

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MARKFORGED INC.,
Petitioner,

v.

CONTINUOUS COMPOSITES, INC.,
Patent Owner.

IPR2022-01220
Patent 9,987,798 B2

Before GRACE KARAFFA OBERMANN, JO-ANNE M. KOKOSKI, and
SHELDON M. McGEE, *Administrative Patent Judges*.

KOKOSKI, *Administrative Patent Judge*.

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

I. INTRODUCTION

Markforged, Inc. (“Petitioner”) filed a Petition to institute an *inter partes* review of claims 13–20 (the “challenged claims”) of U.S. Patent No. 9,987,798 B2 (“the ’798 patent,” Ex. 1001). Paper 3 (“Pet.”). Continuous Composites Inc. (“Patent Owner”) filed a Preliminary Response. Paper 7 (“Prelim. Resp.”). In the Preliminary Response, Patent Owner indicates that claims 15 and 16 have been disclaimed. Prelim. Resp. 11 (citing Ex. 2009).¹ Accordingly, only claims 13, 14, and 17–20 are now pertinent to this proceeding. *See* 37 C.F.R. § 42.107(e).

Institution of an *inter partes* review is authorized by statute when “the information presented in the petition . . . and any response . . . shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” 35 U.S.C. § 314 (2018); *see also* 37 C.F.R. § 42.4 (2021). For the reasons discussed below, we deny the Petition and do not institute an *inter partes* review.

A. Real Parties in Interest

Each party identifies itself as the real party in interest. Pet. 1; Paper 6, 1.

B. Related Matters

The parties indicate that the ’798 patent is asserted in *Continuous Composites, Inc. v. Markforged, Inc.*, No. 1:21-cv-00998-MN (D. Del.). Pet. 1; Paper 6, 1. The ’798 patent also is the subject of IPR2022-01218, filed by Petitioner. Paper 6, 1.

¹ Exhibit 2009 is titled “Disclaimer in Patent Under 37 CFR 1.321(a)” and indicates that claims 15 and 16 of the ’798 patent have been disclaimed. *See* Ex. 2009.

C. The '798 Patent

The '798 patent relates to “the additive manufacturing of three-dimensional objects.” Ex. 1001, code (57). The '798 patent explains that the most common additive manufacturing processes build a three-dimensional part by converting a digital file into horizontal layers, each of which is referred to as a “slice.” *Id.* at 1:18–24. After a base slice is created, successive slices are added one at a time on top of each other to build the part from the bottom up. *Id.* at 1:24–27. The '798 patent states that “[t]o strengthen the parts, some additive manufacturing techniques add reinforcing particles,” which “creates a heterogeneous mixture rather than pure resin, plastic, or metal.” *Id.* at 1:50–52. According to the '798 patent, these techniques have several disadvantages, including that the process is slow, it necessitates that parts are designed to accommodate the slicing process, and the vulnerable joints between the slices create a relatively weak part. *Id.* at 1:56–61.

The '798 patent addresses these problems by providing a method it calls Continuous Composite Three Dimensional Printing (CC3D). Ex. 1001, 2:6–8. “This method enables the additive manufacturing of parts utilizing two or more materials, and uses an alternate means of building parts with paths rather than slices” and “affords stronger lighter parts, with flexibility in structure, design, and functionality.” *Id.* at 2:8–13. In particular, the '798 patent teaches that “[t]he method allows for two or more materials simultaneously incorporated into the construction of a part.” *Id.* at 2:16–17. The primary material is a curable liquid, such as a photosensitive resin, and the secondary material is a solid strand, such as carbon fiber. *Id.* at 2:19–22. “These two materials are extruded together, with the secondary material fully encased within the primary material,” creating a composite material.

Id. at 2:22–26. In this method, a digital model of the part is analyzed and broken up into one or more paths, where each path is one continuous extrusion of the composite material. *Id.* at 2:31–34. The composite material is extruded in a continuous path, and is cured as it is extruded. *Id.* at 2:26–29; *see also id.* at 5:55–57 (“The composite material is extruded and then cured. The best mode cures the composite material immediately after extrusion, creating a solid path.”). “When a path is completed, the composite material is cut and additional paths may be printed to create the part.” *Id.* at 2:34–36. The ’798 patent explains that “[t]he combination of composite material and pathing adds strength to the part” and “more efficiently uses the primary material.” *Id.* at 2:37–44.

The ’798 patent further teaches that, “[p]rior to manufacturing a part, the manufacturer designates an origin,” which “may be any point on any surface suitable for anchoring the part during manufacturing.” Ex. 1001, 8:31–33. This contact point is called an anchor, and some parts may require multiple anchor points to support the part during manufacturing. *Id.* at 8:33–36. The extruder nozzle is then positioned so that the point of extrusion is at the anchor point. *Id.* at 8:37–39. When the first extruded path reaches its endpoint, the path is cut and the nozzle is positioned for the start of the next path. *Id.* at 8:47–50. “Paths are continuously extruded and cured until the sequence and the part is complete.” *Id.* at 8:50–52.

D. Challenged Claims

Petitioner challenges claims 13, 14, and 17–20 of the ’798 patent. Claims 13, 14, and 16–19 are independent. Claim 13 is illustrative of the claimed subject matter, and is reproduced below.

13. A method of manufacturing of a three-dimensional object, comprising:

directing a curable liquid material to a nozzle;

directing a continuous strand material to the nozzle;

discharging from the nozzle a path of composite material containing the continuous strand material at least partially coated with the curable liquid material;

bonding an end point of the path of the composite material to an anchor;

moving the nozzle during discharging to cause the path of composite material extend away from the anchor;
and

exposing the curable liquid material in the path of composite material to a cure energy while the nozzle is moving such that the path of composite material is hardened at a fixed location in three-dimensional space without support at locations between the anchor and the nozzle.

Ex. 1001, 11:38–55.

E. Asserted Grounds

Petitioner asserts that claims 13, 14, and 17–20² would have been unpatentable based on the following grounds:

² In view of Patent Owner's disclaimer of claims 15 and 16 (Ex. 2009), we agree with Patent Owner that Petitioner's proposed grounds 5, 8, and 13 are moot and grounds 2, 6, and 10 are partially moot. Prelim. Resp. 11. Our table reflects the current state of Petitioner's challenges, i.e., after Patent Owner's disclaimer of claims 15 and 16.

Claim(s) Challenged	35 U.S.C. § ³	Reference(s)/Basis
14, 18	103	Ma ⁴
17, 19	103	Ma, Lipsker ⁵
20	103	Ma, Lipsker, Crump ⁶
13	103	Ma, Crump
17–19	103	Lipsker
13, 20	103	Lipsker, Crump
14	103	Lipsker, Ma
18	103	Wohrl ⁷
17	103	Wohrl, Lipsker
14	103	Wohrl, Ma

Petitioner relies on the Declaration of David Rosen, Ph.D. (Ex. 1002) in support of its contentions.

II. ANALYSIS

A. *Level of Ordinary Skill in the Art*

Petitioner contends that a person having ordinary skill in the art (“POSITA”) would have had “a master’s degree in mechanical engineering, materials science, or a related degree, and at least 3–5 years of experience in composite materials or additive manufacturing,” or a bachelor’s degree in

³ The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112–29, 125 Stat. 284 (2011), revised 35 U.S.C. §§ 102 and 103 effective March 16, 2013. Petitioner argues, and Patent Owner does not contest, that the pre-AIA statutory provisions apply to this case. Pet. 13, 15–16, 19, 21–22. Neither party indicates the result would change, however, based on which version of the statute the Board applies for purposes of deciding whether to institute review.

⁴ Erjian Ma, *Solid Freeform Fabrication of Continuous Fiber Reinforced Composite Materials* (August 6, 2001) (Doctoral dissertation, Auburn University) (UMI No. 3016100) (Ex. 1007).

⁵ Lipsker, US 6,153,034, issued Nov. 28, 2000 (Ex. 1006).

⁶ Crump, US 5,121,329, issued June 9, 1992 (Ex. 1008).

⁷ Wohrl, UK Patent App. GB 2213 793 A, published Aug. 23, 1989 (Ex. 1010).

the same fields and at least 5–6 years of experience. Pet. 11 (citing Ex. 1002 ¶ 36). Patent Owner does not address the level of skill in the art at this stage of the proceeding. *See generally* Prelim. Resp.

