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Transcript of Michael A. Hickner, Ph.D.

Date: January 7, 2026

Case: Shenzhen Tuozhu Technology Co., Ltd. -v- Stratasy, Inc. (PTAB)

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Conducted on January 7, 2026

1 (1 to 4)

1 UNITED STATES PATENT AND TRADEMARK OFFICE 2 ----- 3 BEFORE THE PATENT TRIAL AND APPEAL BOARD 4 ----- 5 SHENZHEN TUOZHU TECHNOLOGY CO., LTD., 6 Petitioner, 7 v. 8 STRATASYS, INC., 9 Patent Owner. 10 ----- 11 Case IPR2025-00611 12 U.S. Patent No. 11,886,774 13 ----- 14 15 Deposition of MICHAEL A. HICKNER, PH.D. 16 Conducted Virtually 17 Wednesday, January 7, 2026 18 10:02 a.m. CST 19 Job No.: 614557 20 Pages: 1 - 87 21 Stenographically reported by: Judith E. Bellinger, 22 RPR, CRR, CSR-TX CCR-WA, CCR-NM	3 1 A P P E A R A N C E S 2 3 ON BEHALF OF THE PETITIONER: 4 PATRICK BISENIUS, ESQUIRE 5 FISH & RICHARDSON P.C. 6 60 South 6th Street 7 Suite 3200 8 Minneapolis, MN 55402 9 612.766.2048 10 11 BAILE XIE, ESQUIRE 12 JOSHUA A. GRISWOLD, ESQUIRE 13 FISH & RICHARDSON P.C. 14 1717 Main Street 15 Suite 5000 16 Dallas, TX 75201 17 214.760.6139 18 19 20 21 22
2 1 Deposition of MICHAEL A. HICKNER, PH.D., 2 conducted virtually. 3 4 5 6 7 8 9 10 11 Pursuant to notice, before Judith E. 12 Bellinger, Registered Professional Reporter, 13 Certified Realtime Reporter, and Notary Public in 14 and for the State of Maryland. 15 16 17 18 19 20 21 22	4 1 A P P E A R A N C E S C O N T I N U E D 2 CHRISTOPHER A. von GUNTEN, ESQUIRE 3 FISH & RICHARDSON P.C. 4 1000 Maine Avenue, SW 5 Suite 1000 6 Washington, DC 20024 7 202.783.5070 8 9 ON BEHALF OF THE PATENT OWNER: 10 DEXTER HAMILTON, ESQUIRE 11 McDERMOTT WILL & SCHULTE LLP 12 415 Mission Street 13 Suite 5600 14 San Francisco, CA 94105-2616 15 628.218.3816 16 17 BRIAN W. OAKS, ESQUIRE 18 McDERMOTT WILL & SCHULTE LLP 19 300 Colorado Street 20 Suite 2200 21 Austin, TX 78701 22 512.726.2600

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5 C O N T E N T S EXAMINATION OF MICHAEL A. HICKNER, PH.D. PAGE By Mr. Hamilton 6 PREVIOUSLY MARKED EXHIBITS (Retained by counsel) Exhibit 1001 United States Patent Number 12 11,886,774 B2 Exhibit 1005 United States Patent Application 17 Publication Number 2014/0117585 A1 Exhibit 1006 United States Patent Number 37 9,694,544 B2 Exhibit 1007 United States Patent Application 65 Publication 2014/0127524 A1 Exhibit 1008 European Patent Specification 61 1 087 862 B1 Exhibit 1010 United States Patent Application 46 Publication Number 2014/0236773 A1 Exhibit 1011 Practical 3D Printers 56 Exhibit 1012 KISSlicer Quick-Start Guide 41	7 1 are sent to me through the Zoom chat. I've done 2 that before, but I don't intend to open any other 3 files on my computer or have anything with me. 4 Q And do you have access to any chat or 5 messaging applications other than the Zoom 6 application we are currently using? 7 A No. Those are all closed on my 8 computer. 9 Q And do you have access to any email 10 applications? 11 A That's closed on my computer as well. 12 Q And is there anyone else in the room 13 with you, Dr. Hickner? 14 A No, there is not. 15 Q And can you, please, just let us know 16 if anyone does enter the room? 17 A Yes. I have a do-not-disturb sign on 18 my office door, but I'll let you know if there's 19 an interruption. 20 Q Perfect. 21 Dr. Hickner, have you ever been deposed 22 before?
6 P R O C E E D I N G S MICHAEL A. HICKNER, PH.D., being first duly sworn, was examined and testified as follows: EXAMINATION BY COUNSEL FOR THE PATENT OWNER BY MR. HAMILTON: Q Could you please state and spell your name for the record. 10 A My name is Michael A. Hickner, 11 M-I-C-H-A-E-L, middle initial A, last name 12 Hickner, H-I-C-K-N-E-R. 13 Q Dr. Hickner, because we're conducting a 14 remote deposition today and we're not in the same 15 room, I'm just going to ask you a few questions 16 about your environment. 17 Do you have any materials, whether 18 written or electronic, with you today? 19 A No, I do not. 20 Q And do you intend to open any materials 21 during today's deposition? 22 A I only intend to open any exhibits that	8 1 A Yes, I have. 2 Q And approximately, how many times? 3 A Approximately, 20 times at this point. 4 Q And just as a reminder, I'll ask you 5 questions and you're under oath to answer. Your 6 counsel may object, but I request that you still 7 answer the questions; is that okay? 8 A Yes, I understand the instructions. 9 Q And after I ask you a question, please, 10 just answer the question that I've asked you and 11 not anything else. 12 Is that okay? 13 A Yes. I understand. 14 Q And then, if you need a break, please, 15 just let us know, we will take a break, but I will 16 ask that you finish responding to any questions 17 before we take that break. 18 A That sounds good to me. 19 Q And is there any reason you cannot 20 testify truthfully to the best of your ability 21 today? 22 A There's no reason I can't testify

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9 1 truthfully to the best of my ability today. 2 Q And, Dr. Hickner, you're here today 3 because you offered a declaration in support of 4 petition for inter partes review of IPR 5 2025-00611; is that correct? 6 A Yes. That is correct. 7 Q And who's the petitioner in that inter 8 partes review? 9 A So, I outlined the petitioner and, 10 also, the associated names in my declaration, but 11 as I understand it, without the declaration in 12 front of me, it's Bamboo and their parent company, 13 which is a name that I cannot remember how to 14 pronounce. 15 Q Thank you. 16 I'm going to upload Exhibit 1003 into 17 the chat. Please let me know when you're able to 18 access it. 19 A Yes, it came through. It's just 20 downloading right now. 21 Q And please open the document when you 22 are able.	11 1 A Yes. The first page in the PDF is 2 page 1. 3 Q And when referring to page numbers in 4 an exhibit today, I'll refer to the page numbers 5 at the bottom of the page. So I believe for this 6 document, that should all be aligned with the page 7 count of the document. 8 A That works for me, I understand that. 9 Q And, Dr. Hickner, how much were you 10 paid for this declaration? 11 A I worked about 20 hours on this 12 declaration. And so, based on my hourly rate, it 13 would be, you know, 450 dollars an hour times 14 20 hours. 15 Q Thank you. 16 And in your declaration, you express 17 opinions regarding United States 18 Patent Number 11,886,774? 19 A That's correct. That United States 20 Patent number is noted on the first page, in the 21 header. 22 Q And I'm going to upload what is
10 1 A Okay. I have Exhibit 1003 open, and 2 this is my declaration in this IPR. 3 Q And, Dr. Hickner, was anyone else 4 involved in drafting this declaration? 5 A I collaborated with counsel on drafting 6 this declaration, but this is my full and complete 7 understanding of this case and my testimony in 8 this '774 IPR. 9 Q And when you say "counsel," is that the 10 counsel defending you today? 11 A That's correct. I worked with Attorney 12 Bisenius, also attorneys Xie, and von Gunten, and, 13 also, Attorney Wong, all from Fish & Richardson, 14 on this declaration. 15 Q And besides that counsel, did anyone 16 else contribute to the work or analysis for your 17 opinion in this declaration? 18 A No. 19 Q And let's just stay at page 1 of the 20 declaration for now. 21 Do you see the page number at the 22 bottom of the screen?	12 1 Exhibit Number 1001, into the chat. 2 Please let me know when you're able to 3 access that document. 4 (Exhibit 1001 previously marked for 5 identification and retained by counsel.) 6 A All right. It's downloading. Let me 7 open it. Yes, I have Exhibit 1001 open in front 8 of me. 9 Q And do you recognize Exhibit 1001 as 10 U.S. Patent Number 11,886,774? 11 A That's correct. Yes. 12 Q And you'll understand that if I refer 13 to the '774 patent today, that I'm talking about 14 the patent shown in Exhibit Number 1001, okay? 15 A Yes, that works for me. 16 Q Great. 17 And can you, please, scroll down to 18 page 27 of this exhibit. 19 A 27? Yes. That's the last page of the 20 exhibit. I'm there. 21 Q That's correct. And what's on this 22 page of the exhibit?

