

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

NEENAH, INC.,
Petitioner,

v.

JODI A. SCHWENDIMANN,
Patent Owner.

IPR2020-00634
Patent 7,749,581 B2

Before JEFFREY W. ABRAHAM, MICHELLE N. ANKENBRAND, and
AVELYN M. ROSS, *Administrative Patent Judges*.

ROSS, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining All Challenged Claims Unpatentable
35 U.S.C. § 318(a)

Denying in Part, Dismissing in Part
Patent Owner's Motion to Strike

I. INTRODUCTION

Neenah, Inc. (“Petitioner”)¹ filed a Petition (Paper 2, “Pet.”) requesting *inter partes* review of claims 1–6, 8–21, and 24–31 of U.S. Patent No. 7,749,581 B2 (Ex. 1003, “the ’581 patent”). Pet. 1. Jodi A. Schwendimann (“Patent Owner”) filed a Preliminary Response (Paper 11, “Prelim. Resp.”).

Upon consideration of the Petition, Preliminary Response, and the parties’ evidence, we determined that Petitioner had demonstrated a reasonable likelihood that it would prevail with respect to at least one claim of the ’581 patent. Paper 13 (“Decision on Institution” or “DI”). Thus, pursuant to the Supreme Court’s decision in *SAS Institute Inc. v. Iancu*, 138 S. Ct. 1348, 1355 (2018), and the USPTO Guidance,² we instituted review of all challenged claims on all challenged grounds. *Id.*

Following institution of trial, Patent Owner filed a Patent Owner Response (Paper 17, “PO Resp.”), Petitioner filed a Reply (Paper 22, “Pet. Reply”), and Patent Owner filed a Sur-reply (Paper 27, “Sur-reply”). In support of their respective positions, Petitioner relies on the testimony of Dr. Robert A. Wanat (Ex. 1020, “Wanat Decl.”; Ex. 1062, “Wanat Reply Decl.”), and Patent Owner relies on the testimony of Dr. Scott Williams (Ex. 2001, “Williams Decl.”) and the Declaration of Dr. Christopher Ellison (Ex. 2011, “Ellison Decl.”).

¹ Petitioner identifies Neenah, Inc., Avery Products Corporation, and Stahls’ Inc. as real parties-in-interest. Pet. 1.

² In accordance with USPTO Guidance, “if the PTAB institutes a trial, the PTAB will institute on all challenges raised in the petition.” *See* USPTO, Guidance on the Impact of SAS on AIA Trial Proceedings (April 26, 2018) (available at <https://www.uspto.gov/patents-application-process/patent-trial-and-appeal-board/trials/guidance-impact-sas-aia-trial>) (“USPTO Guidance”).

We held an oral hearing on July 12, 2021, and a transcript of the hearing is included in the record (Paper 38, “Tr.”).

We have jurisdiction under 35 U.S.C. § 6. This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons discussed below, we determine that Petitioner has shown by a preponderance of the evidence that claims 1–6, 8–21, and 24–31 of the ’581 patent are unpatentable. We also deny in part and dismiss in part Patent Owner’s Motion to Strike (Paper 29, “Motion”).

A. Related Proceedings

Petitioner identifies the pending lawsuit between the parties, styled *Jodi A. Schwendimann v. Neenah, Inc.*, Case No. 1:19-cv-00361-LPS (D. Del.) (the “Delaware Lawsuit”), as a related proceeding in which Patent Owner asserts the ’581 patent. Pet. 1; *see also* Paper 12, 2 (Patent Owner’s Mandatory Notices). The ’581 patent is the subject of separate IPRs: *Stahls’ Inc. v. Jodi A. Schwendimann*, IPR2020-00644 and *Stahls’ Inc. v. Jodi A. Schwendimann*, IPR2020-00645. Paper 12, 2; *see* Paper 12, 2.

Petitioner also filed petitions against U.S. Patent No. RE41,623, U.S. Patent No. 7,754,042, U.S. Patent No. 7,771,554, and U.S. Patent No. 7,766,475. Pet. 1–2; Paper 12, 2. We instituted *inter partes* review in IPR2020-00644 but declined to institute IPR2020-00645. *See* IPR2020-00644, Paper 10; IPR2020-00645, Paper 10. We also instituted *inter partes* review of RE41,623, U.S. Patent No. 7,754,042, and U.S. Patent No. 7,766,475 but declined to institute *inter partes* review of U.S. Patent No. 7,771,554. *See* IPR2020-00628, Paper 10; IPR2020-00641, Paper 11; IPR2020-00629, Paper 10; IPR2020-00635, Paper 10; IPR2020-00915, Paper 9; IPR2020-00636, Paper 10; IPR2020-01121, Paper 8.

The ’581 patent is also asserted in the following pending litigations:

Jodi A. Schwendimann v. Stahls', Inc., Case No. 2:19-cv-10525-LVP-MKM (E.D. Mich.); and

Jodi A. Schwendimann v. Siser North America, Inc., Case No. 1:19-cv-00362-LPS (D. Del.)

Pet. 2; Paper 12, 2. The '581 patent was asserted in *Jodi A. Schwendimann v. Arkwright Advanced Coating, Inc. et al.*, Case No. 0:11-cv-00820-JRT-HB (D. Minn.) (the "Arkwright Lawsuit"). Pet. 2, 10.

B. The '581 Patent (Ex. 1003)

The '581 patent, titled "Image Transfer on a Colored Base," issued on July 6, 2010. Ex. 1003, codes (45), (54). The '581 patent is directed to "transferring an image onto a colored base and to an article comprising a dark base and an image with a light background on the base." *Id.* at 1:17–19.

The '581 patent explains that conventional image transfer processes use two-steps: applying a white or light background polymeric material to a colored base with heat and then using another sheet to impart an image to the substantially white polymeric material. *Id.* at 3:37–50. According to the '581 patent, the conventional two-step process required careful alignment of an image with the white background, was "exceedingly time-consuming," and produced significant waste of base and image transfer materials. *Id.* at 3:51–57.

An exemplary image transfer process of the '581 patent is depicted below in Figure 1.

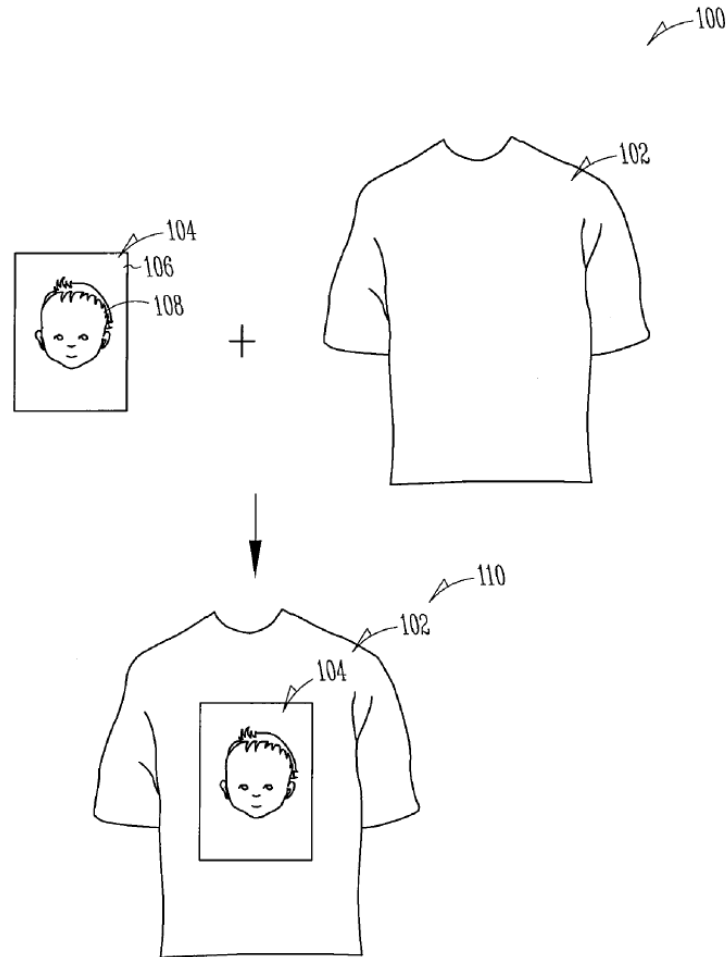


Fig. 1

Figure 1 “illustrates a schematic view of one process of image transfer onto a colored product.” *Id.* at 2:31–32. Figure 1 depicts colored base material 102 (e.g., a colored textile), image 104 including substantially white background 106, and indicia 108 disposed on the substantially white background 106. *Id.* at 3:10–21. The ’581 patent states that image 104 is applied to colored base material 102 with heat to make completed article 110 in a single step. *Id.*

An embodiment of an image transfer device is depicted below in Figure 5.