On this record, we determine that the level of ordinary skill is reflected in the prior art of record. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001) (specific findings on the ordinary skill level are not required “where the prior art itself reflects an appropriate level and a need for testimony is not shown” (quoting *Litton Indus. Prods., Inc. v. Solid State Sys. Corp.*, 755 F.2d 158, 163 (Fed. Cir. 1985))). A more specific definition is not necessary for purposes of deciding whether to institute review.

B. Claim Construction

We construe each claim “in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent.” 37 C.F.R. § 42.100(b) (2019). Under this standard, claim terms are generally given their plain and ordinary meaning as would have been understood by a person of ordinary skill in the art at the time of the invention and in the context of the entire patent disclosure. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1313 (Fed. Cir. 2005) (en banc). Only those terms in controversy need to be construed, and only to the extent necessary to resolve the controversy. *Realtime Data LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019).

Petitioner asserts that the “claim terms should be given their plain and ordinary meaning because, to the extent certain terms are subject to multiple interpretations, those questions do not affect the grounds advanced here.” Pet. 11–12. Patent Owner does not address claim construction at this stage of the proceeding. *See generally* Prelim. Resp.

We determine that no claim term requires express construction for purposes of this Decision.

C. Ground 1: Asserted Obviousness over Ma

Petitioner contends that claims 14 and 18 would have been obvious over the teachings of Ma. Pet. 24–33.

1. Overview of Ma

Ma is a dissertation relating to rapid prototyping (“RP”) and manufacturing technology. Ex. 1007, 7. Ma discloses an “Active Material Supplying” method where “[t]he material is affected by the pressure inside the nozzle that pushes the fluent material out of the orifice.” *Id.* at 53. Ma also discloses a “Passive Material Supplying” method where “the towpreg^[8] is pulled out by the object instead of being pushed out by nozzle pressure.” *Id.* at 54.

Ma distinguishes between these two methods, noting that with the “active” method, “[t]he forming quality of a previous layer do[es] not influence the forming of the current layer,” while with the “passive” method, “the quality of a previous layer has a profound effect on the forming quality of the current layer.” Ex. 1007, 53. Ma sets forth other problems with using the “passive” method. *See, e.g., id.* at 95–96, 98–107, 143, 145–147, 149. For example, Ma teaches that during deposition using the “passive” method, “it is possible to make a big error, especially when the nozzle makes a big-angle turn” (*id.* at 98), and that “[a] toolpath error could be generated if an anchoring point is not formed properly” when using the “passive” method (*id.* at 143). Ma also discloses that forming speed is an issue with the

⁸ Ma defines “towpreg” as a continuous line of composite material. Ex. 1007, 37.

“passive” method, (*id.* at 146), but discloses “[o]ne of the advantages [of the ‘active’ method] is that the forming speed is not limited by the solidification condition of the towpreg during the forming process” (*id.* at 168).

2. Claim 14

Petitioner contends that Ma discloses all of the elements of claim 14. Pet. 24–30. For example, Petitioner contends that Ma discloses “moving the nozzle during discharging to create tension in the continuous strand material that remains after curing of the composite material” because Ma teaches that “[t]ensile forces develop in the towpreg (‘create tension in the continuous strand material’) as the nozzle moves relative to the anchor points (‘moving the nozzle during discharging’).” *Id.* at 28 (citing Ex. 1007, Fig. 4-1B). Petitioner explains that “Ma discloses that the towpreg is pulled (and therefore tension develops in the towpreg) as a result of the nozzle’s movement relative to the anchored points when the towpreg is passively supplied through the nozzle.” *Id.* at 29–30 (citing Ex. 1007, 38) (emphasis omitted). Petitioner further contends that, “[b]ecause Ma secures/anchors the towpreg during the formatting process by ‘curing the curable liquid material in the path of composite material,’ the tension in the towpreg remains after the completion of the curing process.” *Id.* at 30 (emphasis and citation omitted).

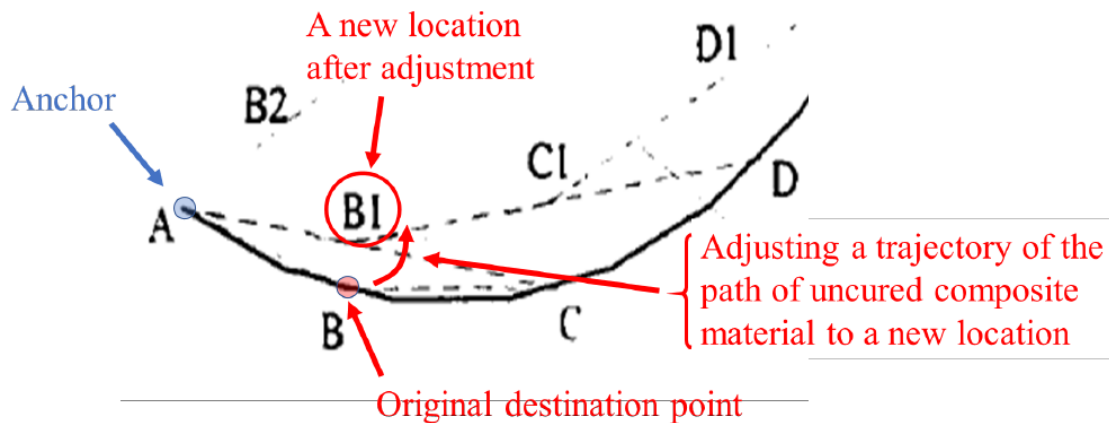
Ma describes “two main fabrication processes” for computer-controlled layer manufacturing: an “active” method that pushes the composite material out of an extruder’s orifice, and a self-anchoring or “passive” method, wherein the composite material is pulled out by the object. Ex. 1007, 7–8, 52–54. Here, Petitioner relies on Ma’s disclosures relating to the passive method. Petitioner, however, fails to provide a persuasive explanation as to why a POSITA would have selected Ma’s

passive pulling method over Ma's active pushing method for further development or improvement. Petitioner's failure to do so is particularly noteworthy here, because Ma includes numerous teachings against the passive method of pulling the composite material through the nozzle. Indeed, Patent Owner identifies no fewer than eight disclosures within Ma that seemingly disparage the passive pulling method and discuss the benefits of the active pushing method. Prelim. Resp. 8–10 (citing Ex. 1007, 53, 95–96, 98–107, 143–147, 149, 167–168). We also agree with Patent Owner that Petitioner has not sufficiently explained why the ordinarily skilled artisan would have combined Ma's active and passive methods, much less with a reasonable expectation of successfully arriving at the subject matter of claim 14. *Id.* at 12–16. In the absence of any explanation from Petitioner on this point, we are not persuaded that a POSITA would have ignored Ma's teachings against the passive pulling method and selected Ma's pulling method over Ma's active pushing method for further development and improvement.

Because Petitioner does not adequately establish that a POSITA would have selected Ma's passive method over Ma's active pushing method, Petitioner does not establish a reasonable likelihood that claim 14 would have been obvious over Ma.

3. *Claim 18*

Petitioner contends that Ma discloses all of the limitations of claim 18. Pet. 30–33. Claim 18 recites, *inter alia*, “adjusting a trajectory of the path of uncured composite material to a new location after discharge from the nozzle.” Ex. 1001, 12:50–52. Petitioner provides an annotated, magnified portion of Ma's Figure 4-2, reproduced below, to illustrate its contentions. Pet. 31.



Annotated Figure 4-2 depicts an arc tool path, in which the nozzle is programmed to move from point A to points B, C, and D, with points B1, B2, C1, and D1 identified off of the tool path. Ex. 1007, 143. Petitioner’s annotations include adding (1) a red circle around point B1, (2) labels identifying point B (“Original destination point”) and point B1 (“A new location after adjustment”), and (3) an arrow pointing from point B to point B1 labeled “Adjusting a trajectory of the path of uncured composite material to a new location.” Pet. 31. Petitioner asserts that, “when the towpreg is not properly anchored (or not anchored) at point B, point B no longer serves as a stationary point to pull the towpreg from the nozzle,” and, “[c]onsequently, as the nozzle continues to move towards point C, point B skids to a new location B1.” *Id.* at 31–32 (emphasis omitted). According to Petitioner, “[t]his demonstrates that an uncured path (‘the path of uncured composite material’) can be relocated ‘to a new location after discharge from the nozzle’ by moving the nozzle and ‘adjusting’ the towpreg’s trajectory.” *Id.* at 32.