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13 1 A So this is column 35 and 36 of the 2 patent, and there's a paragraph starting in column 3 35, there's a first paragraph, and then it has the 4 claims of the patent in the rest of columns 35 and 5 36. 6 Q And in your declaration, you express 7 opinions regarding the claims of the '774 patent; 8 is that correct? 9 A That's correct. I opined on a number 10 of the claims, as outlined in my declaration. 11 Q You expressed opinions regarding 12 claim 1; is that correct? 13 A Yes. I opined on claim 1. 14 Q And does claim 1 require determining a 15 target printer to fabricate an object? 16 A So, in claim 1, as it says, what is 17 claimed is, 1, a method comprising receiving a 18 request to fabricate an object from a 19 three-dimensional model, determining a target 20 printer to fabricate the object. And so, that 21 phrase is right in the claim language. 22 Q So it does require determining a target	15 1 of the target printer relevant to creation of a 2 printable model for fabrication of the object on 3 the target printer. 4 And so, there's no order in those -- in 5 those two limitations of the claim. 6 Q And would you be able to query a target 7 printer before you have determined the target 8 printer? 9 A So, again, there's no order in querying 10 or determining in this claim language, and so, I 11 think in sort of thinking about this, so you can 12 query lots of different printers, one of those 13 might be the target printer. And so, a query can 14 be sent out to a group of printers. One of those 15 may or may not be the target printer. And, then, 16 either before or after, you can determine the 17 target printer to fabricate the object. But 18 there's no order implied in these -- in these two 19 limitations. 20 Q And following that, the '774 patent 21 requires receiving, from the target printer, a 22 dictionary configuration information containing
14 1 printer to fabricate the object? 2 A That's the term in the claim, yes. 3 Q And following that, it also requires 4 querying the target printer for configuration 5 information of the target printer relevant to 6 creation of a printable model for fabrication of 7 the object on the target printer; is that correct? 8 A Right below determining a target 9 printer to fabricate the object, it states, in 10 claim 1, "Querying the target printer for 11 configuration information of the target printer 12 relevant to creation of a printable model for 13 fabrication of the object on the target printer." 14 So that's all in claim 1, as read off. 15 Q And does this '774 patent require 16 determining the target printer prior to querying 17 the target printer? 18 A So there's no order implied by this 19 claim language. And so, I -- there's no order in 20 determining a target printer to fabricate the 21 object. And that's unordered compared to querying 22 the target printer for configuration information	16 1 one or more properties from the target printer 2 that affect fabrication capabilities of the target 3 printer, correct? 4 A Yes. And so, that's the language in 5 claim 1, starting line 25. 6 Q And what do you understand dictionary 7 of configuration information to mean in this 8 context? 9 A So in the abstract of the '774 patent, 10 it says a printer may respond to configuration 11 queries with a dictionary of capabilities or 12 properties. 13 And so, this term "dictionary" is used 14 in the specification of the patent, and it goes on 15 to say in column 1, line 47, the patent goes on to 16 say, in the summary, "This dictionary may be used 17 to select suitable models and determine when a new 18 model must be created." 19 And so, the patent, itself, uses this 20 term "dictionary" throughout the specification in 21 this way. 22 Q Dr. Hickner, some of the opinions you

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17 1 provided in this declaration were based on a 2 reference named Douglas; is that correct? 3 A Yes. That is correct. 4 Q I'm going to put in the chat what was 5 filed as Exhibit Number 1005. 6 Please let me know when you're able to 7 access this document. 8 (Exhibit 1005 previously marked for 9 identification and retained by counsel.) 10 A All right. It's downloading. One 11 second. Okay. I have Exhibit 1005 up. 12 Q And regarding my previous question, I 13 asked what you understand dictionary to mean. And 14 you explained how it's used in the patent, but can 15 you explain what it means, what definition you 16 assigned to it. 17 A So the -- in the '774 patent, it 18 mentions this dictionary a lot, and, let's say, in 19 column 21, line 40, it says "The dictionary may 20 include one or more identifiers for the target 21 printer." 22 So it also says, on line 50 of that	19 1 level of granularity, according to, for example, 2 the data storage and processing capabilities of 3 the components being used in the system 4 implementing the method 300." 5 And so, I think that a POSITA would 6 understand that this dictionary can incorporate 7 lots of different information, as discussed in the 8 '774 patent. 9 Q And in your view, does the Douglas 10 reference disclose a dictionary of configuration 11 information? 12 A So in paragraph 52 of my declaration, a 13 sentence in, I state "Douglas' accumulated data 14 tag 304, as noted in Douglas, data received from 15 the printer constitutes a dictionary of 16 configuration information because it also includes 17 a list or collection of information on 18 characteristics of the build material 312." 19 And so, that's one or more properties 20 of the target printer. 21 So as I state in my declaration, in 22 paragraph 52, Douglas describes this dictionary of
18 1 same column, "The dictionary may also or instead 2 include other information in addition to or in 3 lieu of such an identifier." 4 And so, examples of information in this 5 dictionary are scattered throughout the '774 6 patent. 7 Q That's the information that's included 8 in the dictionary, I suppose. But what is the 9 dictionary as a broader structure? 10 A So in column 22, line 37, the '774 11 patent states "In general, the dictionary may be 12 provided in any suitable format. The dictionary 13 may, for example, may be formed as a vector of 14 binary flags or other attributes that form a 15 description of properties included therein. The 16 dictionary may also, where appropriate exclude 17 scalar quantities for certain properties." 18 And it goes on to say, on the next 19 paragraph, in line 44, "One skilled in the art 20 will recognize that the dictionary may include 21 properties of a printer and information pertaining 22 to the properties of the printer at any desired	20 1 configuration information, at least one example of 2 it. 3 Q And in your view, did Douglas describe 4 receiving any information on characteristics of 5 the build material from the printer? 6 A So in paragraph 53 of my declaration, I 7 state "As discussed above in limitation 1.3, after 8 an inquiry from the print server, Douglas' 3D 9 printers transmit and the print server receives 10 the data tag 304 data for determination of the 11 operational parameters for fabrication of the 12 object 314. And that's receiving, from the target 13 printer, a dictionary of configuration information 14 containing one or more properties from the target 15 printer." 16 And I cited, in Exhibit 1005, 17 paragraphs 19, 32, and 72 to 73 and 97. 18 So, for example, Douglas explains a 19 build material type can affect the fabrication 20 capabilities of the target printer. And so, 21 that's in Douglas paragraph 19. 22 Q And does Douglas describe how the data