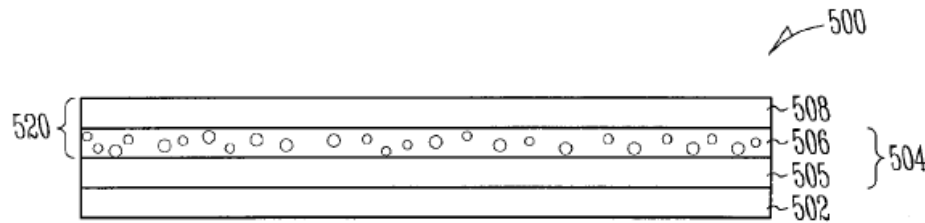


Fig. 5

Figure 5 illustrates “a cross-sectional view of one other embodiment of the image transfer device of the present invention.” *Id.* at 2:41–42. The ’581 patent describes “an image transfer sheet 500 that is comprised of a substrate layer 502 [and] a release layer 504 comprising a silicone coating 505 and a white layer 506.” *Id.* at 8:44–47. Figure 5 also depicts white layer 506 and receiving layer 508 as part of peel layer 520. *See id.* at 8:54–57, 9:1–3.

The ’581 patent describes the white layer as imparting “a white background on a dark substrate.” *Id.* at 3:35–36. According to one embodiment, “the white layer 506 of the image transfer sheet 500 is impregnated with titanium oxide or other white or luminescent pigment.”³ *Id.* at 8:51–54. In another embodiment, “the white layer 506 and a receiving layer 508, contacting the white layer 506 are impregnated with titanium oxide or other white or luminescent pigment.” *Id.* at 8:54–57. According to the ’581 patent:

[f]or some embodiments, a white layer 506, 606, such as is shown in FIGS. 5-6, includes ethylene/methacrylic acid (E/MAA), with an acid content of 0-30%, and a melt index from 10 to 3500 with a melt index range of 20 to 2300 for some embodiments. A low density polyethylene with a melt index higher than 200 is also suitable for use. Other embodiments of

³ “Titanium oxide,” “titanium dioxide,” and “TiO₂” are synonymous, and used interchangeably in the prior art, the parties’ papers, and in this Decision.

the white layer include ethylene vinyl acetate copolymer resin, EVA, with vinyl acetate percentages up to 50%/EVA are modifiable with an additive such as DuPont Elvax, manufactured by DuPont de Nemours of Wilmington, Del. These resins have a Vicat softening point of about 40 degrees to 220 degrees C., with a range of 40 degrees to 149 degrees C. usable for some embodiments.

Id. at 6:6–18.

Referring once again to the embodiment of Figure 5, the '581 patent describes an image transfer process. Specifically, the '581 patent discloses that “an image is imparted to the polymer component of the peel layer 520 utilizing a top coat image-imparting material such as ink or toner.” *Id.* at 9:1–3. The '581 patent explains that “[t]he image transfer sheet 500 is applied to the colored base material so that the polymeric component of the peel layer 520 contacts the colored base” and a source of heat is applied to the image transfer sheet 500. *Id.* at 9:11–19. Thus, “[t]he peel layer 520 transfers the image” and “[t]he application of heat to the transfer sheet 500 results in ink or other image-imparting media within the polymeric component of the peel layer being changed in form to particles encapsulated by the polymeric substrate.” *Id.* at 9:19–25. As a result, “[t]he encapsulated ink particles or encapsulated toner particles and encapsulated titanium oxide particles are then transferred to the colored base in a mirror image to the ink image or toner image on the polymeric component of the peel layer 520.” *Id.* at 9:28–32. The '581 patent further explains:

Because the polymeric component of the peel layer 520 generally has a high melting point, the application of heat, such as from an iron, does not result in melting of this layer or in a significant change in viscosity of the overall peel layer 520. The change in viscosity is confined to the polymeric component that actually contacts the ink or toner or is immediately adjacent to the ink or toner. As a consequence, a mixture of the polymeric component,

titanium oxide or other white or luminescent pigment, and ink or toner is transferred to the colored base as an encapsulate whereby the polymeric component encapsulates the ink or toner or titanium oxide or other white pigment. It is believed that the image transfer sheet, with the white titanium oxide or other white or luminescent pigment background is uniquely capable of both cold peel and hot peel with a very good performance for both types of peels.

Id. at 9:33–48.

C. Illustrative Claims

Petitioner challenges claims 1–6, 8–21, and 24–31 of the '581 patent. Of the challenged claims, claims 1, 17, 24, 27, 30, and 31 are independent. Claims 1 and 17 are illustrative and are reproduced below.

1. An image transfer article, comprising:

an image-imparting member, including at least one surface configured to receive and carry indicia to be transferred and including at least one portion comprising a concentration or configuration of pigment providing an opaque background for received indicia, the opaque background having a substantially non-transparent effect allowing the received indicia to be visible when transferred to a dark-colored base; and

a removable substrate disposed adjacent, and underlaying, the image-imparting member, the removable substrate including a coating comprising at least one of silicone, clay, resin, fluorocarbon, urethane, or an acrylic base polymer.

Ex. 1003, 11:35–48.

17. An image transfer article, comprising:

an indicia-receptive layer including at least one surface configured to receive and carry transferable indicia;

a removable substrate including a release coating; and

a white layer disposed between the indicia-receptive layer and the release coating, the white layer including a white or luminescent pigment providing a substantially opaque, non-

transparent background for received indicia and concurrently transferable with received indicia upon, and following, application of heat.

Id. at 12:41–51.

D. Prior Art and Asserted Grounds of Unpatentability

We instituted trial to determine whether claims 1–6, 8–21, and 24–31 of the ’581 patent would have been obvious in view of the following asserted grounds of unpatentability:

Claims Challenged	35 U.S.C. § ⁴	References/Basis
1–6, 8–21, 24–26	103	Oez-US, ⁵ Meyer ⁶
18, 27–31	103	Oez-US, Meyer, Kronzer ⁷
1–6, 8–21, 24–31	103	Oez-PCT, ⁸ Oez-US
1–6, 8–21, 24–31	103	Kronzer, Oez-US

DI 8, 39 (instituting review on all asserted grounds).

⁴ The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284, 287–88 (2011), amended 35 U.S.C. § 103, effective March 16, 2013. Because the application from which the ’581 patent issued was filed before this date, the pre-AIA version of § 103 applies.

⁵ Oez, US 5,665,476, issued September 9, 1997 (Ex. 1013, “Oez-US”).

⁶ Meyer et al., US 3,359,127, issued December 19, 1967 (Ex. 1019, “Meyer”).

⁷ Kronzer, US 5,798,179, issued August 25, 1998 (Ex. 1018, “Kronzer”). In its Grounds of Unpatentability, Petitioner identifies DeVries, as opposed to Kronzer, as applicable for its challenge to claims 18 and 27–31. *See* Pet. 4. However, in setting forth its arguments regarding claims 18 and 27–31, Petitioner relies on Kronzer. *See id.* at 44–51. Therefore, we understand Petitioner to advance the combination of Oez-US, Meyer, and *Kronzer*.

⁸ Oez, WO 97/41489, published November 6, 1997 (Ex. 1016, “Oez-PCT”). References to Oez-PCT will be to Exhibit 1016, which is an English-language translation of Oez-PCT with line numbers. Pet. 4.