Here, Petitioner again relies on Ma’s teachings regarding the passive pulling method that Ma seemingly disparages, and again fails to explain why a POSITA would have selected Ma’s passive pulling method over Ma’s

active pushing method for further development or improvement.

Accordingly, for the same reasons set forth above with respect to claim 14, we are not persuaded that Petitioner has demonstrated a reasonable likelihood of showing that claim 18 would have been obvious over Ma.

D. Ground 2: Asserted Obviousness over Ma and Lipsker

Petitioner contends that claims 17 and 19 would have been obvious over the combined teachings of Ma and Lipsker. Pet. 33–60.

1. Overview of Lipsker

Lipsker is directed “to rapid prototype deposition modeling techniques and apparatus.” Ex. 1006, 1:4–6. In particular, Lipsker “seeks to provide improved rapid prototype deposition modeling techniques and apparatus, wherein a building material is added layer by layer to build an accurate replica of a given object, without having to remove building material to arrive at the finished prototype.” *Id.* at 1:52–56.

Lipsker’s Figure 1 is reproduced below.

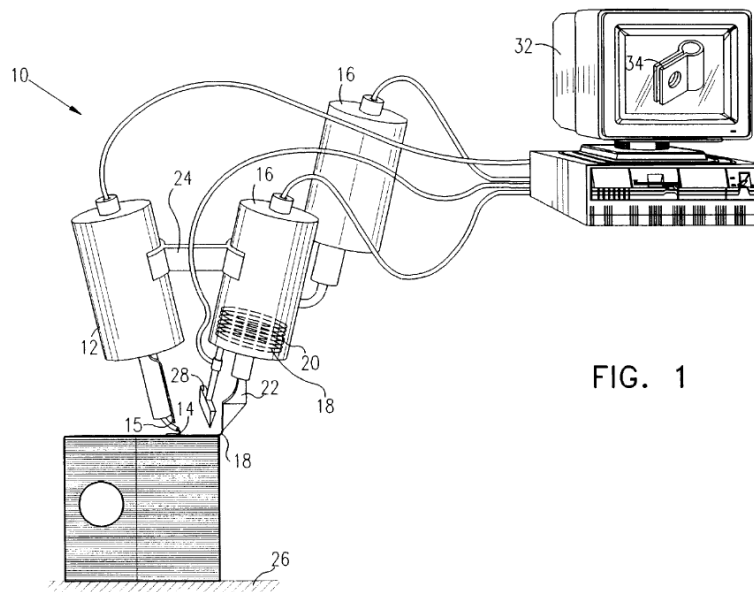


Figure 1 is a “simplified pictorial illustration of [a] rapid prototype apparatus” described in Lipsker. Ex. 1006, 2:65–67. Prototype apparatus 10

includes adhesive dispenser 12 for dispensing adhesive 14 and wire dispenser 16 for dispensing wire 18. *Id.* at 3:27–28, 3:46–47. Wire 18 is stored within storage receptacle 20 and dispensed through nozzle 22 onto bed 26. *Id.* at 3:47–49, 3:56. Bracket 24 fixedly attaches adhesive dispenser 12 to wire dispenser 16. *Id.* at 3:54–55. Cutter 28 is provided for cutting wire 18 after being dispensed by wire dispenser 16. *Id.* at 4:50–51. Apparatus 10 also includes actuator 30, which moves adhesive dispenser 12 and wire dispenser 16 in at least one (preferably four or six) of six degrees of freedom. *Id.* at 4:60–63. Actuator 30 communicates with computer 32, which contains a database containing the three-dimensional geometry of object 34. *Id.* at 5:1–3. Actuator 30 may be used to move adhesive dispenser 12 and wire dispenser 16 according to the geometry of object 34. *Id.* at 5:17–19.

Lipsker explains that actuator 30 “dispenses layers of wire 18 in accordance with the geometry of object 34, and adhesive dispenser 12 applies adhesive 14 to wire 18 so as to bond a previously dispensed portion of wire 18 to a presently dispensed portion of wire 18.” Ex. 1006, 5:24–28. When adhesive 14 cures, the layers of wire 18 form a prototype of object 34. *Id.* at 5:30–31. Lipsker teaches that “wires of different materials may be dispensed to form a multi-material prototype,” and that “a portion of the prototype may be formed with a discardible [sic] wire . . . which serves as a support for other wires and which is purposely removed later to form the finished prototype.” *Id.* at 5:32–36. Lipsker further teaches that “[a]dhesive dispenser 12 may be located so as to dispense adhesive 14 into nozzle 22 such that wire 18 is dispensed from wire dispenser 16 pre-coated with adhesive 14,” and “application of the wires and adhesive may be synchronized in any desired manner.” *Id.* at 5:56–60. Lipsker also describes

embodiments wherein the prototype is “produced by only dispensing layers of adhesive 14 . . . in accordance with the geometry of object 34, and thereafter curing the layers of adhesive 14.” *Id.* at 5:61–67.

2. *Motivation to Combine Ma and Lipsker*

To support a conclusion of obviousness when combining the teachings of multiple references, an articulated reason with some rational underpinning to combine the known elements in the fashion claimed must be provided. *See KSR Int’l Co. v. Teleflex, Inc.*, 550 U.S. 398, 418 (2007); *see also In re Magnum Oil Tools, Int’l, Ltd.*, 829 F.3d 1364, 1381 (Fed. Cir. 2016) (It is the petitioner’s “burden to demonstrate both that a skilled artisan would have been motivated to combine the teachings of the prior art references to achieve the claimed invention[s], and that the skilled artisan would have had a reasonable expectation of success in doing so.” (citation and internal quotation marks omitted)). Having reviewed the parties’ arguments and evidence of record, we are not persuaded that Petitioner provides sufficient articulated reasoning with a rational underpinning as to why one of ordinary skill in the art would have combined the teachings of Ma and Lipsker in the manner recited in the challenged claims.

Petitioner contends that a POSITA would have been motivated to combine Ma and Lipsker because both “are directed to the same field of endeavor—*i.e.*, RP manufacturing methods for fabricating accurate replicas of 3D objects by dispensing a fiber-reinforced composite material.” Pet. 33 (emphasis omitted). Petitioner further contends that “both Ma and Lipsker are responding to shortcomings arising from the use of monolithic building materials (*i.e.*, single-type building materials) in RP processes—like the lack of rigidity and strength in fabricated 3D products.” *Id.* (emphasis omitted). According to Petitioner, “a POSITA eager to address the aforementioned

shortcomings, expand his/her own knowledge on RP, and get informed about the equipment options/materials used in RP, would be highly motivated to seek Lipsker and Ma.” *Id.* (citing Ex. 1002 ¶ 229).

Petitioner’s identification of similarities between Ma and Lipsker, however, is not sufficient, by itself, to support a conclusion of obviousness. *See KSR*, 550 U.S. at 418. The Federal Circuit has said that merely asserting that two references are drawn from the same field of art is “simply too conclusory” to show that the skilled artisan would have combined the references in the way of the claimed invention, because “[s]uch short-cut logic would lead to the conclusion that any and all combinations of elements known in this broad field would automatically be obvious, without the need for any further analysis.” *Securus Techs., Inc. v. Glob. Tel*Link Corp.*, 701 F. App’x 971, 976 (Fed. Cir. 2017); *see Microsoft Corp. v. Enfish, LLC*, 662 F. App’x 981, 990 (Fed. Cir. 2016) (determining that “the Board correctly concluded” that a petitioner “did not articulate a sufficient motivation to combine” where the only reason given was “that the references were directed to the same art or same techniques”).

Further, the question of whether the prior art references are in the same field of endeavor as the challenged patent is merely a jumping-off point in the determination of whether a claimed invention is obvious. *See K-Tec, Inc. v. Vita-Mix, Corp.*, 696 F.3d 1364, 1375 (Fed. Cir. 2012) (to qualify as prior art in an obviousness analysis, references must be analogous art—either in the same field of endeavor as the challenged patent, or reasonably pertinent to the problem with which the inventor is involved). Even assuming the references are analogous art to the ’798 patent, it is still necessary to show that it would have been obvious to a POSITA to select and combine the teachings of those references in the manner claimed.

Petitioner also contends that “although Lipsker and Ma disclose similar operating principles and comparable baseline equipment, they do not overlap in their focus.” Pet. 34 (emphasis omitted). In particular, Petitioner notes that “Lipsker focuses on the equipment side and motion system, while Ma studies in detail the dispensing mechanics.” *Id.* Therefore, Petitioner contends, “a POSITA would have found that Lipsker and Ma are compl[e]mentary to one another and would have been motivated to combine them to benefit from their respective teachings.” *Id.* at 48–49 (citing Ex. 1002 ¶ 230).