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21 1 concerning the type of build material is provided 2 from the printer and received by the print server? 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. 13 Q Do you agree that claim 1 of the '774 14 patent also requires creating a fabrication 15 profile based on the one or more properties? 16 A That's in the claim 1 language. It 17 states "Creating a fabrication profile based on 18 the one or more properties; and generating a 19 machine-ready representation of the 20 three-dimensional model." 21 That's in the claim language, yes. 22 Q And in your declaration, you never	23 1 from Douglas, or based on one or more properties. 2 And so, that's my analysis of how 3 Douglas invokes this fabrication profile concept, 4 or the operational parameters for fabricating the 5 object. 6 Q So you're saying that when the print 7 server determines the operational parameters, that 8 is creating a fabrication profile, in your view? 9 A So in that same paragraph, in 54, in my 10 declaration, I state "A POSITA would have 11 recognized and found it obvious that determining 12 operational parameters for fabrication of the 13 object would have been creating a fabrication 14 profile, as these operational parameters are used 15 for a fabrication process using the build material 16 312 and for the fabrication of an object 314." 17 So Douglas is describing this process 18 and talks about fabricating an object extensively 19 in the Douglas reference. 20 Q What do you understand the term 21 "fabrication profile" to mean in this context? 22 A So, in column 23, starting lines --
22 1 identify a specific structure labeled a 2 fabrication profile in Douglas, correct? 3 A In terms of specific structure, you 4 mean file format, or something like that? Or what 5 do you mean in terms of "structure"? 6 Q File format or data structure, or 7 organizational structure. 8 A Sorry, can you ask the question again? 9 Q Yeah. In your declaration, you never 10 identify a specific structure labeled a 11 fabrication profile in Douglas; is that correct? 12 A So I don't identify a specific file 13 format or a way to organize the data. 14 Q And does Douglas ever use the term 15 "fabrication profile"? 16 A So, in paragraph 54, in my declaration, 17 I say that "Douglas' print server determines 18 operational parameters for fabricating the 19 object." 20 And I say that that's creating a 21 fabrication profile or analogous to creating a 22 fabrication profile, based on data tag information	24 1 line 32, in the '774 patent, it says "As shown in 2 step 312, the method 300 may include creating a 3 fabrication profile based on the one or more 4 properties. The fabrication profile may be 5 created by the target printer, a print server, an 6 external resource, or another component of a 7 system implementing the method 300. The 8 fabrication profile may be the basis for the 9 generation of a machine-ready representation of 10 the three-dimensional model that is executable on 11 the target printer and, thus, the fabrication 12 profile may include information for generating 13 machine-ready representations for the target 14 printer." 15 And so, that's how I understand 16 fabrication profile, as given by the specification 17 of the '774 patent. 18 Q That describes some characteristics of 19 the term "fabrication profile." 20 But what does it mean more broadly? 21 A So the '774 patent provides a lot of 22 characterization of the fabrication profile. As I

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25 1 said in my previous answer, and, also, in 2 paragraph 56 of my declaration, the '774 patent's 3 characterizing of the fabrication profile being a 4 profile used to determine which machine-ready 5 representation is available or suitable for a 6 target printer. And so, I haven't analyzed sort 7 of the outer bounds of what fabrication profile 8 is. But a POSITA would understand what the 9 fabrication profile is, in terms of all the 10 different examples that are given in the '774 11 patent. 12 So a POSITA reading the '774 13 specification, the specification states "The 14 fabrication may include machine-readable 15 information for the slicer in creating a 16 machine-ready model. The fabrication profile may 17 be created using a library or the like in a 18 resource or tool that parses the fabrication 19 profile." 20 And so, based on the examples and 21 discussion of fabrication profile in the '774 22 patent, a POSITA would understand what it means.	27 1 states. 2 Q And I'll repeat the question. 3 Does paragraph 73 of Douglas discuss 4 better data transmission and printing efficiency? 5 A So I didn't analyze paragraph 73 in 6 that context of "better" data transmission. I 7 guess -- I didn't perform that analysis of better 8 or more efficient data transmission. 9 Q Do you see, in paragraph 56 of your 10 declaration, the sentence beginning with "a POSITA 11 would have also recognized and found obvious"? 12 A Paragraph -- okay. I'm at paragraph 13 56. 14 Q In the third line from the bottom of 15 page 49, can you read the sentence beginning with 16 "a POSITA would have also recognized and found 17 obvious"? 18 A Uh, so that is referring to -- so a 19 POSITA -- the paragraph in 56, "A POSITA would 20 have also recognized and found obvious that the 21 accumulation of operational parameters constitutes 22 a profile, or that a profile would have been
26 1 Q Does paragraph 73 of Douglas discuss 2 better data transmission and printing efficiency. 3 A So paragraph 73, in Exhibit 1005, says 4 "As a non-limiting example, a remote client device 5 206 may request an object 314 be printed on the 6 network connected three-dimensional printer 306. 7 The three-dimensional printer 306 may have one or 8 more supplies 302, containing build material 312, 9 connected to one or more couplings 308. The 10 client device 206 may request the 11 three-dimensional printer 306 to transmit the data 12 tag 304 data for one or more of the connected 13 supplies 302 for determination of operational 14 parameters for at least one of the connected 15 supplies 302. The client device 206 may select 16 which of the one or more supplies 302 to use in 17 fabricating the object 314, determine the 18 operational parameters for the selected supply 19 302, and transmit the operational parameters back 20 to the three-dimensional printer 306 for 21 fabrication of the object 314." 22 So that's what paragraph 73 in Douglas	28 1 created based on Douglas' operational parameters 2 for a collection accumulation of information 3 parameters related to the printer for better data 4 transmission and efficiency, because Douglas 5 describes there can be a variety of operational 6 parameters which would be transmitted to the 7 printer." 8 So that cites Exhibit 1005, paragraph 9 73, that we've been talking about, but, also, 10 paragraph 97. And so, this sentence really refers 11 to this accumulation of operational parameters 12 constitutes a profile, or that a profile would 13 have been created based on Douglas' operational 14 parameters. 15 So that profile, a POSITA would have 16 recognized that that profile would be related to 17 better data transmission and efficiency because it 18 collects all of these operational parameters that 19 are, then, transmitted to the 3D printer. 20 And so, that -- that creation of a 21 profile is what that paragraph refers to, in terms 22 of increasing the data transmission efficiency.

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29 1 Q But creating that profile and improving 2 the data transmission and efficiency, that's not 3 disclosed in Douglas; is that correct? 4 A So as I state in paragraph 56 of my 5 declaration, operational parameters are 6 determined, in Douglas, to determine the 7 suitability of the target 3D printer to print the 8 object defined by the 3D model, which is 9 consistent with the '774 patent's characterizing 10 of the fabrication profile. 11 And with this operational parameters 12 from Douglas, which is analogous to the 13 fabrication profile, this collection of 14 operational parameters constitutes this profile 15 and, as I state, a POSITA would have recognized 16 and found obvious that accumulation of operational 17 parameters that constitutes this profile is 18 related to better data transmission and 19 efficiency. 20 So Douglas is disclosing these -- this 21 collection of operational parameters, and a POSITA 22 would have found obvious that the accumulation of	31 1 bottom, it says, Douglas says "In another aspect, 2 the data tag 304 may encode a unique identifier 3 for the supply 302, which can be used by the 4 three-dimensional printer 306 in combination with 5 the remote network resources to determine the 6 properties of the build material from which to 7 further determine operational parameters for 8 fabrication process using the build materials." 9 So a combination to determine this 10 fabrication profile, or determine the operational 11 parameters for fabrication process is discussed in 12 Douglas, in paragraph 64. 13 Q That describes a combination of data 14 tag and unique identifier with the remote network 15 resource; is that correct, not a combination of 16 parameters? 17 A So paragraph 68 in Douglas says "As 18 should be appreciated, the controller may use any 19 combination of data from the data tag and a local 20 or remote data store to determine the operational 21 parameters." 22 So that's a collection to determine the
30 1 the operational parameters increases the data 2 transmission efficiency to the printer. 3 Q But Douglas doesn't disclose that 4 accumulation; is that correct? 5 A So, Douglas discusses operational 6 parameters, in plural. And so, that implies that 7 there's a number of parameters, or an accumulation 8 of parameters. 9 Q Does Douglas disclose compiling that 10 number of parameters? 11 A So in paragraph 75 of Douglas, it 12 states -- so right near the end of paragraph 75, 13 "The operational parameters determined by the 14 three-dimensional printer and the remote resource 15 may be combined into a single set of operational 16 parameters by either the three-dimensional printer 17 or remote source." 18 So this combined or compiled is noted 19 in Douglas. 20 Q Is that compilation referenced anywhere 21 other than paragraph 75 of Douglas? 22 A So in paragraph 64 of Douglas, near the	32 1 operational parameters. 2 Q We can turn to paragraph 68 in a 3 moment, but can you, please, answer my question 4 about paragraph 64 and the combination therein? 5 A Okay. I'm at paragraph 64. You can go 6 ahead and ask a question. 7 Q So you described how -- in another 8 aspect, the data tag may encode a unique 9 identifier for the supply, which can be used by 10 the three-dimensional printer, e.g., in 11 combination with a remote network resource, 12 et cetera. 13 That combination discussed there, just 14 to clarify, that's describing a combination with 15 the remote network resource of its -- or the 16 three-dimensional printer, which can be used in 17 combination with the remote network resource, 18 rather than a combination of operational 19 parameters; is that correct? 20 A So it says "may encode a unique 21 identifier, which can be used by a 22 three-dimensional printer to determine properties

