitioner, is limited to monitoring characteristics of a filament spool. *See* Pet. at 32-33; EX1008, ¶¶[0022]-[0023]. *Dahlin* does not disclose creating or modifying any fabrication profile in response to a detected change, nor does it disclose regenerating print instructions after a spool is replaced. Instead, *Dahlin* merely pauses the process and allows a user to manually intervene by replacing the filament, after which printing continues using preexisting instructions. EX1008, ¶¶[0022]-[0023]. *Douglas* and *Mark* do not cure this deficiency: neither reference discloses automatically detecting a hardware

POR, 27

Intel Corp. v. PACT XPP Schweiz AG, 61 F.4th 1373, 1379 1379-81 (Fed. Cir. 2023) (“a person of ordinary creativity, not an automaton”)

DECLARATION OF DR. MICHAEL HICKNER

80. Second, Dahlin’s techniques would have improved the print quality and prevented the Douglas-Mark system from printing defects resulting from a different reloaded material type from the depleted material type and wasting materials by starting print jobs that could not be finished due to a lack of material. EX-1008, ¶¶[0022]-[0023]. For example, Dahlin checks the adequacy of the loaded materials “at the outset of a job,” which would have prevent the printer from starting a print it could not finish. *Id.* Starting a print in a remote system, like Douglas-Mark, without adequate materials would have either (1) required operator intervention to reload filament in the remote printer, adding to the total time between job submission and completion, or (2) required the user to resubmit their print job to another printer. *Id.* Querying a material amount at the outset of the job, as suggested by Dahlin, would have improved the user experience at least by ensuring the above two scenarios are properly considered and addressed in the Douglas-Mark system. *Id.*

EX1003, ¶80; Pet. 30

Douglas-Mark-Dahlin Renders Claim 6 Obvious

Patent Owner’s strawman is premised upon a restricted view of Dahlin

PATENT OWNER’S RESPONSE

The disclosure of *Dahlin*, as cited by Petitioner, is limited to monitoring characteristics of a filament spool. See Pet. at 32-33; EX1008, ¶¶[0022]-[0023]. *Dahlin* does not disclose creating or modifying any fabrication profile in response to a detected change, nor does it disclose regenerating print instructions after a spool is replaced. Instead, *Dahlin* merely pauses the process and allows a user to manually intervene by replacing the filament, after which printing continues using

Dahlin explains explicitly that the filament monitoring is used to “calculate whether a spool 42 of 56 contains enough filament to complete the job” and verify “that the modeling filament material on the spool is the same material specified in object data.” EX1008, ¶¶[0022]-[0023]. These determinations logically require that print settings and a machine-ready representation have already been set and generated, respectively. This is particularly clear for checking if the material on the

← *Alivacor, Inc. v. Apple Inc.*, 130 F.4th 1006, 1015 (Fed. Cir. 2025) (“To restrict each reference’s teachings to the particular way ... would improperly fail to read these references for all that they disclose”).

← *Allied Erecting & Dismantling Co. v. Genesis Attachments, LLC*, 825 F.3d 1373, 1381 (Fed Cir. 2016) (“The test for obviousness is **not** whether the features of a secondary reference may be bodily incorporated [], but rather whether a skilled artisan would have been motivated to combine the teachings of the prior art references” (internal citations omitted)).

Rep., 11

POR, 27-28

Douglas-Mark-Dahlin Renders Claim 6 Obvious

Patent Owner's strawman imports new requirements into claim 6

PATENT OWNER'S RESPONSE

The disclosure of *Dahlin*, as cited by Petitioner, is limited to monitoring characteristics of a filament spool. *See* Pet. at 32-33; EX1008, ¶[0022]-[0023].

Dahlin does not disclose creating or modifying any fabrication profile in response to a detected change, nor does it disclose regenerating print instructions after a spool is replaced. Instead, *Dahlin* merely pauses the process and allows a user to manually intervene by replacing the filament, after which printing continues using preexisting instructions. EX1008, ¶[0022]-[0023]. *Douglas* and *Mark* do not cure this deficiency: neither reference discloses automatically detecting a hardware

POR, 27

1. A method comprising:
receiving a request to fabricate an object from a three-dimensional model;
determining a target printer to fabricate the object;
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;
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;
creating a fabrication profile based on the one or more properties; and generating a machine-ready representation of the three-dimensional model executable by the target printer to fabricate the object.