This alleged motivation to combine is also insufficient. Petitioner provides little more than a conclusory assertion that Ma and Lipsker complement each other in some way, without identifying how Ma would benefit from Lipsker’s teachings, or explaining why a POSITA reading Ma would have looked to Lipsker for those teachings. Such conclusory statements fall short of providing the requisite rationale sufficient to support a conclusion of obviousness. *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) (*cited with approval in KSR*, 550 US at 418).

It is Petitioner’s burden to provide an articulated reason with some rational underpinning to combine known elements from the cited art in the fashion claimed in order to support a conclusion of obviousness. *See KSR*, 550 U.S. at 418. Here, the Petition lacks an adequate explanation as to why a skilled artisan reading Ma would have looked specifically to Lipsker for its particular teachings, and how a skilled artisan would have combined the teachings of Ma and Lipsker in the manner claimed. Therefore, we are not persuaded that Petitioner has made a sufficient showing that a POSITA would have combined the teachings of Ma and Lipsker as proposed. *See Johns Manville Corp. v. Knauf Insulation, Inc.*, IPR2018-00827, Paper 9

(PTAB Oct. 16, 2018) (informative). Accordingly, we conclude that Petitioner has not demonstrated a reasonable likelihood of prevailing in showing that claims 17 and 19 would have been obvious over the combined teachings of Ma and Lipsker.

E. Ground 3: Asserted Obviousness Over Ma, Lipsker, and Crump

Petitioner contends that claim 20, which depends from claim 19, would have been obvious over the combined teachings of Ma, Lipsker, and Crump. Pet. 60–63. Petitioner relies on its arguments with respect to the combination of Ma and Lipsker in its contentions regarding the motivation to combine Ma, Lipsker, and Crump. *Id.* at 60. Petitioner does not provide additional contentions that remedy the deficiencies in the motivation to combine Ma and Lipsker. *Id.* at 60–61. Accordingly, for the reasons discussed above with respect to the combination of Ma and Lipsker, we conclude that Petitioner has not demonstrated a reasonable likelihood of prevailing in showing that claim 20 would have been obvious over the combined teachings of Ma, Lipsker, and Crump.

F. Ground 4: Asserted Obviousness over Ma and Crump

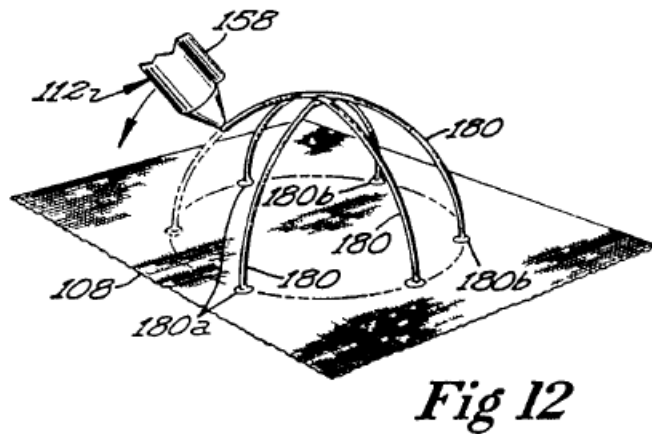
Petitioner contends that claim 13 would have been obvious over the combined teachings of Ma and Crump. Pet. 64–72.

1. Overview of Crump

Crump discloses an “[a]pparatus incorporating a movable dispensing head provided with a supply of material which solidifies at a predetermined temperature, and a base member, which are moved relative to each other along ‘X,’ ‘Y,’ and ‘Z’ axes in a predetermined pattern to create three-dimensional objects.” Ex. 1008, code (57).

Crump discloses an embodiment in Figure 12 where “wire frame objects comprised of multiple, free-standing strands 180 defining wire frame

segments anchored to a substrate 108 at spaced locations 180a and 180b could be formed.” *Id.* at 15:21–26. Figure 12 is reproduced below.



Crump’s Figure 12 embodiment depicts forming strands 180 in an arcuate shape spanning from anchor points 180a and 180b. Ex. 1008, 15:22–32. Crump teaches that “the strands are anchored at two points and also to each other where they intersect.” *Id.* at 15:38–39.

2. Claim 13

Claim 13 recites, *inter alia*, “bonding an end point of the path of composite material to an anchor” and “moving the nozzle during discharging to cause the path of composite material to extend away from the anchor.” Ex. 1001, 11:47–48. Petitioner argues, as it did above with respect to claim 18 (Section II.C.3), that “Ma explicitly demonstrates bonding the towpreg (‘the path of composite material’) on multiple locations (anchors)” in Figure 4-2. Pet. 65–66 (emphasis omitted). In particular, Petitioner points to the following in Ma:

An arc toolpath is shown in Figure 4-2, and the nozzle is programmed to move along the arc toolpath from point A to points B, C, and D. Ideally, the towpreg is firmly anchored at point A. When the nozzle arrives at point B, the towpreg is supposed to be deposited and anchored at once to form a new anchoring point at B. Then the nozzle is moved to point C and

so on to deposit the towpreg be following the path indicated with the broken line ABCDE.

Id. at 66 (quoting Ex. 1007, 127). Petitioner contends “[a] POSITA would have understood that points A through E are anchor point locations,” and “point B is where an end point of the towpreg is anchored after the ‘first’ anchor location A . . . point C is where a new end point of the towpreg is anchored after the ‘second’ anchor point location B, and so on.” *Id.* (emphases omitted). Therefore, according to Petitioner, “a new end point of the towpreg is anchored to a new anchor point location as the nozzle moves forward.” *Id.* at 66–67 (citing Ex. 1002 ¶¶ 116, 256) (emphasis omitted).

As was the case with Petitioner’s contentions with respect to claims 14 and 18, here Petitioner relies on Ma’s teachings regarding the passive pulling method that Ma seemingly disparages, and again fails to explain why a POSITA would have selected Ma’s passive pulling method over Ma’s active pushing method for further development or improvement. Accordingly, for the same reasons set forth above with respect to claims 14 and 18, we are not persuaded that Petitioner has demonstrated a reasonable likelihood of showing that claim 13 would have been obvious over the combined teachings of Ma and Crump. *See supra* Sections II.C.2, II.C.3.

G. Ground 5: Asserted Obviousness over Lipsker

Petitioner contends that claims 17–19 would have been obvious over Lipsker. Pet. 80–82.

Petitioner contends that Lipsker teaches all of the elements of claim 17. Pet. 80. For example, Petitioner contends that Lipsker discloses “directing a curable liquid material to a nozzle” because “Lipsker’s RP apparatus 10 in Figure 2 . . . is equipped with an adhesive dispenser 12 for dispensing an adhesive 14, which ‘is preferably a quick curing adhesive.’”

Pet. 36–37 (citing Ex. 1006, 3:27–28, 3:33–34) (emphasis omitted).

Petitioner further contends that, “[a]s shown in Figure 5, adhesive 14 (‘the curable [] material’) is directed via a feeder . . . through nozzle 22.” *Id.* at 37 (citing Ex. 1006, Fig. 5; Ex. 1002 ¶ 182) (second alteration in original) (emphases omitted).

Similarly, Petitioner contends that Lipsker discloses “discharging from the nozzle a path of composite material containing the continuous strand material at least partially coated with the curable liquid material” because, in Figure 5 “Lipsker discloses that the wire (‘the continuous strand’) is pre-coated (‘at least partially coated’) with the adhesive (‘the curable liquid material’) in the vicinity of the nozzle prior to being discharged from the nozzle (‘discharging from the nozzle’).” Pet. 39 (citing Ex. 1006, 5:56–59). Petitioner also points to Lipsker’s Figure 3, which Petitioner contends shows a cross-section of the composite material wherein the curable liquid material at least partially coats the continuous strand. *Id.* at 39–40 (citing Ex. 1006, Fig. 3). Petitioner further contends that Lipsker’s “Figure 1 shows exposing adhesive 14 (‘curable liquid material’) to UV light from optic fiber 15 (an integral part of the ‘curing device’) to cure the composite material path” and, therefore, Lipsker meets the “curing the curable liquid material in the path of composite material.” *Id.* at 42–43 (citing Ex. 1006, Fig. 1; Ex. 1002 ¶ 167) (emphasis omitted).