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33 1 of the build material from which to further 2 determine operational parameters for a fabrication 3 process using the build material." 4 So that would all go into determining 5 properties of the build material to determine 6 operational parameters for the fabrication 7 process. 8 Q My question is the word "combination," 9 as used in paragraph 64. That's not referring to 10 a combination of operational parameters; is that 11 correct? 12 A Oh, oh, I understand what you're 13 saying. Is that in that example -- so it states 14 "which can be used by the three-dimensional 15 printer, example, in combination with the remote 16 network resource." 17 That combination is combining -- I 18 mean, I would have to -- I would have to think 19 exactly about how this is put together, but it 20 looks like the three-dimensional printer, combined 21 with the remote network resource, to determine 22 operational -- or to determine properties of the	35 1 in Douglas says "As should be appreciated, the 2 controller may use any combination of data from 3 the data tag and the local or remote data store to 4 determine the operational parameters." 5 And so, when it talks about 6 "combination of data," and a "local or remote data 7 store" to determine operational parameters, a 8 POSITA would understand that some of the data, 9 either in the data tag or a local or remote data 10 store, in fact, could be operational parameters 11 directly, like, build material type, or something 12 like that. 13 So Douglas doesn't say combining, say, 14 two different sets of operational parameters to 15 get one new set of operational parameters, but the 16 way that paragraph 68 is written, a POSITA would 17 say, data from the data tag and local or remote 18 data store, those could contain operational 19 parameters directly that are -- that those two 20 data sources are combined to get this operational 21 parameters. 22 I think that's within the understanding
34 1 build material. 2 So that combination is determining 3 properties from the build material, which would 4 further determine operational parameters for a 5 fabrication process. 6 Q And you're saying that the combination 7 is between the -- of the 3D printer and the remote 8 network resource; is that correct? 9 A Yes, that looks like that's the 10 combination there, which would imply that there's 11 information from the three-dimensional printer and 12 the remote network resource. And that information 13 is used in combination to determine properties of 14 the build material. 15 Q Earlier, you mentioned paragraph 68. 16 Paragraph 68 is describing that the -- a 17 combination of data from a data tag and the local 18 or remote data store can be used to determine the 19 operational parameters, rather than describing a 20 combination of operational parameters; is that 21 correct? 22 A So the first sentence of paragraph 68	36 1 of a POSITA, that data and operational parameters 2 don't necessarily have to be different. 3 Q Dr. Hickner, some of the opinions you 4 provided in your declaration were also based on a 5 reference named Demark [sic]; is that correct? 6 A I'm just going to my reference list to 7 identify which exhibit that is, unless you want to 8 tell me. 9 Q I'll drop Exhibit 1006 into the chat. 10 Let me know when you're able to access it. 11 MR. BISENIUS: Counsel, if we're moving 12 to another reference, we've been going for a 13 little over an hour. 14 Now might be a good time for a break. 15 MR. HAMILTON: That's okay with us. We 16 can take a break. 17 MR. BISENIUS: Reconvene at 15 after? 18 MR. HAMILTON: That works. 19 THE WITNESS: Works for me. 20 (Recess taken from 11:04 a.m. to 21 11:15 a.m.) 22

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37 1 BY MR. HAMILTON: 2 Q Welcome back, Dr. Hickner. Did you 3 speak to anybody during the break? 4 A No, I did not. 5 Q And did you receive any texts or 6 messages during the break? 7 A No, I did not. 8 Q And did you open any materials during 9 your break? 10 A No, I didn't. 11 Q Okay. As we left off, I had just added 12 Exhibit 1006 to the chat. 13 Are you able to access that document? 14 A Hold on. Let me download it. 15 (Exhibit 1006 previously marked for 16 identification and retained by counsel.) 17 A Exhibit 1006 is the patent by Mark, et 18 al. 19 Q And did you rely on this patent in your 20 declaration? 21 A Yes, I did. 22 Q Does Mark disclose the use of G code?	39 1 '774 patent. 2 Q So the fabrication profile is distinct 3 from the G code; is that correct? 4 A The fabrication profile would be -- 5 would tend to be understood, as a POSITA, as build 6 material type, build volume, things that we've 7 discussed previously. And the machine-ready 8 representation, one of which those files formats 9 is G code, that's created from the fabrication 10 profile by a piece of software that's usually 11 called a slicing program or a slicer. 12 Q And does Mark describe creating a 13 fabrication profile separately from generating the 14 G code? 15 A So as I explain in paragraph 57 of my 16 declaration, near the bottom of page 50 and 17 starting on page 51, Mark explicitly discloses a 18 configuration file can be created to present 19 parameters, for example, layer thickness, respond 20 row width, variable speed rate, and others. 21 And Mark also illustrates an example 22 rule set or parameter database, which is analogous
38 1 A So, in my overview of Mark in paragraph 2 31 in my declaration, the -- it -- Mark discloses 3 the tool paths are used to create an instruction 4 file for actuation, conventionally called G code, 5 which is sent to the 3D printer. 6 So the G code type of file is mentioned 7 in Mark, yes. 8 Q And in your view, is the G code of Mark 9 equivalent to the machine-ready representation of 10 the three-dimensional model of the '774 patent? 11 A So G code is commonly referred to as 12 machine-ready instructions or machine-readable 13 instructions. And so, G code is included in that 14 category of machine-readable instructions. 15 Q In claim 1 of the '774 patent, it 16 requires both the machine-ready representation and 17 a fabrication profile; is that correct? 18 A So, in claim 1 it states "Creating a 19 fabrication profile based on the one or more 20 properties and generating a machine-ready 21 representation of the three-dimensional model." 22 That's what it says in claim 1 of the	40 1 to a fabrication profile, including various rules 2 and parameters. And a POSITA would have 3 recognized and found obvious that Mark's rule set 4 or parameter database would have been created 5 based on the properties of the printer, and then 6 that's used to generate G code. 7 So as I say in paragraph 58 of my 8 declaration, as shown in regards to the figure in 9 Mark, Figures 5-7 and 21, the parameters in these 10 rule sets or configuration file assist Mark's 11 slicer and path generator for controlling path 12 planning in the generation of G code, which is 13 also consistent with the '774 patent description 14 of the fabrication profile. 15 So Mark has this rule set parameter 16 database to generate the G code. 17 Q In your declaration, you also relied on 18 a reference called KISSlicer; is that correct? 19 A Yes. That's correct. 20 Q Going to add Exhibit 1012 to the chat. 21 Please let me know when you're able to 22 access that document.

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41 1 (Exhibit 1012 previously marked for 2 identification and retained by counsel.) 3 A It's downloading. Bear with me. All 4 right. Here it comes. One second. It's opening. 5 Okay. I have Exhibit 1012, KISSlicer 6 Quick-Start Guide, in front of me. 7 Q And is this the KISSlicer reference 8 that you refer to in your declaration? 9 A Yes, it is. 10 Q Does this reference KISSlicer describe 11 profiles? 12 A Yes. KISSlicer describes a number of 13 profiles. 14 Q And in KISSlicer, the user has to 15 select these profiles; is that correct? 16 A So, for instance, on page 3, on the 17 bottom of the KISSlicer quick-start guide, under 18 material, it says that "ABS and PLA default 19 profiles are provided." 20 Q And those profiles are provided by the 21 software? 22 A Yes. They're default profiles, so	43 1 Q Page 3 of KISSlicer explains that ABS 2 and PLA default profiles are provided in the 3 software. 4 Are you saying that that's coming from 5 the printer? 6 A So, KISSlicer has a printer profile 7 tab. And as I said in my declaration, it would 8 have been obvious to a POSITA to create these 9 profiles based on a printer's capabilities. And 10 so, you get the best slicing result, which is 11 ultimately what KISSlicer is doing, is taking this 12 profile and slicing it and creating G code, you 13 get the best result based on the printer's 14 capabilities and the available materials. 15 Q But KISSlicer doesn't describe reading 16 those capabilities from the printer, correct? 17 A So based on KISSlicer's dialogue boxes, 18 material, printer, speeds, it would have been 19 obvious to a POSITA to import various printer 20 settings, as needed, into the KISSlicer 21 environment. 22 Q Does KISSlicer explain where you would
42 1 they're provided by the KISSlicer software. 2 Q So the profiles aren't reported by the 3 printer; is that correct? 4 A So in some of the settings on 5 KISSlicer, those are saved in the software. In 6 others, let's say in printer, on the top of 7 page 4, printer profile, that could be provided by 8 the printer. And so, KISSlicer has a mixture of 9 printer-provided and stored, and even 10 user-changeable parameters on the dialogue. 11 Q Does the KISSlicer reference explain 12 that the printer profile is reported by the 13 printer? 14 A So as I state in paragraph 124 of my 15 declaration, "It's well-known in the art before 16 the Critical Date for slicing applications to 17 generate setting/configurations based on printer 18 capabilities." For example, KISSlicer creates 19 profiles for each print that are based on printer 20 capabilities, for example, the printer's available 21 materials. And I show a screenshot of the 22 material setting in KISSlicer.	44 1 have imported those settings into the KISSlicer 2 environment from? 3 A So based on a POSITA's knowledge of 4 important print parameters, like build material 5 type, which is -- which is shown in the material 6 dialogue, or the material tab on KISSlicer, or 7 printer settings, number of extruders, bed size, 8 offset. Because those are critical parameters for 9 printing, a POSITA would have understood that it 10 would be advantageous to import those parameters 11 from the printer connected to KISSlicer. 12 Q But KISSlicer, itself, doesn't explain 13 that, correct? 14 A KISSlicer discusses default profiles, 15 and it discusses how a user could modify those 16 default profiles. 17 Q So the user has to make these 18 modifications and the modifications are not 19 provided by the printer itself? 20 A The KISSlicer documentation doesn't 21 explicitly say, one way or the other, whether the 22 parameters are read from the printer or they're in