4. The method of claim 1 wherein the one or more properties include a hardware configuration of the target printer.

6. The method of claim 4 wherein the hardware configuration includes an automatically detected hardware reconfiguration.



Claim 7

FISH.

Claim 7

7. The method of claim 4 wherein the hardware configuration includes a manually specified hardware reconfiguration.

Douglas-Mark-Dahlin Renders Claim 7 Obvious

The prior art discloses manually specified hardware reconfigurations

DAHLIN

spool. As filament 40 is wound off of the spool 42, the CPU keeps track of how much material was commanded to be extruded, subtracts this amount from the total on the EEPROM 188 and writes the new value to the EEPROM 188. Preferably, the data on EEPROM board 120 is encrypted so that it can be updated only by the CPU 92. Filament sensor 118 senses and indicates the presence or absence of filament at the entrance to the filament feed tube. With filament remaining on the spool, the operator can then grab ahold of the filament and extract it from the extrusion head 32. Unloading of the used filament and spool and reloading of a new spool is thereby made easier.

EX1008, [0022]; EX1003, ¶86; Pet. 33-34; Rep. 16-17

DECLARATION OF DR. MICHAEL HICKNER

78. It would have been obvious for a POSITA to combine the teachings of Douglas-Mark and Dahlin to include Dahlin's techniques of querying material type and amount at the outset of a print job, for example, to ensure the appropriate and sufficient material to complete a print job. EX-1005, ¶¶[0023]-[0024], [0063]-[0064], [0074], [0077]; EX-1008, ¶¶[0022]-[0023]. A POSITA would have been motivated to combine Douglas-Mark and Dahlin for at least the following reasons.

79. First, Dahlin's techniques provide the assurance that the selected printer has enough material to complete the print job, something that is just as important as whether the printer has the correct materials. EX-1008, ¶¶[0022]-[0023]. This would have improved the user experience with the Douglas-Mark system, as it would prevent a user from having to resubmit a print job after the first job failed to complete. *Id.* Although Douglas' data tag data includes many parameters about the loaded material, Douglas does not explicitly disclose querying the material amount before at the outset of a job. *Id.* Additionally, querying the material type after a reload would have provided an opportunity to alert the user if an incorrect material was loaded. *Id.* To the extent it is argued a POSITA would not have found it obvious to query a material amount, Dahlin's techniques

EX1003, ¶¶78-79; Pet. 30-31

Transcript of Michael A. Hickner, Ph.D.

16 Q And the user switching spools, is that
17 a manually specified hardware reconfiguration, in
18 your view?
19 A I mean, it is the user's choice, what
20 type of filament to install. And so, I mean,
21 Dahlin, itself, talks about – talks about the
22 interaction of the system with the operator, in

EX2015, 64:16-22

Claim 8

FISH.

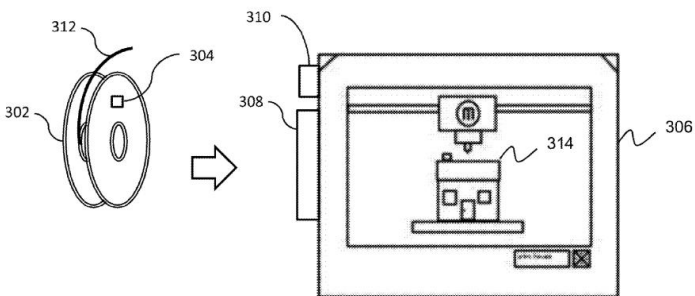
Claim 8

8. The method of claim 1 wherein the one or more properties include a firmware configuration of the target printer.

Douglas-Mark-Batchelder Renders Claim 8 Obvious

Batchelder suggests transmitting firmware information

Douglas et al.