Petitioner relies on the same or similar arguments with respect to similar elements in claims 18 and 19. *See* Pet. 47 (citing Ex. 1002 ¶¶ 202–205, 208), 80 (citing Ex. 1002 ¶¶ 291–294). For example, Petitioner relies on Lipsker’s Figures 1–3 for the “discharging from the nozzle a path of uncured composite material containing the continuous strand material at least partially coated with the curable liquid material” limitation of claim 18,

and on Lipsker's Figure 5 for the "curing the curable liquid material in the path of uncured composite material at the new location after adjusting" limitation of claim 18. Pet. 39–40, 42–44, 80–82. Similarly, Petitioner relies on Lipsker's Figures 1–3 for the "discharging from a nozzle a first path of composite material" and "discharging a second path of composite material adjacent the first path of composite material" limitations of claim 19, and on Lipsker's Figure 5 for the "curing a first portion of the first path of composite material, leaving a second portion of the first path of composite material at least partially uncured" and "curing the second path of composite material" limitations of claim 19. Pet. 51–55, 56, 60, 80.

Patent Owner responds that "Petitioner relies on distinct embodiments of Lipsker for different elements of independent claims 17 and 19 without providing a reason to combine any aspects of those embodiments." Prelim. Resp. 17. Specifically, Patent Owner argues that "Petitioner relies simultaneously on Lipsker's non-precoating actuator embodiment of Figures 1–3 as well as Lipsker's distinct precoating actuator embodiment of Figure 5" for the claimed "directing," "discharging," and "curing" steps of the claims. *Id.* (citing Pet. 36–42, 47). Patent Owner argues that, because the non-precoating actuator embodiment of Figure 2 applies adhesive 14 to previously-dispensed portions of wire 18, and the precoating actuator embodiment of Figure 5 dispenses wire 18 pre-coated with adhesive, "Petitioner relies on two entirely different embodiments of Lipsker as teaching different elements of" the claims. *Id.* at 17–18 (citing Ex. 1006, 5:22–32, 5:53–58).

Patent Owner further argues that "Petitioner provides no reason to combine these different embodiments of Lipsker," and, "[a]t most, Petitioner merely mentions boilerplate language in Lipsker mentioning that

combinations of embodiments are possible.” Prelim. Resp. 18 (citing Pet. 15 (citing Ex. 1006, 6:56–62)). Patent Owner argues that Lipsker’s “boilerplate language” “does not show how or why a POSITA would have combined Lipsker’s different embodiments to arrive at the claimed invention.” *Id.* (emphases omitted). Patent Owner also argues that Petitioner fails to “show how such a combination could be made with a reasonable expectation of success.” *Id.*

We agree with Patent Owner that Petitioner’s reliance on two disparate embodiments in Lipsker to show the elements of claims 17–19 falls short of establishing a reasonable likelihood that those claims would have been obvious over Lipsker.

Patent Owner is correct that Petitioner relies on aspects of Lipsker’s non-precoating actuator embodiment illustrated in Figures 1–3 and Lipsker’s precoating actuator embodiment illustrated in Figure 5 to demonstrate that the limitations of independent claims 17–19 were known in the prior art. Prelim. Resp. 17–18. For example, Petitioner relies on Lipsker’s precoating actuator embodiment in Figure 5 as disclosing “discharging from the nozzle a path of composite material containing the continuous material strand at least partially coated with the curable liquid material.” Pet. 39–40 (citing Ex. 1006, 5:56–59; Ex. 1002 ¶ 190). Petitioner does not point to any disclosure within Lipsker, however, regarding how the precoating actuator in Figure 5 discloses the curing limitations recited in claims 17–19. Indeed, Figure 5 does not illustrate optic fiber 15, which is depicted in the *non*-precoating actuator embodiment of Figures 1 and 2 as being attached to the outlet of adhesive dispenser 12. Ex. 1006, Figs. 1, 5. Nor does Lipsker’s description of Figure 5’s precoating actuator embodiment address how the adhesive coating the wire is cured. *Id.* at 5:53–60. Thus, it is unclear on this

record whether Lipsker’s precoating actuator embodiment “cur[es] the curable liquid material in the path of composite material.”

We also agree with Patent Owner that Petitioner has not sufficiently explained why a POSITA would have combined the non-precoating embodiment of Lipsker’s Figures 1–3 and the precoating embodiment of Lipsker’s Figure 5, much less with a reasonable expectation of successfully arriving at the subject matter of claims 17–19. Prelim. Resp. 18–19. As Patent Owner points out (*id.* at 18), Petitioner’s general assertion that “Lipsker discloses that combinations of the disclosed embodiments and features is proper” (Pet. 15 (citing Ex. 1006, 6:56–62)), does not constitute a reasoned explanation regarding why the skilled artisan would have combined Lipsker’s precoating and non-precoating actuator embodiments to arrive at the claimed subject matter.

Accordingly, we determine that Petitioner fails to establish a reasonable likelihood of showing that claims 17–19 would have been obvious over the teachings of Lipsker.

H. Ground 6: Asserted Obviousness over Lipsker and Crump

Petitioner contends that claims 13 and 20 would have been obvious over the combined teachings of Lipsker and Crump. Pet. 83–88.

1. Claim 13

Claim 13 requires, *inter alia*, “bonding an end point of the path of composite material to an anchor.” Ex. 1001, 11:45–46. Petitioner asserts that “Lipsker discloses that the adhesive (‘the curable liquid material’) in the adhesive-coated wire (‘the path of composite material’) is bonded to a previously dispensed layer.” Pet. 84 (citing Ex. 1006, 5:26–28). Petitioner contends that this bonding “is an outcome of the curing process, which causes the matrix material to harden and adhere to a layer/surface,” and

“[e]ach bonding site to which the presently dispensed path is attached constitutes an anchor.” *Id.* (citing Ex. 1002 ¶ 307) (emphasis omitted).

Petitioner also contends that Crump meets this limitation of claim 13. Petitioner contends that Crump “discloses forming bonding sites, which anchor the building material to any desired surface, by solidifying the building material.” Pet. 84 (emphasis omitted). Petitioner points to Crump’s statement that “dispensing a material at a controlled rate from a dispensing head unto a substrate of base member . . . , with the material being dispensed in multiple layers which solidify and adhere to each other to build up the article” to support its contention. *Id.* at 84–85 (citing Ex. 1008, 3:10–16) (emphasis omitted). According to Petitioner, “[t]hese bonding sites are anchors or anchor point locations.” *Id.* at 85 (emphasis omitted).

As we understand it, Petitioner is arguing that a POSITA would have understood Lipsker’s and Crump’s teachings that bonding the layers of adhesive-coated wire to each other to build up the object is “bonding an end point of the path of composite material to an anchor” as recited in claim 13. Petitioner’s argument appears to be premised on the understanding that any point at which the path contacts, and is cured to, a surface is the claimed anchor. The ’798 patent, however, describes an anchor as something more than just any point to which a part of the path is affixed.

In particular, the ’798 patent teaches that, “[p]rior to manufacturing a part, the manufacturer designates an origin. The origin may be any point on any surface suitable for anchoring the part during manufacturing. This point of contact is called an anchor. Some parts may require multiple anchor points to support a part during manufacturing.” Ex. 1001, 8:31–36.

The ’798 patent further teaches that “[t]he origin of the path adheres to the anchor, allowing the extruder to pull on the secondary material during the

extrusion” and “[t]he initial contact between the proposed part and the anchor must provide enough adhesion to support the tension force desired.” *Id.* at 10:1–10. Taken together, these disclosures indicate that an anchor is a contact point to which the fiber is affixed and that serves as an origin point for the formation of the path and provides support for the part during manufacturing.

Lipsker teaches, with reference to Figure 2:

Actuator 30 preferably dispenses layers of wire 18 in accordance with the geometry of object 34, and adhesive dispenser 12 applies adhesive 14 to wire 18 so as to bond a previously dispensed portion of wire 18 to a presently dispensed portion of wire 18. A successive layer of wire 18 may be dispensed one on top of a previous layer. Adhesive 14 then cures so that the layers of wire 18 form a prototype 40 of object 34.

Ex. 1006, 5:24–30. Similarly, Crump describes dispensing a material onto a substrate or base member, “with the material being dispensed in multiple layers which solidify and adhere to each other to build up the article.”