II. ANALYSIS

A. Legal Standards

To prevail in its challenge, a Petitioner must demonstrate by a preponderance of the evidence that the claims are unpatentable. 35 U.S.C. § 316(e); 37 C.F.R. § 42.1(d) (2019). A claim is unpatentable under 35 U.S.C. § 103(a) if “the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art” to which said subject matter pertains. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) objective evidence of nonobviousness.⁹ *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

B. Level of Ordinary Skill in the Art

In the Decision on Institution, we determined that a person of ordinary skill in the art at the time of the invention of the ’581 patent

would have at least a Bachelor’s degree in Chemistry, Chemical Engineering, Imaging Technology or Material Science with at least one year of experience in coating technologies and imaging technologies, or at least five years of work experience in the field of coating technologies and imaging technologies.

DI 11–12 (adopting Patent Owner’s proposed definition); *see* Prelim.

Resp. 12.

⁹ The parties have not asserted or otherwise directed our attention to any objective evidence of nonobviousness.

For purposes of this Final Written Decision, we maintain our determination from the Decision on Institution because neither party disputes that determination and because that level of skill is consistent with the record. *See* PO Resp. 17; *see generally* Pet. Reply.

C. Claim Construction

In an *inter partes* review filed on or after November 13, 2018, we construe claims “using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. 282(b), including construing the claim in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent.” 37 C.F.R.

§ 42.100(b) (2019); *see Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). Furthermore, we expressly construe the claims only to the extent necessary to resolve the parties’ dispute. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co. Ltd.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (“[W]e need only construe terms ‘that are in controversy, and only to the extent necessary to resolve the controversy.’” (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

In the Decision on Institution, we construed the term “white layer” to mean “a layer comprising a concentration or configuration of pigment providing a white background for received indicia and which further comprises a polymer that melts and mixes with another layer or layers during application.” DI 13–14. Our construction was based on the parties’ agreement that the claims of the ’581 patent require a white layer that melts and mixes with another layer and the the claim construction the district court in the Arkwright Lawsuit adopted. Ex. 1022, 17 (Arkwright Markman Order”). The district court in the Delaware Lawsuit also adopted a similar

construction of “white layer.” *See* Ex. 1066, 6 (Delaware Markman Order). In the Decision on Institution, we rejected Patent Owner’s attempt to broaden the interpretation adopted in the Arkwright Lawsuit to include “a polymer that softens or melts and mixes to some degree with another layer.” *Id.* (Patent Owner’s modifications indicated with underlining); Prelim. Resp. 13.

Patent Owner now requests that we adopt a construction of “white layer” that includes “a layer comprising a concentration or configuration of pigment providing a white background for received indicia and which further comprises a polymer that softens or melts, such that it mixes with another layer or layers during application, without the resulting composition needing to be substantially uniform.” PO Resp. 18 (Patent Owner’s modifications indicated with underlining).

Petitioner contends we should again reject Patent Owner’s attempt to rewrite the construction of “white layer,” because it is “completely at odds” with the constructions adopted by the district court in both the Arkwright and the Delaware Lawsuits, which requires actual melting, not just softening, and construes “mix” to have its plain and ordinary meaning. Reply 2 (citing Ex. 1066, 6).

We agree with Petitioner and decline to adopt Patent Owner’s newly offered construction for the same reasons expressed in our Decision on Institution and because that construction departs from the construction in the Arkwright Lawsuit and the Delaware Lawsuit. DI 13–14; Ex. 1022, 17; Ex. 1066, 6. We further note that Patent Owner states that “the parties’ disputes with respect to the construction of the ‘white layer’ make no difference to the Board’s resolution of this matter.” PO Resp. 19; Tr. 13:24–

14:3, 53:9–54:13. Accordingly, we maintain our construction of the term “white layer.”¹⁰

D. Obviousness over Kronzer and Oez-US (claims 1–6, 8–21, 24–31)

Petitioner contends claims 1–6, 8–21, and 24–31 are unpatentable as obvious over Kronzer and Oez-US. Pet. 66. Petitioner directs us to portions of Kronzer and Oez-US that purportedly disclose all the limitations in the challenged claims. *Id.* at 66–81. Petitioner also relies on the declaration testimony of Dr. Wanat to support its arguments. *See id.*; Pet. Reply 2–14.

1. Overview of Asserted Prior Art

a) Oez-US (Ex. 1013)

Oez-US “relates to a transfer paper and to a process for transferring photocopies to textiles, such as, in particular, T-shirts.” Ex. 1013, 1:6–8. Oez-US describes “a transfer paper which has, as the coating of plastic, at least: a polyurethane which can be cross-linked under the action of heat by a melamine-formaldehyde resin esterified with methanol, mixed with an acrylic acid ester/acrylic acid copolymer, the latter being a thickener.” *Id.* at 1:37–42. Oez-US states that it is of “essential importance that a white pigment (TiO₂) can be incorporated into the mixture so that the prior white coating of dark (black) textiles hitherto necessary can now be dispensed with and the print can be transferred immediately with a single film.” *Id.* at 1:51–55.

¹⁰ Although the term “white layer” is not expressly recited in each claim of the ’581 patent, both parties agree that all claims of the ’581 patent require a white layer that melts and mixes. *See, e.g.*, Pet. 21–24; Prelim. Resp. 13–14, 20–24, 28–29, 32–36, 37–38 (treating “white layer” and “opaque background” as synonymous).

Oez-US discloses that the coating “can be peeled off from the paper as a film and can be laid as a positive on the textile substrate to be ironed on and to bond with the textile fibers.” *Id.* at 1:47–49. Oez-US describes ironing the film onto a textile “at elevated temperatures.” *Id.* at 3:56–58.

b) Kronzer (Ex. 1018)

Kronzer relates to a printable heat transfer paper having cold release properties to permit the removal of the carrier or base sheet after the transfer sheet has cooled. Ex. 1018, Abstract, 2:25–30. According to Kronzer, the heat transfer paper includes a flexible first layer, or base sheet, that has “sufficient strength for handling, coating, sheeting, and other operations associated with its manufacture, and for removal after transferring an image.” *Id.* at 4:15–26. The heat transfer paper includes a second layer, or “release layer,” disposed on the base sheet and composed of a thermoplastic polymer having essentially no tack at transfer temperatures. *Id.* at 5:23–45. A third layer, which overlays the second layer, includes a thermoplastic polymer with a melting point from about 65° C to about 180° C. *Id.* at 5:46–48. According to Kronzer, “[t]he third layer functions as a transfer coating to improve the adhesion of subsequent layers in order to prevent premature delamination of the heat transfer material.” *Id.* at 5:48–51. A fourth layer overlays the third layer to provide a layer on which an image is placed by an ink jet printer. *Id.* at 7:3–6. The printable heat transfer material of Kronzer may further include a fifth layer, including a film-forming binder and located between the second and third layers, to improve adhesion and prevent delamination. *Id.* at 8:31–46. Additionally, Kronzer states that “any of the foregoing film layers may contain other materials, such as processing aids, release agents, pigments, deglossing agents, antifoam agents, and the

like,” because “use of these and similar materials is well known to those having ordinary skill in the art.” *Id.* at 8:47–51.

2. *Analysis of Claim 1*

Petitioner contends that the combination of Kronzer and Oez-US suggests the image transfer article of claim 1. Pet. 67–72. Petitioner argues that Kronzer describes “‘a heat transfer paper’ (*i.e.*, image transfer article) ‘for transferring designs, messages, and illustrations’ (*i.e.*, images) ‘on articles of clothing, such as T-shirts.’” *Id.* at 67–68 (citing Ex. 1018, 1:5–11, 9:1–18:6; Ex. 1020 ¶ 222). Petitioner asserts that “Kronzer teaches an image-imparting member/indicia-receptive layer . . . configured to receive and carry indicia to be transferred.” *Id.* at 68 (Ex. 1020 ¶ 223). Specifically, Petitioner alleges that Kronzer describes “a fourth layer may overlay the third layer in order to provide an ink jet printable heat transfer material [that] typically includes a film forming binder and a powdered thermoplastic polymer.” *Id.* (quoting Ex. 1018, 2:65–67, 7:3–9, 4:15–16).