[0094] Types of data that may be usefully stored by the data tag are described above. Without limiting the generality of the foregoing, the data may include information about mechanical or structural properties of the build material, thermal properties of the build material (including phase change data), aesthetic properties of the build material, or any other properties useful for determining operational parameters.

speed, and a cooling requirement. More generally, any parameter that can be controlled by the three-dimensional printer might usefully be determined with reference to the type of material and/or other information available on the data tag.

EX1005, [0094], [0097]; EX1003, ¶90; Pet. 36

Batchelder et al.

consumable material with an optical sensor assembly. The method further includes transmitting the read information to a controller of the additive manufacturing system, and adjusting at least one property of the additive manufacturing system based on the transmitted information.

[0054] Encoded markings 50 may include a variety of different information, such as information relating to filament 44 and/or system 10. Examples of suitable types of information that may be included in encoded markings 50 include local filament cross-sections (e.g., diameters and root-mean-square variations), volume increments, local and global filament extrusion parameters, length of filament 44 remaining in supply source 20 or 22, measurements of local filament fingerprint characteristics, material type (e.g., modeling and support materials), material composition, material color, manufacturing information for filament 44 (e.g., manufacturing dates, manufacturing locations, and lot numbers), product codes, material origin information, software and firmware updates for system 10, and combinations thereof.

EX1007, [0010], [0054]; EX1003, ¶96; Pet. 37; Rep. 17

DECLARATION OF DR. MICHAEL HICKNER

90. First, it was known to a POSITA that firmware was a vital component of the 3D printer. EX-1007, ¶¶[0043], [0054]. Evans corroborates the importance of printer firmware and explains the “printer control ... communicates with a specialized set of code called firmware” that “controls the electronics hardware to build our 3D objects according to the instructions received from the printer control,” and further, describes that “[h]ow well firmware [interprets G-code] will determine how well your 3D printer will print objects.” EX-1011, 35, 41, 76-80. Based on the importance of firmware in affecting the fabrication capability of the printer, a POSITA would have been motivated to include the firmware configuration into the information transmitted by the printer (e.g., Douglas’ data tag information) to assist the printer server in determining a suitable target printer and generating operational parameters (which are dependent on a printer’s firmware version). EX-1007,

EX1003, ¶90; Pet. 36

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Douglas-Mark-Batchelder Renders Claim 8 Obvious

Petitioner articulated three predictable benefits; Patent Owner never disputed

DECLARATION OF DR. MICHAEL HICKNER

90. First, it was known to a POSITA that firmware was a vital component of the 3D printer. EX-1007, ¶¶[0043], [0054]. Evans corroborates the importance

of printer firmware and explains the “printer control

specialized set of code called firmware” that “controls

build our 3D objects according to the instructions received

and further, describes that “[h]ow well firmware [interprets]

how well your 3D printer will print objects.” EX-1011, 3

importance of firmware in affecting the fabrication of

POSITA would have been motivated to include the firmware configuration into the

information transmitted by the printer (e.g., Douglas’ data tag information) to assist

the printer server in determining a suitable target printer and generating operational

parameters (which are dependent on a printer’s firmware version). EX-1007,

91. Second, incorporating the firmware configuration (e.g., the current

version or update) into Douglas-Mark system would have improved the quality of

resulting prints because, with the knowledge of the firmware configuration, a more

compatible G-code can be generated based on the user’s printers control

applications. This was important because firmware updates were frequent, as

printing hardware and software was changing r

92. Third, incorporating the firmware configuration (e.g., the current

version or update) into Douglas-Mark system would have improved user experience.

e.g., by avoiding re-submitting of a failed or less satisfied print result resulted from

incompatible. For example, verifying a printer firmware configuration at the

outset of a job would prevent a user from having to resubmit a print job after the

first job failed to complete because the generated G-code was incompatible with

EX1003, ¶¶90-92; Pet. 35-37

Douglas-Mark-Batchelder Renders Claim 8 Obvious

Dr. Hickner explained what a POSITA would have recognized from Batchelder

Transcript of Michael A. Hickner,
Ph.D.