Ex. 1008, 3:10–16. Crump further teaches that “at least the material under the dispensing head[] has solidified before additional material is applied on top of it to form a subsequent layer.” *Id.* at 3:16–20. In light of these disclosures in Lipsker and Crump, Petitioner does not adequately explain why a POSITA would have understood that adhering layers of adhesive-coated material to each to form an object other creates an anchor as the ’798 patent teaches and claim 13 requires.

We also note that Petitioner’s element-by-element analysis of the claims is unclear as to how a POSITA would have combined elements of Lipsker and Crump to achieve the invention. *See* Pet. 83–88. For example, although Petitioner alleges that Lipsker and Crump each separately disclose “bonding an end point of the path of composite material to an anchor,”

Petitioner does not describe the aspects of Crump that would be combined with Lipsker (or vice versa), despite contending that “Lipsker in combination with Crump discloses” this limitation. *Id.* at 84–85. This lack of clarity regarding the particular combination Petitioner is alleging further supports our determination that Petitioner does not meet its burden for institution. *See Harmonic Inc. v. Avid Tech. Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016).

For these reasons, we conclude that Petitioner does not sufficiently establish that the combined teachings of Lipsker and Crump teach “bonding an end point of the path of composite material to an anchor” as recited in claim 13. Accordingly, we determine that Petitioner does not demonstrate a reasonable likelihood of prevailing in showing that the subject matter of claim 13 would have been obvious over the combined teachings of Lipsker and Crump.

2. *Claim 20*

Claim 20 depends from claim 19, and further requires that discharging the first and second paths of composite material includes simultaneous discharge. Ex. 1001, 13:8–11. Petitioner relies on its arguments in Ground 6 that Lipsker alone discloses claim 19 in its contentions regarding claim 20. Pet. 85. Petitioner does not provide additional contentions that remedy the deficiencies identified with respect to claim 19 in Ground 6. *Id.* Accordingly, for the reasons discussed above with respect to Ground 6, we conclude that Petitioner has not demonstrated a reasonable likelihood of prevailing in showing that claim 20 would have been obvious over the combined teachings of Lipsker and Crump.

I. Ground 7: Asserted Obviousness over Lipsker and Ma

Petitioner contends that claim 14 would have been obvious over the combined teachings of Lipsker and Ma.⁹ Pet. 92–95. Petitioner relies on its arguments with respect to the combination of Ma and Lipsker in Ground 2 in its contentions regarding the motivation to combine Lipsker and Ma. *Id.* at 92. Petitioner does not provide additional contentions that remedy the deficiencies in the motivation to combine Ma and Lipsker. *Id.* Accordingly, for the reasons discussed above with respect to the combination of Ma and Lipsker in Ground 2, we determine that Petitioner has not demonstrated a reasonable likelihood of prevailing in showing that claim 14 would have been obvious over the combined teachings of Lipsker and Ma.

J. Ground 8: Asserted Obviousness over Wohrl

Petitioner contends that claim 18 would have been obvious over the teachings of Wohrl. Pet. 100–103.

⁹ The references asserted in this ground are the same as those set forth in Ground 2. The Decision addresses the grounds separately because that is how they are presented in the Petition. *See, e.g., Global Shade Corp.*, IPR2021-00365, Paper 36 at 56 (PTAB July 25, 2022) (noting that one ground “merely duplicates” another “but reverses the order of the references,” which is “irrelevant”); *Stanley Black & Decker, Inc. v. Zircon Corp.*, Paper 10 at 5 n.5 (PTAB Apr. 19, 2021) (addressing sets of references together as single grounds); *Cardiovascular Sys., Inc. v. Cardio Flow, Inc.*, IPR2018-01549, Paper 11 at 5 n.10 (PTAB Feb. 26, 2019) (same); *In re Bush*, 49 C.C.P.A. 752, 296 F.2d 491, 496 (CCPA 1961) (“[W]here a rejection is predicated on two references each containing pertinent disclosure which has been pointed out to the applicant, we deem it to be of no significance, but merely a matter of exposition, that the rejection is stated to be on A in view of B instead of on B in view of A, or to term one reference primary and the other secondary.”).

1. Overview of Wohrl

Wohrl relates to the “manufacture of a three-dimensionally twisted airfoil of a rotor blade.” Ex. 1010, code (57). Wohrl explains that technical problems are encountered “in the manufacture of fibre-reinforced components of complex shapes with three-dimensionally twisted surfaces, especially if these take a partially concave form and if the requirements are for different strength and vibration properties in different directions,” and “[c]onventional manufacture of these components is associated with considerable effort involving high manufacturing costs.” *Id.* at 1:18–23, 2:1–3. Wohrl seeks “to enable the manufacture of” such fiber-reinforced components “by a simple and rapid method that permits selective manipulation of component properties by selective routing of the fibres and more particularly so as to permit ready application of fibres also to concave surfaces.” *Id.* at 2:10–16.

Wohrl describes a method “wherein fibre strands wetted with a resin matrix are pressed against the core[,] for example, by means of a nip roller, and the resin matrix precured immediately thereafter.” Ex. 1010, 2:17–24. Wohrl teaches that “[f]ibres can be applied in a simple manner, in each and every direction and on any shape of airfoil surface and so that they will then adhere and not subsequently become dislodged.” *Id.* at 2:27–3:2. According to Wohrl, after the fibers have precured, they will adhere to concave surfaces and therefore “can be laid rapidly and accurately in position.” *Id.* at 3:2–4.

Wohrl's Figure 1 is reproduced below.

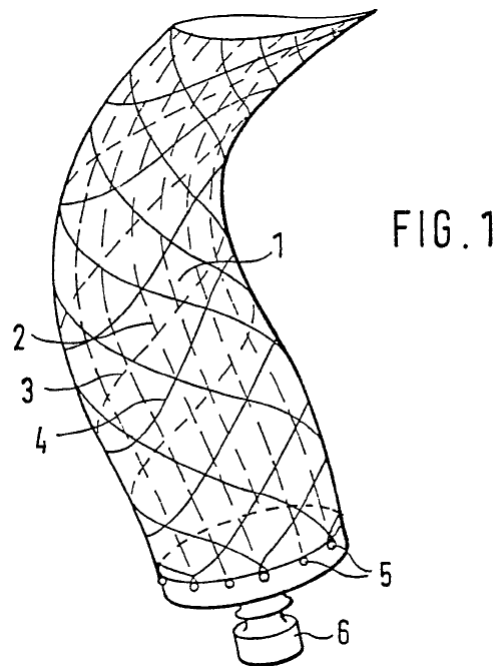


Figure 1 is a perspective view of airfoil 1 of a rotor blade. Ex. 1010, 4:7, 4:12–13. Tensile direction 2 and diagonal layers 3 and 4 illustrate the preferred directions of the fibers to be deposited. *Id.* at 4:13–15. “The fibres are preferably looped around attaching nipples 5 on a blade root 6, so as to ensure a satisfactory union between the two components and for good transfer to the blade root 6 of the tensile force arising in operation.” *Id.* at 4:15–19.

Wohrl's Figure 2 is reproduced below.