Petitioner further argues that “[a]lthough Kronzer does not expressly disclose a pigment to provide an opaque background to allow indicia to be viewed when transferred to a dark fabric, this feature was extremely well-known as shown by Oez-US.” *Id.* In particular, Petitioner explains that “Oez-US expressly discloses a white layer to provide an opaque/non-transparent background for better image quality on dark/black fabrics.” *Id.* (citing Ex. 1013, 1:26–31). Petitioner contends that a person of ordinary skill in the art would have had reason to combine the teachings of Kronzer and Oez-US “to include the white pigment/layer of Oez-US into at least the third layer of Kronzer for the reasons explicitly stated in Oez-US, *i.e.*, to provide a contrasting opaque background for image transfers to dark/black fabrics.” *Id.* at 69 (citing Ex. 1013, 1:26–55; Ex. 1020 ¶ 224).

Petitioner additionally asserts that both “Kronzer and Oez-US further teach the ‘melt and mix’ requirement.” *Id.* at 71. Petitioner contends that Kronzer includes layers of thermoplastic polymers that melt between 65 °C and 180 °C. *Id.* (citing Ex. 1018, 2:35–67; Ex. 1020 ¶ 257). According to Petitioner, a person skilled in the art would have understood that the Kronzer/Oez-US transfer sheet would have been heated above 180 °C during application and, therefore, that the white layer and image-imparting layers “would necessarily melt and mix.” *Id.* at 71–72 (Ex. 1018, 2:35–67; Ex. 1020 ¶¶ 256–258).

Lastly, Petitioner asserts that Kronzer describes the removable substrate adjacent to and underlaying the image-imparting member that includes a coating as claimed by the ’581 patent. In particular, Petitioner explains that “Kronzer teaches ‘[t]he printable heat transfer material includes a flexible first layer [that] serves as a base sheet or backing [and] typically will be a film or a cellulosic nonwoven web.’” *Id.* at 69 (citing Ex. 1018, 4:15–20, 4:27–31). According to Petitioner, Kronzer also explains that the backing sheet, which can be easily removed after the image has been transferred to the fabric, may include an acrylic base polymer or clay. *Id.* at 69–70 (citing Ex. 1018, 4:6–14, 5:23–45, 9:49–50, 12:12–43, Tables VI–XIV).

Patent Owner does not challenge many of Petitioner’s allegations regarding the teachings of Kronzer and Oez-US. *See generally* PO Resp. Patent Owner contends that including the Oez-US white layer for Kronzer’s third layer would not result in “mixing and melting” as the claims require. PO Resp. 31. Patent Owner further contends that Petitioner has not demonstrated a reason to combine the Oez-US pigment with Kronzer’s structure or that such a combination would yield a reasonable expectation of

success. *Id.* at 36. Additionally, Patent Owner affirmatively asserts that because of the differences between Kronzer and Oez-US, a person of ordinary skill in the art would not have had a reason to combine their teachings to achieve the invention claimed by the '581 patent. *Id.* at 39. We have reviewed the information submitted by Petitioner and determine Petitioner's arguments and evidence are sufficient to show, by a preponderance of the evidence, that each limitation of claim 1 is suggested by the combination of Kronzer and Oez-US, except those disputed by Patent Owner. We address Patent Owner's arguments below.

a) Whether the combination of Kronzer and Oez-US discloses a "white layer that melts and mixes"

Patent Owner first contends that it is unclear whether Petitioner alleges that a person of ordinary skill in the art "would borrow (1) the entire, cross-linking, white **layer** from Oez; or (2) just the white **pigment** from Oez." PO Resp. 31. Patent Owner asserts that "[b]orrowing the entire white **layer** from Oez would not render obvious any asserted claim because all of the Challenged Claims require a 'white layer' that contains at least one polymer that 'melts and mixes with another layer or layer[s]' during application." *Id.* at 32. According to Patent Owner, "[t]his is because Oez uses a particular chemical reaction, which involves cross-linking polyurethanes through the use of a melamine formaldehyde . . . which results in a non-melting layer." *Id.* Patent Owner reasons that "Oez-US thus **teaches away** from a transfer sheet in which the 'white layer' mixes and melts with another layer [as] the purpose of Oez-US is to provide a coating **that does not melt and mix.**" *Id.* at 35. Patent Owner further alleges "[e]very expert that has addressed the issue has testified that, because the polyurethane in Oez is cross-linked under heat and pressure . . . the coating

with white pigment . . . does not melt and cannot mix with any other components or layers.” *Id.* at 33 (citing Ex. 2007, 112 (Dr. Macosko’s testimony from the Arkwright Lawsuit); Ex. 1020 ¶¶ 53, 118 (Dr. Wanat’s testimony that cross-linking is an “important factor that can prevent mixing” and that certain conditions such as cross-linking can prevent mixing). Patent Owner further contends that Dr. Wanat’s testimony that the Oez-US white layer would melt and mix is unsupported and conclusory. *Id.* at 33–35.

Petitioner replies that its allegations are based upon including the white pigment in Kronzer’s transfer sheet and not Oez-US’s entire white layer. Therefore, Petitioner urges that “[Patent Owner’s] assertions about substituting Oez’[s] entire layer into Kronzer’s sheet are inapposite.”

Pet. Reply 4.

As we explained in our Decision on Institution, Petitioner alleges that Kronzer describes a white layer that melts and mixes with other layers, when its polymeric third layer is modified to include the *white pigment* of Oez-US—not the entire cross-linked white layer of Oez-US. DI 33. Petitioner reaffirms our understanding in its Reply, stating that “the Petition demonstrates a [person of ordinary skill in the art] would have found it obvious, based on Oez-US’s teachings, to include a **white pigment** in Kronzer’s transfer sheet.” Pet. Reply 3–4 (emphasis in original) (describing Patent Owner’s argument as a red herring). Therefore, Patent Owner’s arguments are directed to a position that Petitioner does not advance and are unavailing.

Petitioner, instead, argues that although Kronzer does not expressly teach using a white pigment in its image transfer sheet, Kronzer expressly discloses that pigments may be used in any of its film layers. Pet. Reply 3; Ex. 1018, 8:46–50. Thus, the only teaching Oez-US provides is the specific

color of the pigment, that is, a white pigment or TiO_2 to provide a white background for image transfers to dark fabrics and textiles. Pet. 68–69; Pet. Reply 3; Ex. 1013, 1:46–54. Petitioner explains that because contacting layers of Kronzer’s polymers will necessarily mix together when heated to a temperature of 180°C , “the application of heat [to] the third/white layer and fourth/image imparting layer of Kronzer/Oez-US’s transfer sheet would necessarily melt and mix,” the layers. Pet. 71–72 (citing Ex. 1018, 2:35–67; Ex. 1020 ¶¶ 256–258). Dr. Wanat testifies that because of the similarities between the third and fourth layers, the polymers have “some degree of compatibility and will mix together when they are melted.” Ex. 1020 ¶ 258 (citing Ex. 1018, 6:52–55, 7:30–32). We credit Dr. Wanat’s unrebutted testimony. Accordingly, the preponderance of the evidence supports Petitioner’s assertion that the ordinarily skilled artisan would have understood that the combination of Kronzer and Oez-US would have resulted in a white layer that mixes and melts with another layer.

b) Whether Petitioner has established a reason to combine Kronzer and Oez-US

Patent Owner argues that Petitioner has failed to meet its burden of establishing that a person skilled in the art would have been motivated to combine Kronzer and Oez-US and that each of Petitioner’s three reasons to combine must fail. PO Resp. 36–38. Patent Owner contends that Petitioner’s first reason, i.e., that each reference teaches “printable multi-layered transfer structures having a removable substrate, release coating, and image-imparting layer,” is incorrect. *Id.* at 36. Patent Owner explains that “every example and every claim is Oez teaches a single coating of plastic, not a multi-layered transfer with a distinct ‘image-imparting layer.’” *Id.* at 36–37 (citing Ex. 1013 generally). Patent Owner additionally argues that

mere identity of subject matter between two references is insufficient to establish that the ordinarily skilled artisan would have had a reason to combine the teachings of those references. *Id.* at 37.