11 Q In your view, is a firmware update a
12 firmware configuration?
13 A I mean, so I've updated firmware in my
14 own printers. And so, firmware updates are
15 updating the firmware configuration. I mean, the
16 way that this usually proceeds, and the way that
17 I've done it in my own lab, is that when you start
18 the printer and the software, there can be a
19 firmware check, and either the computer determines
20 that a firmware update needs to happen or there's
21 a published firmware update.
22 And so, that firmware update, updates
1 the configuration, but I think a POSITA would
2 understand that when Batchelder says software and
3 firmware updates for the system, that is talking
4 about the firmware configuration and whether or
5 not it needs to be updated. That was a common
6 occurrence, in this time, of 3D printing.

6 A So Batchelder explains these encoded
7 markings that contain information about a firmware
8 update. So one example of this could be, if you
9 have an encoded marking that says something like,
10 you know, here's the filament cross-section, which
11 is in that paragraph, here's the extrusion
12 parameters, and this filament is compatible with
13 firmware version 7, or something like that.
14 And so, in this encoded markings that
15 Batchelder is talking about, along with the
16 material type or extrusion parameters indicating,
17 for example, that -- okay, this -- you really need
18 this software and this firmware in order to use
19 this material correctly, I think that would be one
20 example of how Batchelder's encoded markings might
21 give an indication of what software and firmware
22 are most suitable for printing that specific

EX2015, pp.66-68; POR, 31-32

Hamilton-Evans-Batchelder Renders Claim 8 Obvious

A POSITA would have known that firmware was critical

DECLARATION OF DR. MICHAEL HICKNER

171. First, a 3D printer's firmware was typically detected when setting up or sending jobs to a 3D printer ("*a firmware configuration of the target printer*"), as the printer's firmware had a significant effect on the capabilities of the printer and its compatibility to the user's printers control applications. Evans corroborates the importance of printer firmware and explains the "printer control ... communicates with a specialized set of code called firmware" that "controls the electronics hardware to build our 3D objects according to the instructions received from the printer control," and further, describes that "[h]ow well firmware [interprets G-code] will determine how well your 3D printer will print objects." EX-1011, 35, 41-43, 76-80. Evans explains that printer control and firmware are intertwined, and to even begin utilizing a 3D printer, the printer's firmware would have needed to have been compatible with the corresponding printer control application. *Id.* To that end, a POSITA would have understood and found obvious that a printer's firmware configuration (e.g., any current version or update) would have been queried or at least received from the printer as one of the *properties that affect fabrication capabilities of the target printer* to ensure its compatibility with the user's printer control application. *Id.*

EX1003, ¶171; Pet. 82-83

Evans

Firmware

Every control board needs specialized code called firmware loaded on its microcontroller to make the electronics come to life. The firmware is responsible for interpreting the G-code commands sent to the electronics from the printer control application. How well the firmware does this will determine how well your 3D printer will print objects.

If you bought a 3D printer in a kit—which you did right?—then the electronics in your kit will generally come preinstalled with its own firmware from the manufacturer. This lets you jump straight to printing 3D objects without ever thinking twice about the firmware installed on your electronics. This is a good thing. If, however, you are looking to squeeze out every last possible ounce of print quality in your 3D printer, or if you were one of the adventurous types to source and build their 3D printer from the ground up, then you will want to experiment with using different firmware and adjusting the firmware settings to get your 3D printer just right.

Sometimes just moving to a different version of firmware will bump up your print quality enough to make the upgrade worth it. For example, if buying a Prusa or Mosaic 3D printer kit, the usual default firmware to ship with the included RAMPS electronics is the Sprinter firmware. Sprinter has been around in one form or another for a while and is a stable and reliable printer firmware. Using default firmware is a good choice if you are getting started on these particular platforms because the firmware will work and there is always the knowledgeable community available if something doesn't. With that said, a new firmware called Marlin is picking up steam at the time of this writing. It improves on Sprinter by better supporting arcs and print speed acceleration using a technique called "look-ahead" to more efficiently plot the movement of the extruder, resulting in much cleaner and more precise prints.

While changing the firmware might result in better prints, and in some cases it's needed to properly calibrate your printer, if your printer works out of the box with the default firmware, only venture forth with firmware modification if you are an advanced user and feel confident with your knowledge of your 3D printer.

EX1011, 41; EX1003, ¶171; Pet. 82-83

Claims 9-10

FISH.