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45 1 the software, or even which parameters can be user 2 selected. But I think it would be obvious to a 3 POSITA that these critical parameters could be 4 read in from the printer. 5 Q But to clarify, KISSlicer doesn't 6 actually say that they are or explain that it has 7 that functionality; is that correct? 8 A KISSlicer, itself, discusses default 9 profiles and says things like, you can select 10 printing temperature. It doesn't discuss 11 importing parameters or -- it doesn't discuss that 12 one way or the other. 13 Q Turning back to the '774 patent. 14 Claim 1 also requires receiving a request to 15 fabricate an object from a three-dimensional 16 model; is that correct? 17 A Yes. That's the first sentence, after 18 a method comprising. It says "receiving a request 19 to fabricate an object from a three-dimensional 20 model." 21 Q And in your declaration, you also 22 relied on a reference called Hamilton; is that	47 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. 15 Q Let's go to page 9 of the Hamilton 16 reference. 17 A Okay. 18 Q On the left hand column, on the fourth 19 line of that page, there's a sentence beginning 20 with "The designs for the printer will consist 21 of." 22 Can you, please, read that sentence.
46 1 correct? 2 A Yes. That's correct. 3 Q I'm going to add Exhibit 101 -- 1010 4 into the chat. 5 Please let me know when you're able to 6 access this document. 7 (Exhibit 1010 previously marked for 8 identification and retained by counsel.) 9 A All right. I have Exhibit 1010 opened 10 on my computer, and that's the patent from 11 Hamilton. 12 Q And is this the reference you refer to 13 in your declaration? 14 A Yes, it is. 15 Q Does the Hamilton reference mention the 16 term "model"? 17 A I'm just word-searching the reference, 18 but the term "model" doesn't appear in the 19 Hamilton reference. 20 Q So Hamilton does not disclose a 21 three-dimensional model; is that correct? 22 A So Hamilton does talk about product	48 1 A "Designs for the printer will consist 2 of the necessary printer requirements for the 3 design information on the materials required, 4 instructions for the 3D printer, separately 5 numbered individual parts, and instructions for 6 assembly of the product for the user." 7 Is that the sentence you're referring 8 to? 9 Q Yes, that's the sentence I was 10 referring to. 11 Are any of those listed -- is any of 12 that listed information the three-dimensional 13 model, in your view? 14 A So, I mean, separately numbered 15 individual parts, if you're discussing parts, that 16 refers to, you know, some sort of shape or model. 17 And, also, instructions for the 3D printer. I 18 mean, can or may include a three-dimensional 19 model. 20 Q But Hamilton explains that the designs 21 include instructions for the three-dimensional 22 printer, as they exist; is that correct?

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49 1 A Yeah, I mean, that's what it says in 2 that sentence, "designs for the printer will 3 consist of," and then lists a few different 4 things. 5 Q So do those designs, then, exist before 6 the printer is queried? 7 A So in Hamilton, it says, in paragraph 8 21, "Using these design requirements, the system 9 will query the user's 3D printer for its accuracy 10 and material ability." 11 So at least there's design requirements 12 that are used in querying the printer. 13 Q Are these design requirements the 14 designs as described as including, you know, 15 information on the materials required, 16 instructions for the 3D printer, separately 17 numbered individual parts, and instructions for 18 assembly of the product for the user? 19 A I mean, Hamilton has a number of things 20 that go into this design, some of which you read 21 off, but design is discussed throughout the 22 patent, in terms of describing this design for	51 1 include the instructions for the 3D printer 2 already; is that correct? 3 A So instructions for the 3D printer is 4 not a term of art, like machine-readable model, or 5 some more specific term that a POSITA would 6 understand means G code. It's not clear, 7 everything that's included in instructions for the 8 3D printer in Hamilton, because the term G code 9 isn't used or machine-readable instructions. 10 Those are the two real synonymous terms 11 that refer to G code. Because Hamilton is pretty 12 broad. It doesn't give all the detail on what 13 instructions for the 3D printer means in this 14 context. 15 Q So are you saying that instructions for 16 the 3D printer is different than machine-readable 17 instructions? 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.
50 1 printing specific parts. 2 Q Paragraph 21 of Hamilton says that once 3 a design is requested, the system will access the 4 design for the design requirements. 5 So in order to access the design for 6 the design requirements, the design must exist; is 7 that correct? 8 A I think -- I think that's reasonable. 9 It's reasonable to say that in order for a system 10 to access the design requirements, some kind of 11 design needs to exist beforehand, and the elements 12 of that design are described in Hamilton. 13 Q And does Hamilton describe running a 14 licer at any point? 15 A So Hamilton does not specifically 16 discuss slicers, but in order to print a 17 3D-printed part, a POSITA understands that a 18 licer would have to be involved, or a POSITA 19 would be motivated to use a slicer in order to 20 print that part; otherwise, you can't generate 21 instructions for printing. 22 Q But Hamilton explains that the designs	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? 13 A So Hamilton doesn't talk about some 14 sort of iterative slicing loop or something like 15 that. In Figure 2, it does say that -- say, in 16 box 230 in Figure 2, you receive query printer 17 material, you respond. There's a response in the 18 loop there. Print material locating in box 260. 19 And then Hamilton's talking about this payment 20 issue. But then it says receive design 280. 21 And so, once the first boxes, 230, 240, 22 and 260, are used in Hamilton, a POSITA would

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53 1 recognize that, oh, this helps to determine the 2 target printer, and now that the material is okay, 3 for instance, I have enough material, the material 4 type is right, this is the specific printer I'm 5 going to use. 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. 18 Q Paragraph 21 of Hamilton, there's also 19 a sentence that says "The user's 3D printer will, 20 then, respond with its accuracy and material 21 capabilities." 22 Does Hamilton describe whether their	55 1 will, then, compare the capabilities of the 2 printer to the requirements of the design." 3 So that's sort of the full passage of 4 this – the system exchanging information, or the 5 system querying the user's 3D printer, and the 6 system waiting for a response from the printer. 7 Q But it doesn't say whether or not those 8 accuracy and material capabilities are combined 9 and then sent as a collection; is that correct? 10 A I mean, it just says the user's 3D 11 printer will, then, respond with its accuracy and 12 material capabilities. I think a POSITA would 13 understand that that can happen in any sort of 14 reasonable data transmission format. Again, a 15 file type or protocol is not specified here, but 16 it does say accuracy and material capabilities. 17 And so, that implies that that information is all 18 sent in some sort of unspecified manner. 19 Q Dr. Hickner, did you also rely on 20 reference called Evans, in your declaration? 21 A Yes, I did. 22 Q I'm going to add Exhibit 1011 into the
54 1 printer sends its accuracy and material 2 capabilities as a collection of information? 3 A Sorry, I'm at paragraph 21 now. 4 Can you point me towards the specific 5 sentence and ask the question again? 6 Q Yes. Is the sentence that -- I believe 7 the 9th line of the paragraph, the user's 3D 8 printer will, then, respond with its accuracy and 9 material capabilities. 10 A Yes, I see that. 11 Q And does Hamilton describe whether the 12 printer sends these accuracy and material 13 capabilities as a collection of information? 14 A So in paragraph 21, a couple lines 15 before that, it says "Once a design is requested, 16 the system will access the design for the design 17 requirements. Using these design requirements, 18 the system will query the user's 3D printer for 19 its accuracy and material capabilities. The 20 system will wait for a response from the printer. 21 The user's 3D printer will, then, respond with its 22 accuracy and material capabilities, and the system	56 1 chat. 2 Please let me know when you're able to 3 access this document. 4 (Exhibit 1011 previously marked for 5 identification and retained by counsel.) 6 A Okay. I have Evans up. 7 Q Is this the Evans reference that you 8 refer to in your declaration? 9 A Yes, it is. 10 Q Can you, please, go to page 67 of 11 Evans. 12 A I'm there, on page 67, on the bottom of 13 the PDF, which looks like page 62 of the Evans 14 book. 15 Q Can you, please, read the first 16 sentence on page 67, beginning with "while the 17 print settings are." 18 A Yeah. Evans says, under Printer and 19 Filament, "While the print settings are the most 20 important settings that we will most likely use on 21 a print-by-print basis, we also need to tell our 22 slicer application a little about our printer and