Petitioner asserts that Patent Owner’s allegation regarding Oez-US being limited to a single layer of plastic is “demonstrably false.” Pet. Reply 4. Petitioner explains that “Oez-US discloses and claims a multi-layered transfer sheet” and that “[Patent Owner’s] expert admitted as much during his deposition.” *Id.* at 5 (citing Ex. 1013, 2:36–44; Ex. 1063, 295:8–296:18).

We agree with Petitioner that Oez-US is not limited to a single layer coating and instead encompasses multi-layered designs. Here, Petitioner shows that that Oez-US, like Kronzer, describes multi-layered transfer structures. *See* Ex. 1013, 2:36–44 (describing a polymer layer *between* the paper and the polyurethane layer), claim 12 (same); *see also* Ex. 1063, 295:8–296:18 (Dr. Ellison’s testimony describing Oez-US as having a second, optional layer).

Furthermore, although we agree with Patent Owner that identity of subject matter is, alone, is insufficient to demonstrate that the ordinarily skilled artisan would have had reason to combine the teachings of Kronzer and Oez-US, Petitioner does not rely on identity of subject matter alone, as discussed in more detail below. Nevertheless, we consider Petitioner’s discussion relevant for purposes of demonstrating the references are analogous art, which is part of the obviousness analysis. *Wyers v. Master Lock Co.*, 616 F.3d 1231, 1238 (Fed. Cir. 2010); *see also In re Kahn*, 441 F.3d 977, 987–88 (Fed. Cir. 2006) (noting that the inquiry as to whether a person of ordinary skill in the art would have sought to combine the references “picks up where the analogous art test leaves off”).

Patent Owner next challenges Petitioner’s argument that Kronzer and Oez-US “share the common goal of improving image transfer characteristics” because “Kronzer and Oez-US actually solve fundamentally different problems using fundamentally different technologies.” PO Resp. 37. Patent Owner explains that Kronzer “solves the problem of creating an image transfer that has ‘cold release properties’” where, in contrast, Oez-US “solves the problem of printing in ‘positive,’ incorporating white pigment into ‘a coating of plastic,’ and the use of ‘black textiles.’” *Id.* at 37–38. Therefore, Patent Owner reasons that “the respective goals of the two inventions actually demonstrates why a [person of ordinary skill in the art] would **not** be motivated to combine the references.” *Id.* at 38. Similarly, Patent Owner contends that the fact that “Oez-US teaches that its transfer sheets ‘can be used particularly advantageously on dark (black) fabrics’” is not a reason to combine Oez-US with Kronzer. *Id.* (quoting Pet. 67 and citing Pet. 68–69). According to Patent Owner, “Petitioner does not argue that there is something lacking in Oez-US that would be improved by combining it with Kronzer or even that the combination of the two references would result in some new desirable feature.” *Id.* As a result, Patent Owner argues that Petitioner’s combination of Kronzer and Oez-US is improper hindsight. *Id.*

Petitioner maintains that “Kronzer and Oez-US are both directed to improving the image transfer quality of multi-layer transfer sheets.” Pet. Reply 5 (citing Pet. 66–67; Ex. 1020 ¶¶ 220–221; Ex. 1062 ¶¶ 11–12). Citing our Decision on Institution, Petitioner explains that “Kronzer does not limit its invention to light or dark textiles . . . and . . . [that] a [person of ordinary skill in the art] would have understood from Oez-US’s teachings that a ‘positive’ image would be printed on top of Kronzer’s layer in

conjunction with adding white pigment to provide an opaque background for the transferred image.” *Id.* (citing DI 34–35; Ex. 1020 ¶¶ 224–225; Ex. 1062 ¶¶ 7–14). Petitioner further explains that “[t]hese grounds do not propose to modify or improve anything in Oez-US. Rather, Petitioner demonstrated that it would be obvious to improve **Kronzer** by adding a white pigment, as taught by Oez-US.” Pet. Reply 6.

In weighing the evidence and arguments before us, we find Petitioner advances sufficient reasoning with rational underpinnings to explain why one of ordinary skill in the art would have had reason to combine Kronzer and Oez-US. Pet. 66–67. Petitioner relies on Oez-US’s express teaching that including a white pigment “ensures a greater brilliance of the image . . . especially for printing black textiles.” Ex. 1013, 1:29–31. Accordingly, Petitioner reasons that a person of ordinary skill in the art would have included the white pigment of Oez-US in the polymer layer of Kronzer “to provide a contrasting opaque background for image transfers to dark/black fabrics.” Pet. 69 (citing Ex. 1013, 1:26–31; Ex. 1020 ¶ 224).

Patent Owner’s arguments do not address Petitioner’s primary argument, as Patent Owner focuses on alleged differences in how Kronzer and Oez-US solve allegedly different problems, whereas Petitioner focuses on improving the quality of image transfer in general, which is the common result in both Kronzer and Oez-US. Thus, we disagree that Kronzer and Oez-US have “divergent goals” such that a person of ordinary skill in the art would not have had reason to take advantage of the benefits described in Oez-US. *See KSR*, 550 U.S. at 420 (“Under the correct analysis, any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed.”).

Patent Owner's additional argument—that Petitioner does not allege that something is missing from Oez-US or that the combination with Kronzer improves Oez-US—once again misses the main point of Petitioner's arguments. Petitioner's arguments are based on Oez-US supplying something beneficial that is missing from Kronzer, and therefore improving the system of Kronzer, not the reverse. We thus disagree that Petitioner has not indicated why a person of ordinary skill in the art would have had reason to combine Oez-US and Kronzer, and Petitioner's reliance on express teachings from Oez-US and Kronzer undermines Patent Owner's argument that Petitioner improperly relied on hindsight.

c) Whether a person of ordinary skill in the art would have had reason to combine Kronzer and Oez-US to yield the invention described in the '581 patent claims

In addition to arguing Petitioner fails to establish that a person skilled in the art would have been motivated to combine Kronzer and Oez-US, Patent Owner affirmatively argues the evidence of record shows a person of ordinary skill in the art would not have been motivated to combine Kronzer and Oez-US. PO Resp. 39. Specifically, Patent Owner contends that

[t]his evidence includes: (1) Kronzer does not even address dark t-shirt transfer; (2) Kronzer and Oez rely upon different chemical reactions (heat alone v. heat plus a chemical reaction); (3) Kronzer and Oez employ different structures (multi-layered v. single layered); (4) Kronzer and Oez solve different problems (cold peel v. dark fabric transfer); Kronzer and Oez use different technologies to solve those problems (specific formulations v. a cross-linking white layer and a peel-first method); and (5) Kronzer and Oez use opposite methods of printing (mirror v. positive) and opposite methods of applications (image down/peel later v. image up/peel first).

Id. Patent Owner additionally alleges that because Petitioner incorporates only the white pigment from Oez-US, “while wholly ignoring the impact of

other functions of the white pigment,” the person of ordinary skill in the art would not have had a reasonable expectation of success. *Id.* at 39–40. We address each of Patent Owner’s arguments below.

(1) whether a person of ordinary skill in the art would not have had reason to combine where Kronzer does not solve or address problems associated with dark fabrics

Patent Owner argues that “a [person of ordinary skill in the art] would not be motivated to combine Kronzer with Oez-US to create the inventions of the ‘581 Patent is because Kronzer does not solve – or even acknowledge – the problem of transferring an image onto dark fabric.” PO Resp. 40. For example, Patent Owner contends that Kronzer does not acknowledge that conventional, transparent transfers result in an image that has insufficient brilliance on dark fabric, and that none of Kronzer’s examples utilize a pigment at all, let alone one used to form an opaque background for dark fabrics. *Id.* at 41 (citing Ex. 1018 generally; Ex. 2011 ¶ 137).