Claims 9-10

9. The method of claim 1 wherein the one or more properties include one or more user settings on the target printer.

10. The method of claim 9 wherein the one or more user settings include user setting from a previous fabrication process.

Douglas-Mark Renders Claims 9-10 Obvious

The '774 patent recites similar examples to Douglas

US 11,886,774 B2

figuration of the printer or its components, or by using a GUI or the like on the printer or a device in communication with the printer. The user settings may include settings related to the hardware configuration, or settings that otherwise influence the fabrication of the object. For example, the user settings may include without limitation color settings, resolution settings, speed settings, size settings, location settings, material settings, and so forth. In one aspect, the user settings may automatically be detected by the printer or print server. For example, material settings such as type of material may be detected through the use of a labeled material source (a labeled spool or the like), through a code on the material, via a sensor on the printer, and so forth.

EX1001, 21:1-13; Rep. 12-13

Douglas et al.

[0077] In another aspect, the data tag 304 may encode ordering information, such as information on how to purchase replacement build material, or information including an identifier of a suitable replacement container (with build material). When a three-dimensional printer or a suitably instrumented container detects a depletion of build material, the data tag 304 may be referenced by the three-dimensional printer to automatically order a suitable replacement, or to generate an alert to a user to order replacement material. In the latter case, the alert to the user may automatically be annotated to identify a part number, build material type, or the like to assist the user in ordering a suitable replacement.

EX1005, [0077]; EX1003, ¶¶71-72; Pet., 26-27

Douglas-Mark-Dahlin Renders Claims 9-10 Obvious

Patent Owner did not present arguments specific to Dahlin

PATENT OWNER'S RESPONSE

or more properties include one or more user settings on the target printer.” Claims
9 and 10 are additionally not taught because the filament monitoring of *Dahlin* is
incompatible with the system of the '774 Patent, as described regarding claim 6.
EX2014, ¶107.

POR, 30-31

Claim 19

FISH.

Claim 19

19. The method of claim 1 further comprising generating descriptive metadata to accompany the machine-ready representation, the descriptive metadata specifying one or more properties for comparison to properties of printers selected for fabricating the model.

Douglas-Mark-Pax Renders Claim 19 Obvious

The combination of Douglas-Mark-Pax renders obvious generating descriptive metadata...

PAX

[0097] In step 1104, the color and material requirements for fabricating the object may be identified. For example, in step 1104 it may be determined that a particular object requires a first amount of green build material, a second amount of yellow build material, a third amount of cyan color additive, etc. The color and material requirements may be identified in several ways. In some implementations, these requirements may be identified from a “virtual fabrication,” in which fabrication instructions are processed in memory of a computer, while totals of the various materials are tracked. In some implementations, the requirements may be determined from the object model using standard geometric computations. In some implementations, the requirements may be contained in metadata of the object model, fabrication instructions, or a related file.

EX1013, [0097]; EX1003, ¶103; Pet. 40-41

Douglas et al.

dimensional printers. In another aspect, the print queue may be allocated between the database 209 and a local memory of the three-dimensional printer 204. In another aspect, the print queue may be stored, for example, in the database 209 of the print server 208. As used here, the term ‘print queue’ is intended to include print data (e.g., the three-dimensional model or tool instructions to fabricate an object) for a number of print job (which may be arranged for presentation in order of expected execution), as well as any metadata concerning print jobs. Thus, a portion of the print queue such as the metadata (e.g., size, status, time to completion) may be usefully communicated to a print server 208 for sharing among users while another portion of the print queue such as the model data may be stored at a printer in preparation for execution of a print job.

EX1005, [0041]; EX1003, ¶98; Pet. 37

DECLARATION OF DR. MICHAEL HICKNER

98. For example, Douglas discloses that a “print queue” of a printer includes “tool instructions” for the print jobs and accompanying “metadata concerning print jobs.” EX-1005, ¶[0041]. Pax provides specific examples of information that are included in the metadata, such as, “the color and material requirements,” which can be used for “pre-fabrication check” to ensure “the color and material require[d]” by the “tool instructions to fabricate an object model” in the

EX1003, ¶98; Pet. 39-40

Thank You

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