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57 1 filament. The first item on the agenda is our 2 printer's nozzle size, MakerGear hotends," 3 et cetera, talking about different nozzle sizes. 4 Q Evans describes the user informing the 5 slicer application about the printer and filament; 6 is that correct? 7 A I mean, Evans uses pretty informal 8 language here, in terms of, we also need to tell 9 our slicer application a little bit about our 10 printer and filament. And so, I think that just 11 informally, Evans is trying to make the connection 12 between what the slicer needs to know and the 13 characteristics of the printer and filament. 14 Q Can you, please, scroll to page 68 of 15 Evans. 16 A Yes, I'm there. 17 Q On the third paragraph of that page, 18 can you, please, read the sentence beginning with 19 "with the nozzle and filament diameters worked 20 out"? 21 A Yes. It says "With the nozzle and 22 filament diameters worked out, you can enter these	59 1 with all of the things that go into a slicer 2 before slicing is accomplished. 3 Q In other passages, does Evans refer to 4 things being sent by the printer? 5 A So Evans describes a number of 6 different slicing applications available at the 7 time, one of which is called "Slic3r," and it's 8 S-L-I-C-3-R, that's just its brand name. 9 And so, in paragraph 123, Evans 10 describes these applications that calculate 11 configurations creating a fabrication profile for 12 generating the tool paths upon receiving only a 13 few parameters about your printer, the filament, 14 and that's discussed in Evans, along with more 15 sophisticated programs, like the Netfabb engine. 16 And so, there is some automation to these slicing 17 programs, as detailed by Evans. 18 Q The calculation done there, that's 19 based on parameters about the printer, the 20 filament, and desired print settings that are 21 input into the software; is that correct? 22 A So what Evans says in -- on page 40,
58 1 measurements into the printer and filament 2 settings, along with the print center, if that's 3 an option, to place the center of the print in the 4 center of the print bed." 5 Q Here, is Evans referring to the user 6 entering these measurements into the -- entering 7 these measurements into the printer and filament 8 settings? 9 A Yeah, that's what Evans says, you can 10 enter these measurements into the printer and 11 filament with the print center. I think that 12 Evans is describing sort of this process in 13 general because he says "if that's an option," to 14 place the center of the print in the center of a 15 print bed. 16 Q So Evans doesn't describe those 17 settings being sent by the printer; is that 18 correct? 19 A In these specific passages, Evans 20 doesn't talk about things being sent by the 21 printer. He's talking about more of a manual 22 operation in order for a user to get more familiar	60 1 under the Slic3r paragraph, in Figure 2-11, he's 2 talking about different slicing programs, and he 3 says "where Skeinforge asked users to make a lot 4 of calculations regarding the filament extrusion, 5 Slic3r calculates all of these values under the 6 hood after inputting over a few parameters about 7 your printer, the filament, and the desired print 8 settings." 9 And so, this is talking about inputs 10 into the slicer, and then the automatic 11 calculations that Slic3r does, based on those 12 desired print setting. 13 Q So this describes that the calculations 14 are automatic, but the parameters are not 15 automatically input, based on what's described 16 here; is that correct? 17 A I mean, Evans says "after inputting 18 only a few parameters about your printer," and I 19 think a POSITA would understand that, you know, 20 that can be done by hand, as we discussed about 21 user settings in KISSlicer, or it's within a 22 POSITA's knowledge, at this time, to import key

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61 1 parameters, like build volume and other settings 2 from the printer, in order to give the slicer what 3 it needs for effective G code generation. 4 Q But the Evans reference doesn't 5 actually describe doing that; is that correct? 6 A As I said, Evans sort of talks about 7 this process in informal language, in terms of 8 getting to know your printer and getting to know 9 the settings. Evans doesn't dive into printer 10 software communication or other things like that. 11 Q Dr. Hickner, did you also rely on a 12 reference called Dahlin, in your declaration? 13 A Yes, I did. 14 Q I'm going to add Exhibit 1008 into the 15 chat. 16 (Exhibit 1008 previously marked for 17 identification and retained by counsel.) 18 Q Please let me know when you're able to 19 access that document. 20 A Bear with me. My PDF viewer just 21 froze. Let me close it and restart it here. One 22 moment.	63 1 reloading during the process." 2 And so, at the outset of the job, the 3 CPU verifies that the modeling filament material 4 on the spool is the same as specified in the 5 object data. If these materials are not the same, 6 an operator information is provided via a 7 touchscreen display. 8 Q And does Dahlin ever describe creating 9 a fabrication profile based on that information? 10 A So Dahlin discusses providing the 11 operator an opportunity to switch spools. And so, 12 I think that that is something that -- well, it 13 ensures that there's enough material or enough 14 build material type to complete the job. 15 Q But what Dahlin is doing is tracking 16 the amount of filament that's available? 17 MR. BISENIUS: Objection. 18 Was there a question there? 19 Q Is Dahlin tracking the amount of 20 filament that's available? 21 A So Dahlin, as I say in paragraph 32 of 22 my declaration, "Dahlin discloses a 3D printer
62 1 Q No worries. 2 A Okay. I have Exhibit 1008 up. 3 Q Is this the Dahlin reference you refer 4 to in your declaration? 5 A Yes, it is. 6 Q And the Dahlin reference discloses 7 detecting filament replacement; is that correct? 8 A So, as I say in paragraph 32 of my 9 overview for Dahlin, it says "Dahlin discloses a 10 3D printer filament spool that includes 'a circuit 11 for monitoring data concerning the filament on the 12 filament spool,' for example, 'the type and amount 13 of filament on the spool.'" 14 Q And does Dahlin disclose generating 15 print instructions after filament is replaced? 16 A So it says in Dahlin, paragraph 23, "At 17 the outset of a job, the CPU will calculate 18 whether a spool contains enough filament to 19 complete the job. Operator is then notified via 20 touchscreen display, either stating that the 21 filament is adequate to complete the job or that 22 the filament spool will need replacement and	64 1 filament spool that includes 'a circuit for 2 monitoring data concerning the filament on the 3 filament spool,' for example, 'the type and amount 4 of filament on the spool,'" and, also, discloses a 5 circuit that can notify the operator if the type 6 of filament does not match the type of material 7 identified by the object specification, or if the 8 amount of filament on the pool is sufficient to 9 create a desired object. 10 So that doesn't imply tracking, 11 necessarily, it just describes whether it's -- at 12 the outset, it's monitoring how much filament is 13 there and whether there's enough for a job. And 14 then if it isn't, it provides an opportunity for 15 the user to switch spools. 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