Petitioner “asserts that Oez-US—not Kronzer—discloses the problem of transferring images onto dark fabrics and discloses the solution to that problem; *i.e.*, including a white/opaque pigment to provide a white/opaque background onto which a positive image can be printed,” the same issue the ‘581 patent purports to solve. Pet. Reply 6–7. Petitioner further explains that Kronzer is not limited to any fabric color and a person skilled in the art “would have been motivated to improve Kronzer by including a white pigment as taught by Oez-US.” *Id.* at 7.

Contrary to Patent Owner’s assertions, Kronzer need not solve, much less acknowledge, the problem of dark image transfer. The test for obviousness is not whether any one or all of the references expressly suggests the claimed invention, but whether the claimed subject matter

would have been obvious to those of ordinary skill in the art in light of the combined teachings of those references. *See In re Keller*, 642 F.2d 413, 425 (CCPA 1981). One of ordinary skill can use his or her ordinary skill, creativity, and common sense to make the necessary adjustments and further modifications to result in a properly functioning article. *See KSR*, 550 U.S. at 418 (“a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ”). And, where “a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill.” *See id.* at 417.

Here, Kronzer teaches each element of claim 1 of the ’581 patent—including a pigment in any one of its polymer layers. Pet. 66–72; Ex. 1018, 8:46–51. Kronzer, however, is silent as to the color of the pigment and the color of the substrate used. Oez-US teaches use of a white, opaque pigment and explains that a white pigment “ensures a greater brilliance of the image . . . especially for printing on black textiles.” Ex. 1013, 1:28–29. The record evidence discussed above supports a finding that a person of ordinary skill in the art would have recognized that the Oez-US white pigment would improve the transfer sheet disclosed in Kronzer, and would have had a reason to combine the teachings of Kronzer and Oez-US. *KSR*, 550 U.S. at 417.

(2) *whether a person of ordinary skill in the art would not have had reason to combine Oez-US’s white pigment alone and whether a reasonable expectation of success exists*

Patent Owner argues that a person of ordinary skill in the art would not have had reason to use only the white pigment from Oez-US because

Oez-US teaches away from a white layer that does not cross-link.

PO Resp. 42. According to Patent Owner, “[t]he cross-linking reaction in Oez is **required** for the white layer of Oez to function, but Petitioner simply ignores it.” *Id.* Patent Owner explains that “transferring a pigment from a reactive system to a non-reactive system raises significant technical challenges from a chemistry and materials science perspective.” *Id.* at 43 (citing Ex. 2011 ¶ 141). As a result, Patent Owner explains that “a ‘drop in’ replacement for an existing ingredient that will result in the identical finished part color,” is “extremely rare.” *Id.* (citing Ex. 2012, 3). Patent Owner states “that, in the reactive system of Oez, the titanium dioxide performs multiple functions beyond providing whiteness.” *Id.* at 44 (citing Ex. 2011 ¶ 144). Patent Owner further argues that titanium dioxide is a particulate that “would change the viscosity and flow properties of the third layer at transfer temperatures.” *Id.* at 44–45 (citing Ex. 2011 ¶ 145). In addition, “solid state characteristics of the third layer, such as modulus, elasticity, and flexibility” would also be changed. *Id.* As a result, a person of ordinary skill in the art would not have had a reasonable expectation of success. *Id.* at 45. And Patent Owner contends that the numerous failures of Kronzer’s system support its argument. *Id.*

Petitioner asserts that nothing in Oez-US teaches away from using only the white pigment and “Oez-US does **not** suggest that using TiO₂ with thermopolymers, such as those disclosed in Kronzer, would not achieve the same improvement to an image transfer sheet.” Pet. Reply 7–8 (citing Ex. 1062 ¶¶ 13–20). Instead, Petitioner explains that Oez-US describes using TiO₂ to improve image quality on dark substrates and “Kronzer **encourages** the use of pigments in any of its polymer layers.” *Id.* at 8 (citing Ex. 1013, 1:46–55; Ex. 1062 ¶¶ 16–20; Ex. 2011 ¶¶ 87–91; Ex. 1018, 8:46–51).

Petitioner asserts that a person of skill in the art would have understood “that TiO₂ would function as a white pigment—and provide a white/opaque background—**regardless of whether it was present in a cross-linked polymer or a non-cross-linked polymer**,” as Dr. Ellison admits. *Id.* (citing Ex. 1063 ¶¶ 17–20; Ex. 1063, 304:8–22). Petitioner further states that neither Patent Owner nor Dr. Ellison cite to record evidence “to support their assertion that TiO₂ somehow participates in the cross-linking reaction in Oez-US.” *Id.* (citing PO Resp. 42–43; Ex. 2011 ¶¶ 141–148; Ex. 1063, 302:4–303:21).

We do not agree with Patent Owner’s arguments that Oez-US teaches away from using white pigment alone or that Oez-US requires a cross-linking polymer for the white pigment to function. *See* PO Resp. 42–43. To teach away, a reference must discourage one of ordinary skill in the art from following the path set out in the reference, or lead that person in a direction divergent from the path taken by the applicant. *In re Gurley*, 27 F.3d 551, 553 (Fed. Cir. 1994) (“[A] reference will teach away if it suggests that the line of development flowing from the reference’s disclosure is unlikely to be productive of the result sought by the applicant.”). “A reference does not teach away . . . if it merely expresses a general preference for an alternative invention but does not ‘criticize, discredit, or otherwise discourage’ investigation into the invention claimed.” *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 567 F.3d 1314, 1327 (Fed. Cir. 2009) (quoting *In re Fulton*, 391 F.3d 1195, 1201 (Fed. Cir. 2004)). Patent Owner does not identify any teaching in Oez-US that either requires use of a cross-linking polymer with its white pigment or discourages use of a white pigment without a cross-linking polymer. And, our independent review of Oez-US does not reveal any such teaching. The fact that Oez-US uses a white

pigment in conjunction with a cross-linked polymer does not mean that cross-linking is required for TiO₂ to function as a pigment nor does it teach away from pursuing the path taken in the '581 patent.

Patent Owner's arguments that transferring a white pigment from a reactive to non-reactive system would have been unpredictable because the titanium dioxide performs functions beyond whiteness and because the properties and characteristics of the layer would be altered is similarly unavailing. *See* PO Resp. 42–46. Neither Patent Owner nor its expert, Dr. Ellison, identify anything in Oez-US that suggests the titanium dioxide functions other than to provide a contrasting background. *See generally id.*; *see generally* Ex. 2011. Rather, Oez-US consistently refers to the white pigment or titanium dioxide as responsible for providing contrast for images transferred to dark colored textiles. Ex. 1013, 1:28–29, 1:50–52, 2:50–51. In fact, Oez-US states that “[i]f white textiles are to be printed on, the titanium oxide pigment can be omitted.” *Id.* at 2:31–32. Further, Dr. Ellison's testimony that “white pigments like titanium dioxide *often* have a surface chemistry [that] . . . *can* interact with components of reactive systems [and] . . . *can* itself chemically react with the components of the single polymer layer of Oez[-US] and become part of the crosslinked network,” is inconclusive and, at best, describes *possible* interactions in a *reactive* system—not in a non-reactive system as proposed by Petitioner. Ex. 2011 ¶ 144 (emphasis added).

In addition, record evidence supports Petitioner's position that a person of ordinary skill in the art would have understood incorporating titanium dioxide within a polymer layer to provide a white background whether the polymer is cross-linked or not. Ex. 1062 ¶¶ 17–18 (citing Ex. 1055 ¶¶ 120–121); Ex. 1063, 304:8–22 (Dr. Ellison's testimony that the

reactions described in Oez-US would not be required for titanium dioxide to provide whiteness). Regarding the purported changes titanium dioxide would have on certain properties or characteristics of the polymer layers, Patent Owner's argument is based solely on the conclusory declaration testimony of Dr. Ellison. *See* Ex. 2011 ¶¶ 145–148.