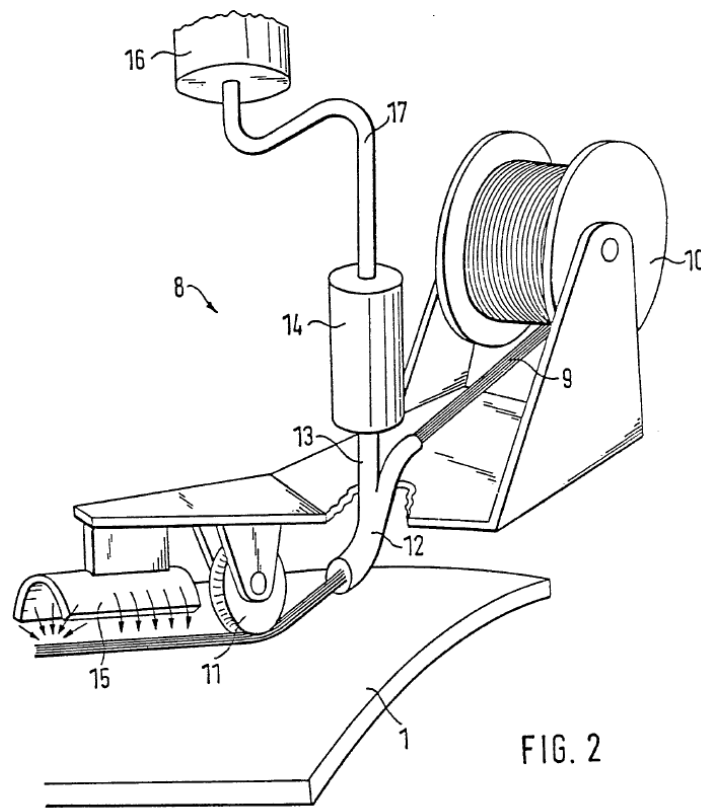


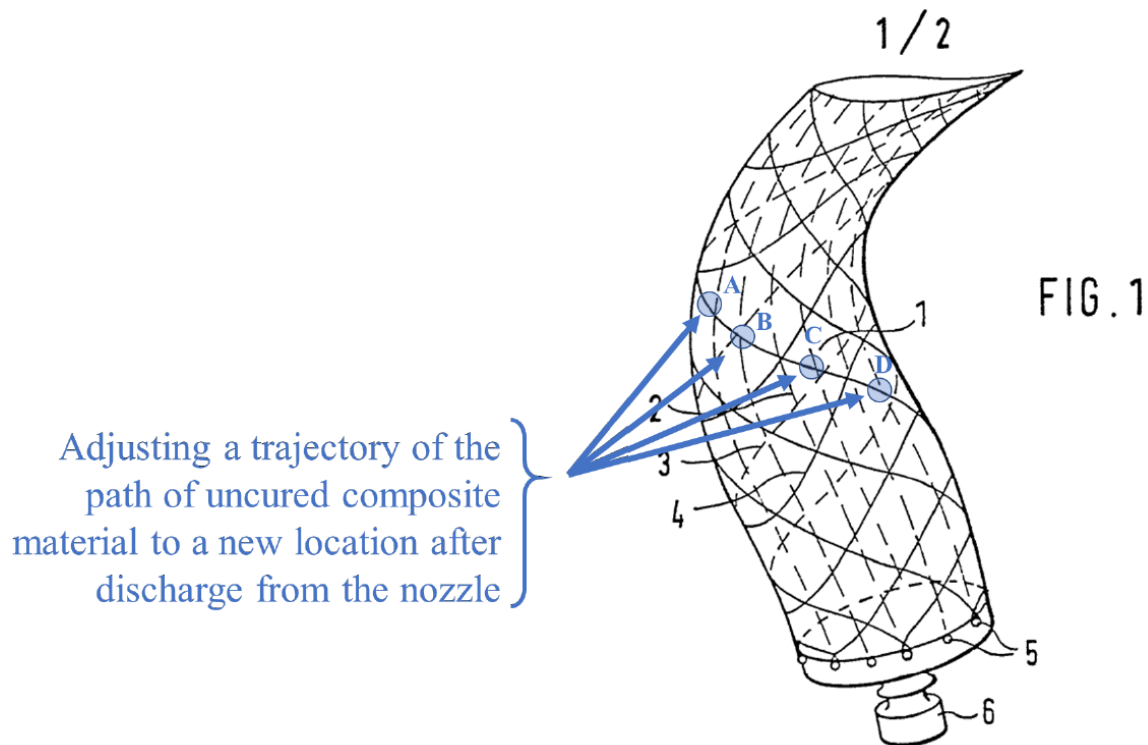
Figure 2 is a perspective view of a fiber laying device described in Wohrl. Ex. 1010, 4:8–9. Fiber laying device 8 includes fiber drum 10, fiber feed duct 12 leading to fiber nip roll 11, and precuring facility 15. *Id.* at 4:20–23. Fiber strand 9, unwound from fiber drum 10, is pulled by nip roll 11 through fiber feed duct 12. *Id.* at 4:23–25. Matrix material is supplied from storage container 16 to matrix unit 14 through flexible feed line 17. *Id.* at 4:27–5:1. The matrix material is then fed into feed duct 12 in defined quantities from matrix metering unit 14 through feed duct 13. *Id.* at 4:25–27. The wetted fibers are laid on to the component in the desired track under fiber nip roll 11 and precured by precuring device 15, which causes the surface to dry and stick. *Id.* at 5:3–7. Wohrl explains that, “[i]n this manner, the fibre is fixed to a point where it can be laid on to radiused tracks,” and “further fibre

layers can be deposited in any desired orientation over the precured fibres.”
Id. at 5:7–10.

Wohrl teaches that fiber laying device 8 “is connected to the ‘wrist’ of a six-axis portal robot 7 and can thus—under computer control—deposit the fibres strand 9 on the component core fully automatically along precalculated tracks.” Ex. 1010, 5:11–16. According to Wohrl, “[t]his makes for very accurate reproducibility (<0.2 mm) of the fibre laying process.” *Id.* at 5:16–17.

2. *Analysis*

Petitioner contends that Wohrl teaches or suggests all the limitations of independent claim 18. Pet. 100–103. For example, Petitioner contends that a POSITA would have understood that Wohrl’s Figure 1 discloses “adjusting a trajectory of the path of uncured composite material to a new location after discharge from the nozzle.” Pet. 101–102. Petitioner provides an annotated version of Wohrl’s Figure 1, reproduced below, to illustrate its contentions.



Annotated Figure 1 depicts a perspective view of airfoil 1, with Petitioner's addition of arrows pointing to four blue circles labeled A, B, C, and D,¹⁰ wherein the arrows originate from Petitioner's addition of the phrase "Adjusting a trajectory of the path of uncured composite material to a new location after discharge from the nozzle." Pet. 102 (citing Ex. 1010, Figure 1); Ex. 1010, 4:7, 4:12–13. Petitioner contends that "[a] POSITA would have understood that the recited 'new location' corresponds to an anchor point on which the resin-impregnated fibre path is going to be anchored." Pet. 101. Referring to annotated Figure 1, Petitioner contends that "each anchor point may coincide with the approximate location where the curvature of the path changes, *see* points A-D." *Id.* Therefore, according to Petitioner, "it is understood that the trajectory of the resin-

¹⁰ The unannotated version of Figure 1 in Wohrl does not include points A–D. Ex. 1010, Fig. 1.

impregnated fibre path (‘the path of uncured composite material’) is adjusted from point A to point B (first ‘new location’), from point B to point C (the second ‘new location’), etc.” *Id.* 102 (citing Ex. 1002 ¶ 414).

We are not persuaded that Petitioner sufficiently establishes that Wohrl teaches or suggests “adjusting a trajectory of the path of uncured composite material to a new location after discharge from the nozzle.” Petitioner’s contentions rely on Petitioner’s identification of points A–D on Figure 1, but Petitioner does not adequately explain why points B, C, and D are “new locations” as recited in claim 18, or why Petitioner chose to place points A–D in those locations. Pet. 101–102. Petitioner merely states that “the recited ‘new location’ corresponds to an anchor point on which the resin-impregnated fibre path is going to be anchored.” *Id.* at 101. To the extent we understand it, Petitioner appears to be arguing that the “new location” recited in claim 18 is the same as the “anchor” recited in claim 13. As set forth above (Section II.H.1), the ’798 patent disclosures indicate that an anchor is a contact point to which the fiber is affixed and that serves as an origin point for the formation of the path and provides support for the part during manufacturing.

Petitioner does not point us to any disclosure in Wohrl of affixing the fiber to a contact point that serves as the origin point for path formation. Wohrl describes wrapping a core by pressing the path against the core using a nip roller, and then precuring so that the matrix material “gel[s] to a point where the fibre is cemented in place before the fibre matrix mixture still is fully cured.” Ex. 1010, 2:17–26, 3:7–10. Wohrl teaches that this precuring allows the fibers to adhere to concave surfaces “so they can be laid rapidly and accurately in position.” *Id.* at 3:3–5; *see also id.* at 5:3–7 (“Having been wetted in this manner the fibres are accurately laid on to the component in

the desired track under the fibre nip roll 11 and are precured (gelled) by means of the precuring device 15, causing the surface to dry and stick.”). In light of these disclosures in Wohrl, Petitioner does not adequately explain why a POSITA would have understood that using a nip roller to press the path onto the core, then precuring the path as it is laid, creates an anchor as the ’798 patent teaches. Nor does Petitioner sufficiently address why a POSITA would have understood Wohrl to be teaching the use of an anchor when Wohrl uses a core to support the formation of the part. Moreover, Dr. Rosen’s declaration testimony on this point is entitled to little to no weight as it merely parrots the Petition. *Compare* Pet. 101–102, *with* Ex. 1002 ¶¶ 414–416; *see* 37 C.F.R. § 42.65(a).