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65 1 terms of replacing the spool. And so, Dahlin 2 talks about the operator – just as I said, 3 replacing the spool and then getting further 4 notification from the system. 5 Q Dr. Hickner, did you also refer to a 6 reference called Batchelder in your declaration? 7 A Yes, I did. 8 Q I'm going to add Exhibit 1007 into the 9 chat. 10 Please let me know when you're able to 11 access this document. 12 (Exhibit 1007 previously marked for 13 identification and retained by counsel.) 14 A Okay. I have Exhibit 1007 up, that's 15 Batchelder U.S. patent. 16 Q And does the Batchelder reference refer 17 to firmware? 18 A So, as I say in the overview of 19 Batchelder, in paragraph 33 of my declaration, 20 "Batchelder discloses information relative to the 21 material and 3D printer, such as 'software and 22 firmware updates for the 3D printing system 10,'"	67 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. 7 Q And does the Batchelder reference 8 describe querying firmware configuration 9 information? 10 A So where Batchelder talks about 11 firmware updates is in paragraph 54. And 12 paragraph 54 starts with "encoded markings 50 may 13 include a variety of different information, such 14 as information relating to filaments and/or the 15 system." 16 And so, it lists all of these 17 characteristics after that. And at the end of 18 that sentence, it talks about product codes, 19 material, origin information, software and 20 firmware updates for the system, and a combination 21 thereof. 22 So this encoded markings containing a
66 1 and are read by a sensor assembly. 2 So Batchelder does refer to firmware. 3 Q And Batchelder specifically refers to 4 firmware updates for the system; is that correct? 5 A So in paragraph 54 of Batchelder, in 6 the last sentence, just as I said in my overview, 7 it says that -- well, it's a long sentence in 8 paragraph 54, but it refers to software and 9 firmware updates for a system and combinations 10 thereof. 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	68 1 variety of different information sounds like the 2 markings contain information on this firmware 3 update. 4 Q And does Batchelder explain querying 5 for that information? 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

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69 1 material. 2 Q That example that you described, that's 3 not actually described in Batchelder, though; is 4 that correct? 5 A I mean, that's an example that I just 6 came up with. I'd have to look and analyze the 7 other examples that Batchelder talks about. But 8 that was -- you know, based on my understanding of 9 how this might work or a POSITA's understanding of 10 how this might work, that might be one example 11 where Batchelder could be used. 12 Q And, Dr. Hickner, did you also refer to 13 a reference called Pax in your declaration? 14 A Yes, I did. 15 Q I'm going to add Exhibit 1013 into the 16 chat. 17 Please let me know when you're able to 18 access this document. 19 A I have Pax up, 1013, on my computer. 20 Q And this is the Pax reference that you 21 refer to in your declaration? 22 A That's correct.	71 1 Q So when it comes to the available build 2 materials, then the user has to input them into 3 the system; is that correct? 4 A I mean, it says in paragraph 98 "In 5 step 1106, the types, amounts, and colors of 6 available build materials may be identified." 7 So that doesn't say one way or the 8 other. But then the next sentence says "In some 9 implementations, a user may be directly queried." 10 And so, I think that the first sentence 11 of paragraph 98 leaves it open, in terms of may be 12 identified, and doesn't specify whether that's a 13 user or by some other system. 14 Q Pax doesn't say that configuration is 15 automatically identified; is that correct? 16 A In -- well, in the middle of paragraph 17 98, it says "In another aspect, predetermined 18 values may be obtained from computer memory and 19 used in subsequent processing. For example, a 20 printer may have four feed paths intended for 21 specific colors of red, green, blue, and white 22 building material. The intended color of each
70 1 Q Please scroll to page 28 of Pax. 2 A Okay. 3 Q In paragraph 98, do you where it says 4 "in some implementations, a system, e.g. the 5 controller of the three-dimensional printer or 6 remote computer, automatically tracks material 7 usage and updates material inventory with respect 8 an initial inventory"? 9 A Yes, I see that. 10 Q The tracking there, that's just on -- 11 based on the initial inventory, right? 12 A I mean, it does say "automatically 13 tracks material usage and updates material 14 inventory with respect to an initial inventory." 15 I mean, that's the language in this 16 reference. 17 Q And Pax, in paragraph 98, also 18 describes that in some implementations, the user 19 may be queried as to what build materials are 20 available; is that correct? 21 A Yes, that's the second sentence of 22 paragraph 98.	72 1 material may be stored and associated with a 2 particular drive motor, or the like." 3 And so, it doesn't -- it doesn't say 4 whether that is a user directly inputting that. 5 It just says it may be stored in computer memory. 6 So I think that paragraph 98 leaves it 7 open as to whether a user may be directly queried 8 or values may be stored in memory, or may be 9 obtained from computer memory, as Pax says. 10 Q Pax explains, though, right, that the 11 values there are predetermined and, therefore, 12 they're not going to update if the filament color 13 is changed or something like that; is that 14 correct? 15 A I don't understand that question. Can 16 you ask it again? 17 Q Yes. So Pax is referring to 18 predetermined values, so those values are not 19 updated according to what is currently present in 20 the printer; is that correct? 21 A I mean, if they're stored in computer 22 memory, the values need to be used somehow. So I

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73 1 guess I don't understand the question, in terms of 2 if it's -- if the value's stored in memory, a user 3 doesn't have to enter it. 4 Q Regardless of whether the user enters 5 them, are they -- they don't change, right; 6 they're predetermined? 7 A So I think that Pax is talking about 8 inventory tracking, which it -- it does 9 automatically, right? Pax is talking about 10 inventory tracking. And so, again, I don't -- I 11 don't understand the question, in terms of, is 12 this initial inventory or is this obtained from 13 computer memory? I'm just not sure what you're 14 asking. 15 Q I'm not referring to the inventory 16 portion, I'm referring to "In another aspect, 17 predetermined values may be obtained from computer 18 memory and used in subsequent processing." 19 A Okay. I see that. 20 Q And my question is, if those values are 21 predetermined, the predetermined values, those 22 will not change with the configuration of the	75 1 aspect, predetermined values may be obtained from 2 computer memory and used in subsequent 3 processing." And that means, to me, that the 4 values are stored in computer memory and can be 5 called up and used in whatever processing you 6 want. And those values don't have to be 7 determined by a user, they're already stored. 8 And so, I mean, the value -- if a user 9 is not going to enter a value, it has to be stored 10 somehow, so Pax is describing storing a value in 11 computer memory and then using that value in 12 processing. And Pax goes on to say that the 13 aspects of that build material, like the color, in 14 this example, can be associated with a particular 15 drive motor. 16 And so, that doesn't -- that implies 17 that since things are stored in computer memory, a 18 user doesn't have to enter any values. 19 Q If, for example, drive motor 1 has a 20 red filament, and that red filament is changed for 21 a blue filament, does Pax describe changing those 22 values to reflect that that drive motor now has a
74 1 printer; is that correct? 2 A I mean, it goes on to say the intended 3 color of each material may be stored and 4 associated with a particular drive motor or the 5 like. 6 So, to me, that means whether it's, you 7 know -- the values are stored in computer memory, 8 and they're associated with a particular drive 9 motor, say, drive motor 1, 2, or 3. And so, 10 anytime drive motor 3 is used, those values for 11 the, in this case, color of each material, or 12 whatever property you want, are associated with 13 that drive motor, and that value has to be stored 14 somehow. It's stored in computer memory. 15 So it associates the material, the 16 drive motor, and that's all stored independent 17 of -- or doesn't have to be entered by a user. 18 Q But to clarify, those values, they're 19 predetermined, is what Pax is saying; is that 20 correct? 21 MR. BISENIUS: Objection. Form. 22 A It says -- I mean, Pax says "In another	76 1 blue filament? 2 A I mean, that would be a user change to 3 the hardware configuration. So I think that would 4 be the user or operator of the three-dimensional 5 printer being queried as to what build materials 6 are available. 7 I don't know that a user would change a 8 filament, say, okay, the computer thinks I have 9 red, I'm going to change the filament to blue and 10 see what happens. I don't know that a POSITA 11 would do that. A POSITA would say, you know, in 12 order to get the most efficient printing, a user 13 really doesn't try and deceive the printer as to 14 what's in there. 15 Q So the POSITA would, then, update the 16 settings to reflect that you've loaded a blue 17 filament? 18 Is that what you're suggesting? 19 A Yeah, I think that -- let's say you 20 have red on number 1 extruder and blue on number 2 21 extruder. And you do something else, you use 22 white and green, or whatever.