Similarly, Patent Owner's argument that "it is 'extremely rare' to find a 'drop in' replacement" for titanium dioxide (PO Resp. 44) is based on an incomplete understanding of the referenced articles and is conclusory. Patent Owner relies on the testimony of Dr. Ellison and Exhibits 2012 and 2013, and identifies the problem as a possible color shift or variance in lightness of up to 10% (Ex. 2012)—not unpredictability. Dr. Ellison also testified that he had not studied the details of Exhibit 2012 and conceded that Exhibit 2013 is not relevant to inorganic pigments, like titanium dioxide. Ex. 1063 343:11–347:7, 350:5–355:2.

On the other hand, Petitioner identifies evidence that suggests titanium dioxide is the most widely-used and well-known white pigment. Pet. Reply 8–10 (citing Ex. 1062 ¶¶ 19–39; Ex. 1054; Ex. 1056); *see also*, Ex. 2012, 2 ("Titanium dioxide is the most widely used white pigment because of its unique ability to provide exceptional opacity and lend whiteness and brightness."); Ex. 1063, 243:6–22; Ex. 1055 ("Half of all TiO₂ pigment produced is consumed by the coatings industry and a quarter by the paper industry."); Ex. 1057; Ex. 1058.

We also disagree with Patent Owner's assertion that the alleged "numerous failures" in Kronzer demonstrate why adding a new component to the third layer would be unpredictable. PO Resp. 43; Sur-reply 5. Even if we were to accept Patent Owner's characterization of Kronzer as including some failures as true, none of Kronzer's trials include a pigment. Ex. 1018,

Tables VI–XIV; Ex. 2011 ¶ 149. Thus, we fail to see the particular significance of those specific trials to the question of unpredictability based on the addition of a pigment to Kronzer. Moreover, a reference should be considered in its entirety for what it fairly teaches one skilled in the art, which would include the multiple successful trials in Kronzer and an express statement that each of the film layers may include a pigment. Ex. 1018, Tables VI–XIV (showing transfer sheet trials with characteristics, including image transfer, that are “good” and/or “excellent”), 8:46–48; *see In re Wesslau*, 353 F.2d 238, 241 (CCPA 1965).

(3) *whether a person of ordinary skill in the art would not have had reason to combine where Kronzer and Oez-US involve the different structures and manufacturing processes*

Patent Owner contends there are “fundamental differences in [the] structures and manufacturing” of Kronzer versus Oez-US such that the ordinarily skilled artisan would not have combined their teachings.

PO Resp. 46. Patent Owner explains that “Kronzer is a multi-layered structure, in which each layer is laid down separately during manufacturing and in which each layer serves a different function,” whereas “every example and every claim in Oez teaches a single homogenized coating, which is pre-mixed during manufacture.” *Id.* at 47.

Petitioner argues that Oez-US is not a “single homogenized coating” as Patent Owner suggests. Pet. Reply 11. Petitioner asserts that both Oez-US itself and Patent Owner’s own expert describe Oez-US as having a multi-layered structure. *Id.*

For the same reasons discussed above in Section II.D.2.b, we do not agree with Patent Owner’s arguments, in this regard. As we explained above, Oez-US and Kronzer each describe a multi-layered image transfer

structures. *See* Ex. 1013, 2:36–44 (describing a polymer layer *between* the paper and the polyurethane layer), claim 12 (same); *see also* Ex. 1063, 295:8–296:18 (Dr. Ellison’s testimony describing Oez-US as having a second, optional layer); Ex. 1018, 2:33–3:6 (describing a heat transfer sheet having up to five layers).

(4) *whether a person of ordinary skill in the art would not have had reason to combine where the technology and problems solved are different*

Patent Owner also argues that “a [person of ordinary skill in the art] would not be motivated to combine Kronzer and Oez is because of the fundamental differences in the problems each reference seeks to address and the fundamental differences in the technology each reference uses to solve those problems.” PO Resp. 47–48.

Petitioner replies that “Oez-US and Kronzer are both generally directed to, *inter alia*, compositions and methods, including multi-layered polymer sheets for transferring images to fabric . . . and share the common goal of improving the quality of the transferred image when applied to fabric.” Pet. Reply 11–12. Petitioner further argues that “both Oez-US and Kronzer teach the use of overlapping classes of polymers, *e.g.*, polyurethane and acrylic acid and acrylic acid ester polymers” and therefore, “the technologies employed by Kronzer and Oez-US are fundamentally the same; *i.e.*, multi-layer sheets comprising similar polymer layers for heat transfer to fabrics.” *Id.* at 12 (citing Ex. 1020 ¶¶ 88, 220–221; 1063 ¶¶ 8–10).

For the same reasons discussed above, in Section II.D.2.b, Patent Owner’s arguments, in this regard are unavailing. As we explained above, we consider Kronzer and Oez-US to be aligned with a common goal of improving the quality of transferred images. Moreover, Petitioner’s

evidence and arguments regarding the use of the same polymers in both references undermines Patent Owner's arguments that the technology in the two references is so different that a person of ordinary skill in the art would not have had any reason to combine the teachings of the references.

(5) *whether a person of ordinary skill in the art would not have had reason to combine where the printing and applying method of Kronzer and Oez-US are opposite to one another*

Lastly, Patent Owner contends that a person of ordinary skill in the art would not have had a reason to combine Kronzer and Oez-US because the “two references use opposite methods of application” and a person of ordinary skill in the art would not have had a reasonable expectation of success. PO Resp. 48. According to Patent Owner, a person of ordinary skill in the art would have been dissuaded from adding a white pigment to Kronzer's third layer because the pigment would “obscure the decorative graphic.” *Id.* at 48–49.

Petitioner asserts that “far from being ‘counterintuitive’ (PO [Resp.], 48-49), a [person of ordinary skill in the art] (or anyone else possessing a modicum of common sense) would have understood that the inclusion of a white/opaque pigment in Kronzer's layer would necessitate the image to be positioned positively on top of (not underneath) the opaque/white layer, as expressly taught by Oez-US.” Pet. Reply 12.

On this issue, Petitioner has the better position. The ordinarily skilled artisan would have understood that there were two known methods for applying image transfer sheets—i.e., either “peel first” or “peel last”—and would have considered the benefits and disadvantages of each in developing an image transfer sheet. *See generally* Ex. 1016 (describing “peel first”); Ex 1018 (describing “peel last”); Tr. 36:8–37:8. Further, as Patent Owner

acknowledges, using the “peel last” method would have resulted in the white layer covering the image, and therefore the image would be obscured. PO Resp. 48 (citing Ex. 2011 ¶ 150) (“a [person having ordinary skill in the art] would expect that white pigment in the third layer would obscure the decorative graphic.”); Pet. Reply 12; Ex. 1062 ¶¶ 42–43. The “person of ordinary skill is also a person of ordinary creativity, not an automaton,” and does not abandon common sense when considering the combination of references. *KSR*, 550 U.S. at 421; *Winner Int’l Royalty Corp. v. Wang*, 202 F.3d 1340, 1349 n.8 (Fed. Cir. 2000) (explaining that a person of ordinary skill in the art would have considered both the advantages and disadvantages of the prior art). Accordingly, the person of ordinary skill in the art would not have been deterred by two different application types, but rather, would have had reason to consider the teachings as a whole and opt for the “peel first” method well within their technical grasp. *KSR*, 550 U.S. at 421 (“When there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp.”).

For all of the foregoing reasons, we are persuaded by Petitioner’s arguments and evidence demonstrating that a person of ordinary skill in the art would have had reason to combine the teachings of Kronzer and Oez-US, and would have had a reasonable expectation of successfully doing so to arrive at the subject matter recited in claim 1. As noted above, we also agree with Petitioner’s arguments and evidence that Kronzer and Oez-US teach or suggest all of the limitations recited in claim 1. As a result, we find Petitioner has established by a preponderance of the evidence that claim 1 is unpatentable as obvious in view of Kronzer and Oez-US.

3. *Claims 2 and 3*

Claim 2 requires the article of claim 1 “wherein the indicia and the opaque background are arranged to concurrently transfer to the dark-colored base in contact with the image-imparting member upon application of heat.” Ex. 1003, 11:49–52. Claim 3 requires the article of claim 2, “wherein the portion of the image-imparting member comprising the pigment and providing the opaque background is configured to be contactable to the dark-colored base, during a transfer process, such that received indicia face upwards.” *Id.* at 11:53–57.