Consequently, we conclude that Petitioner does not sufficiently establish that Wohrl teaches “adjusting a trajectory of the path of uncured composite material to a new location after discharge from the nozzle” as recited in claim 18, and we determine that Petitioner does not demonstrate a reasonable likelihood of prevailing in showing that the subject matter of claim 18 would have been obvious over Wohrl.

K. Ground 9: Asserted Obviousness over Wohrl and Lipsker

Petitioner contends that claim 17 would have been obvious over the combined teachings of Wohrl and Lipsker. Pet. 103–106.

1. Motivation to Combine Wohrl and Lipsker

Petitioner contends that “[a] POSITA would have realized that Wohrl’s filament winding process is the precursor of the RP processes that emerged a decade later” and “exhibits striking similarities with recently developed RP processes.” Pet. 103 (emphasis omitted). In particular, Petitioner asserts that Wohrl’s filament winding process is fully automated/computerized, can be used to fabricate 3D objects from fiber

reinforced composite material, and features independent mechanisms for feeding liquid adhesive material and fiber into a nozzle and combine them to form a composite material. *Id.* (citing Ex. 1002 ¶ 432). Nevertheless, Petitioner contends, “it would be in a POSITA’s best interest to explore more recent RP processes” such as “Lipsker, which shares Wohrl’s fundamental teachings and principles.” *Id.* at 104. Petitioner further contends that Lipsker “benefits from advances in automation, equipment, and material selection,” and “a POSITA eager to improve and modernize Wohrl’s concepts, would be highly motivated to look into Lipsker to take advantage of Lipsker’s teachings.” *Id.* (citing Ex. 1002 ¶ 433) (emphasis omitted).

This sort of alleged motivation to combine is insufficient because it “fails to explain why a person of ordinary skill in the art would have combined elements from specific references *in the way the claimed invention does.*” *ActiveVideo Networks, Inc. v. Verizon Commc’ns, Inc.*, 694 F.3d 1312, 1328 (Fed. Cir. 2012) (discussing expert trial testimony which was “generic and [bore] no relation to any specific combination of prior art elements”). Petitioner neither identifies the alleged advances “in automation, equipment, and material selection” in Lipsker a POSITA would have taken advantage of to “improve and modernize” Wohrl, nor explains with sufficient specificity the manner in which a POSITA would have combined Lipsker’s teachings with Wohrl’s method to meet all the elements of the challenged claims.

Petitioner also contends that “because the processes disclosed by Wohrl and Lipsker are closely related, a POSITA would have the expectation that the combination would yield predictable results.” Pet. 104 (citing Ex. 1002 ¶ 434). This, too, does not suffice as an articulated reason

with rational underpinning to combine the respective teachings of Wohrl and Lipsker. That Wohrl's and Lipsker's processes are "closely related" says nothing about the relevant teachings of Wohrl or Lipsker, or how Lipsker would be used to improve Wohrl in order to meet all of the elements of the challenged claims. Instead, Petitioner appears to be arguing that a POSITA could have combined unspecified teachings of Lipsker in unspecified ways to improve Wohrl's method. However, "obviousness concerns whether a skilled artisan not only *could have made* but *would have been motivated to make* the combinations or modifications of [the] prior art to arrive at the claimed invention." *Belden Inc. v. Berk-Tek LLC*, 805 F.3d 1064, 1073 (Fed. Cir. 2015); *see also In re Giannelli*, 739 F.3d 1375, 1380 (Fed. Cir. 2014) ("[T]he mere *capability* of pulling the handles is not the inquiry that the Board should have made; it should have determined whether it would have been obvious to modify the prior art apparatus to arrive at the claimed rowing machine.").

Accordingly, the Petition lacks an adequate explanation as to why a skilled artisan reading Wohrl would have looked specifically to Lipsker for its particular teachings, and how a skilled artisan would have combined the teachings of Wohrl and Lipsker in the manner claimed. Therefore, we are not persuaded that Petitioner has made a sufficient showing that a POSITA would have combined the teachings of Wohrl and Lipsker as proposed. *See Johns Manville Corp.*, IPR2018-00827, Paper 9.

For these reasons, we conclude that Petitioner does not demonstrate a reasonable likelihood of prevailing in showing that claim 17 would have been obvious over the combined teachings of Wohrl and Lipsker.

L. Ground 10: Asserted Obviousness over Wohrl and Ma

Petitioner contends that claim 14 would have been obvious over the combined teachings of Wohrl and Ma. Pet. 106–109.

1. Motivation to Combine Wohrl and Ma

Petitioner contends that “[a] POSITA would have realized that Wohrl’s filament winding process is the precursor of the RP processes that emerged a decade later,” and it would have been in the POSITA’s “best interest to explore more recent studies on RP” such as Ma. Pet. 106–107 (citing Ex. 1002 ¶ 450) (emphasis omitted). Petitioner contends that “Ma carefully reviews the material selection and studies how equipment can impact the dispensing mechanism in RP processes that use fiber reinforced materials,” and “[a] POSITA eager to improve and modernize Wohrl’s concepts, would be highly motivated to look into Ma to take advantage of Ma’s teachings.” *Id.* at 107 (citing Ex. 1002 ¶ 451) (emphasis omitted).

This sort of alleged motivation to combine is insufficient because it “fails to explain why a person of ordinary skill in the art would have combined elements from specific references *in the way the claimed invention does.*” *ActiveVideo Networks*, 694 F.3d at 1328. Petitioner provides little more than a conclusory assertion that Ma contains teachings that are relevant, and would be advantageous, to Wohrl’s process, without identifying those teachings or explaining why a POSITA reading Wohrl would have looked to Ma for those teachings. Such conclusory statements fall short of providing the requisite rationale sufficient to support a conclusion of obviousness. *In re Kahn*, 441 F.3d at 988.

Moreover, that Wohrl and Ma both describe RP processes is not sufficient, by itself, to support a conclusion of obviousness. *See KSR*, 550 U.S. at 418. The Federal Circuit has said that merely asserting that two

references are drawn from the same field of art is “simply too conclusory” to show that the skilled artisan would have combined the references in the way of the claimed invention, because “[s]uch short-cut logic would lead to the conclusion that any and all combinations of elements known in this broad field would automatically be obvious, without the need for any further analysis.” *Securus Techs.*, 701 F. App’x at 976; *see Microsoft*, 662 F. App’x at 990.

Finally, Petitioner contends that “because the processes disclosed by Wohrl and Ma are closely related, a POSITA would have the expectation that the combination would yield predictable results.” Pet. 107 (citing Ex. 1002 ¶ 452). This, too, does not suffice as an articulated reason with rational underpinning to combine the respective teachings of Wohrl and Ma. That Wohrl’s and Ma’s processes are “closely related” says nothing about the relevant teachings of Wohrl or Ma, or how Ma would be used to improve Wohrl in order to meet all of the elements of the challenged claims. Instead, Petitioner appears to be arguing that a POSITA could have combined unspecified teachings of Ma in unspecified ways to improve Wohrl’s method. However, “obviousness concerns whether a skilled artisan not only *could have made* but *would have been motivated to make* the combinations or modifications of [the] prior art to arrive at the claimed invention.” *Belden*, 805 F.3d at 1073; *see In re Giannelli*, 739 F.3d at 1380.

It is Petitioner’s burden to provide an articulated reason with some rational underpinning to combine known elements from the cited art in the fashion claimed in order to support a conclusion of obviousness. *See KSR*, 550 U.S. at 418. Here, the Petition lacks an adequate explanation as to why a skilled artisan reading Wohrl would have looked specifically to Ma for its

particular teachings, and how a skilled artisan would have combined the teachings of Wohrl and Ma in the manner claimed.

For these reasons, we are not persuaded that Petitioner has made a sufficient showing that a POSITA would have combined the teachings of Wohrl and Ma as proposed. *See Johns Manville*, IPR2018-00827, Paper 9. Accordingly, we conclude that Petitioner has not demonstrated a reasonable likelihood of prevailing in showing that claim 14 would have been obvious over the combined teachings of Wohrl and Ma.

III. CONCLUSION

Based on the arguments in the Petition and the Preliminary Response, and the evidence of record, we determine that Petitioner has not established a reasonable likelihood that it would prevail on its challenge that claims 13, 14, and 17–20 of the '798 patent are unpatentable.

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that the Petition is *denied* and no trial is instituted.

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