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77 1 But then you go back and say, okay, I 2 have red on extruder 1 and blue on extruder 2. 3 Call up those values automatically or the 4 predetermined values obtained from computer memory 5 can be used to keep printing red and blue. 6 I think that's one example of 7 connecting, in this case, a color to a particular 8 drive motor. And you can recall those settings, 9 rather than the printer not knowing what filament 10 is in the machine and having to query the user 11 about what build materials are available. 12 Q And, Dr. Hickner, did you also refer to 13 a reference called Pettis, in your declaration? 14 A Yes. 15 Q I'm going to add Exhibit 1009 into the 16 chat. 17 Please let me know when you're able to 18 access this document. 19 A I have Exhibit 1009, Pettis up, U.S. 20 Patent, Downloadable Three-Dimensional Models. 21 Q And does Pettis disclose querying a 22 printer to obtain configuration information?	79 1 capabilities of the print server. A print server 2 may also communicate periodically with the 3 three-dimensional printers in order to obtain 4 status information concerning, for example, 5 availability of the printers, or the status of 6 particular print jobs, any of which may be 7 subsequently presented to a user through the web 8 server or any suitable interface." 9 So that's discussing not only print 10 server, but this web server, but communication of 11 these servers with the printers to talk about the 12 status of jobs or information that can be 13 subsequently presented to a user. 14 Q And does Pettis disclose comparing 15 metadata to printer configuration properties? 16 MR. BISENIUS: Objection. Scope. 17 A So in Pettis, as I state in paragraph 18 38 of my declaration, "Pettis further discloses a 19 data structure 300 that includes metadata 308 that 20 accompanies multiple different machine-ready 21 models 314 generated by a server for a 3D model 22 304 for use in selecting a suitable printer and
78 1 A So, as I say in paragraph 38 of my 2 declaration, which is the overview of Pettis, 3 Pettis discloses network three-dimensional 4 printing environment that includes any number of 5 three-dimensional printers and print servers. The 6 server automatically determines a printer type and 7 selects a suitable corresponding machine-ready 8 model for immediate fabrication by the printer. 9 Q And the configuration information in 10 Pettis, that's received from a server, not from a 11 printer; is that correct? 12 MR. BISENIUS: Objection. Scope. 13 A Ask that question again. I'm ready to 14 answer now. 15 Q Okay. The configuration information in 16 Pettis, that's received from a server, not from a 17 printer; is that correct? 18 MR. BISENIUS: Objection. Scope. 19 A So it says in paragraph 30 of Pettis, 20 sort of midway down that paragraph, "A print 21 server may also include a web server that provides 22 web-based access by the client device to the	80 1 verifying the suitability of the selected printer, 2 similar to the '774 patent's disclosure." 3 And so, I go on to say, a verification 4 engine 316 may also be included to verify the 5 suitability of machine-ready models 314 for 6 fabrication on an intended device and verification 7 may be performed selectively, for example, for 8 popular printer types, and each machine-ready 9 model may be annotated in the metadata or within 10 the model to indicate it has been successfully 11 fabricated. 12 So that shows that this metadata is 13 used in selecting and verifying a suitable 14 printer, similar to the '774 patent's disclosure. 15 Q But does Pettis disclose actually 16 comparing the metadata to some other information? 17 A So it says in Pettis, paragraph 61 to 18 67, and this is noted in my declaration in 19 paragraph 38, "disclosing that a verification 20 engine 316 may also include to verify the 21 suitability of machine-ready models for 22 fabrication on an intended device."

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81 1 So this verification implies a 2 comparison or some sort of method for determining 3 whether these machine-ready models can be 4 fabricated on an intended device. 5 Q But Pettis does not describe the 6 metadata used for that comparison; is that 7 correct? 8 A So in paragraph 67 of Pettis, where it 9 discusses this verification engine, it says "A 10 verification engine may also be included to verify 11 the suitability of machine-ready models for 12 fabrication on an intended device. This may, for 13 example, include computer-based verification, such 14 as rule-based verification of compliance with any 15 number of build rules covering overhangs," 16 et cetera. 17 Then it talks about, in on aspect -- 18 sorry, it says "In another aspect, a machine-ready 19 model may be manually verified by fabricating the 20 model with the printer and having a user confirm 21 that the build is successful. In one aspect, this 22 manual verification may be performed selectively,	83 1 A The comparison of the metadata to -- to 2 what? 3 Q To -- 4 A I don't -- 5 Q -- a printer configuration? 6 A So if we look at Figure 3, where it 7 talks, in the patent, about verification engine, 8 metadata, three-dimensional model, you see this 9 loop, or this arrow going from the sort of 10 analysis engine, slicing engine, verification 11 engine, in Figure 3, back over towards 12 three-dimensional model, metadata, machine-ready 13 model, machine-ready model 2. And so, this figure 14 shows that the metadata is in this verification or 15 slicing engine, analysis engine-type loop, along 16 with the three-dimensional model. 17 Q Does Figure 3 show the metadata being 18 fed into the analysis engine, slicing engine, or 19 verification engine? 20 A So in the -- in Pettis, it says 21 "Figure 3 shows a data structure for use with 22 machine-ready models." And then it says "The data
82 1 e.g., for popular printer types, and may be noted 2 in the metadata or within the model to indicate 3 whether it has been successfully fabricated." 4 So this paragraph connects the metadata 5 308 to the model, to this verification. And so, 6 this verification, in paragraph 67, can take note 7 of the metadata, or where it says "can be 8 annotated in the metadata," as to whether or not 9 it has been successfully fabricated. 10 Q And that aspect, that's referring to 11 manual verification; is that correct? 12 A Well, it says that manual verification 13 may be performed selectively but then noted in the 14 metadata, and then that verification, then, is 15 part of the metadata that could be used in 16 subsequent verifications. 17 And so, that's where the metadata has 18 this verification process in the metadata for the 19 model 314. 20 Q But paragraph 67 does not actually 21 describe a comparison of that metadata; is that 22 correct?	84 1 structure 300," this is paragraph 60 now, "may 2 also include an identifier," et cetera, models. 3 The data structure, in paragraph 61, may include 4 metadata, such as any descriptive information for 5 the object. 6 So this Figure 3, overall, shows how a 7 server may include this analysis engine or 8 verification engine in this overall data 9 structure. And Figure 3 gives one example of 10 that. 11 Q Dr. Hickner, I just have a few 12 additional questions. 13 Did you receive -- 14 A Okay. 15 Q -- any chats or messages during your 16 deposition today? 17 A No, I did not. 18 MR. HAMILTON: Okay. I do not have any 19 further questions. I'll pass the witness. 20 MR. BISENIUS: I'd think we'd want 21 about 20 minutes to see if we have any additional 22 questions.

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85 1 Shall we reconvene at half past the 2 hour? 3 MR. HAMILTON: That works. 4 THE WITNESS: That works for me. 5 (Recess taken from 1:09 p.m. to 6 1:27 p.m.) 7 MR. BISENIUS: No questions. 8 THE STENOGRAPHER: If I could get your 9 orders on the record, please. 10 MR. BISENIUS: Baile, correct me if I'm 11 wrong me, but I don't think we need a transcript 12 on our side, correct? 13 I don't think we need one on our side. 14 (Off the record at 1:27 p.m.) 15 16 17 18 19 20 21 22	87 1 I further certify that I am not related to 2 any of the parties to this action by blood or 3 marriage, I am not employed by or an attorney to 4 any of the parties to this action, and that I am 5 in no way interested, financially or otherwise, in 6 the outcome of this matter. 7 8 IN WITNESS WHEREOF, I have hereunto set my 9 hand this 8th day of January, 2026. 10 11 My commission expires: 12 November 3, 2028 13 <i>Judith E. Bellinger</i> 14 _____ 15 E-NOTARY PUBLIC IN AND FOR THE 16 State of Maryland 17 18 19 20 21 22
86 1 CERTIFICATE OF SHORTHAND REPORTER - NOTARY PUBLIC 2 I, Judith E. Bellinger, Certified 3 Stenographer and Notary Public within and for the 4 State of State of Maryland do hereby certify: 5 6 That MICHAEL A. HICKNER, PH.D., the 7 witness whose deposition is hereinbefore set 8 forth, was duly sworn by me before the 9 commencement of such deposition and that such 10 deposition was taken before me and is a true 11 record of the testimony given by such witness. 12 13 I further certify that the adverse party, 14 Shenzhen Tuozhu Technology Co., Ltd., was 15 represented by counsel at the 16 deposition. 17 18 I further certify that the deposition of 19 MICHAEL A. HICKNER, PH.D., occurred remotely 20 on Wednesday, January 7, 2026, commencing at 21 10:02 a.m. CST to 1:27 p.m. CST. 22	

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