Petitioner explains that “Kronzer teaches first placing its image transfer sheet on a fabric, applying heat to effect a[n] image transfer, and (after cooling) peeling off the first/base layer.” Pet. 76. Petitioner asserts that a person of ordinary skill in the art “would have naturally [] applied the image transfer steps and image orientation taught by Oez-US” because “the purpose of adding the white pigment to Kronzer’s third layer is to provide a white background for the image being transferred.” *Id.* at 77 (citing Ex. 1020 ¶¶ 261 (explaining that if applied otherwise, the white layer would be on top of the image); Ex. 1013, 1:26–55, 2:50–51, 3:30–59; Ex. 1018, 4:15–16).

Patent Owner argues that Petitioner “cite[s] no support or evidence for the proposition” that it would have been “natural” to apply the “image transfer steps and image orientation taught by Oez-US.” PO Resp. 49 (citing Pet. 77). Patent Owner explains that this “is a complete re-engineering of Kronzer” and Petitioner does not explain why a person of ordinary skill in the art would expect such re-engineering to be successful. *Id.* at 49–50. Patent Owner reasons that “[t]his re-engineering is based on hindsight.” *Id.* at 50.

Petitioner replies that modifying Kronzer to include a “peel first” image orientation would not require a “complete reengineering” as Patent Owner alleges. Pet. Reply 13. Petitioner asserts that “[Patent Owner] and its expert make conclusory assertions that reversing the layers would not be successful, would be unpredictable and would impact the transfer, with no support for these assertions.” *Id.* Petitioner contends its challenge is based on reversing the order of the third and fourth layers which “are largely the same, and can include the same thermoplastic polymers/binders having the same characteristics.” *Id.* (citing Ex. 1018, 5:46–48, 5:62–65, 6:1–8, 6:54–56, 7:12–41; Ex. 1020 ¶¶ 42–48). Petitioner argues that a person of ordinary skill in the art “would have understood that flipping the orientation of these two layers would result in the same (or materially similar) functionality as the original orientation.” *Id.* (citing Ex. 1036 ¶ 46; Ex. 1018, 6:17–19).

In weighing the evidence before us, we disagree with Patent Owner’s argument that Petitioner improperly relies on hindsight. Impermissible hindsight is inferred when the specific understanding or principle within the knowledge of one of ordinary skill in the art that would have motivated one (with no knowledge of the claimed invention) to make the proposed combination has not been explained. *In re Rouffet*, 149 F.3d 1350, 1358 (Fed. Cir. 1998). Here, however, Petitioner reasonably asserts that a person of skill in the art “would have naturally also applied the image transfer steps and image orientation taught by Oez-US” and would have reordered Kronzer’s third and fourth layers because to do otherwise would result in the white layer being on top of the image. Pet. 77 (citing Ex. 1020 ¶ 261). Petitioner explains that its proposed “peel first” embodiment would have been successful “because Kronzer expressly teaches that its substrate layer has ‘cold release’ properties.” *Id.* (citing Ex. 1018, 4:15–16; Ex. 1020

¶ 261). Petitioner also explains that each of Kronzer’s third and fourth layers are similar and include thermoplastic polymers that melt in the same range, i.e., about 65 °C to about 180°C. *Id.* at 71 (quoting Ex. 1018, 2:35–67). Dr. Wanat testifies that a “complete re-engineering” is not required because “Kronzer discloses that the desired characteristics and examples of the major components of the third and fourth layer[s] **are largely the same**” and a person skilled in the art would expect the layers to function similarly regardless of orientation. Ex. 1062 ¶¶ 44–45. Therefore, Petitioner has provided sufficient reasoning with rational underpinnings to explain why one of ordinary skill in the art would have had reason modified the teachings of Kronzer and Oez-US. *See KSR*, 550 U.S. at 418.

Furthermore, critically lacking from Patent Owner’s argument is any explanation why “a complete reversal of the order of the layers would not yield predictable results” (PO Resp. 50), what “complete re-engineering” other than a reordering the layers would have been required, or any suggestion that reversing the order of layers is beyond technical knowledge of the person of ordinary skill in the art. Accordingly, on this record, we find no evidence of hindsight reconstruction.

For the foregoing reasons, Petitioner has established by a preponderance of the evidence that claims 2 and 3 are unpatentable as obvious in view of Kronzer and Oez-US.

4. Remaining Claims (claims 4–6, 8–21, and 24–31)

Petitioner also alleges that the combined teachings of Kronzer and Oez-US would have rendered obvious the subject matter of independent claims 17, 24, 27, 30, and 31 and dependent claims 4–6, 8–16, 18–21, 25–26, and 28–29. Pet. 66–81. Independent claims 17, 24, 27, 30, and 31 are similar to claim 1 except that claims 27, 30, and 31 additionally require

(1) the polymer layer underlying the white layer (claims 27 and 31) or underlying the ink-receptive layer (claim 30) to include ethylene acrylic acid and (2) a silicone-coated removable substrate underlying the polymer layer (claims 27 and 31) or underlying the white layer (claim 29). *See generally* Ex. 1003, claims. Petitioner argues that Kronzer describes a fifth layer comprising ethylene acrylic acid that may be located between the second layer and third layers (i.e., the white layer as modified), thereby meeting claims 27 and 31. Pet. 73 (citing Ex. 1018, 11:55–65; Ex. 1020 ¶ 238). Alternatively and relevant to claim 30, Petitioner argues that Kronzer discloses that any of the third, fourth, or fifth layers may include ethylene acrylic acid, and that in “Kronzer’s five layer variant, a POSITA would have been motivated to place Oez-US’s white pigment in the fifth layer to provide the most spatial separation of the indicia and white pigment.” *Id.* at 74 (citing Ex. 1020 ¶¶ 243–244). Additionally, Petitioner argues that although Kronzer does not disclose that the release layer may include silicone, but rather clay, Oez-US “expressly teaches a silicone release layer” for easy removal. *Id.* (citing Ex. 1013, 3:14–16). Petitioner contends that a person of ordinary skill in the art would have reason to replace the clay (in Kronzer), a known release coating, for another known alternative, i.e., silicone (in Oez-US), as it involves a matter of simple substitution to achieve the invention of claims 27, 30, and 31. *Id.* at 74–75 (citing Ex. 1020 ¶¶ 241, 246–247, 255).

Patent Owner does not address independent claims 17, 24, 27, 30, and 31 or dependent claims 4–6, 8–16, 18–21, 25–26, and 28–29 beyond what Patent Owner argues for claims 1–3, and therefore has forfeited any arguments based on these uncontested claims. *Cf. In re NuVasive*, 842 F.3d 1376, 1381 (Fed. Cir. 2016) (explaining that a patent owner waives an argument presented in the preliminary response if it fails to renew that

argument in the patent owner response during the instituted trial). For the reasons we discuss above, we are persuaded by Petitioner’s arguments and evidence. We have reviewed the information Petitioner provides, including the relevant portions of both Wanat Declarations and Petitioner’s arguments that a person of ordinary skill in the art would have had reason to combine the various disclosures set forth in Kronzer and Oez-US and that a person of ordinary skill in the art would have had a reasonable expectation of success in achieving the claimed invention. Because a preponderance of the evidence supports Petitioner’s arguments as to claims 4–6, 8–21, and 24–31, we adopt Petitioner’s analysis as our own. Accordingly, Petitioner establishes that the subject matter of claims 4–6, 8–21, and 24–31 would have been obvious over Kronzer in view of Oez-US.

E. Remaining Grounds

Having determined that Petitioner establishes by a preponderance of the evidence that the combination of Kronzer and Oez-US renders the subject matter of claims 1–6, 8–21, and 24–31 obvious, we need not address Petitioner’s additional grounds challenging claims 1–6, 8–21, and 24–31. *See SAS Inst. Inc. v. Iancu*, 138 S. Ct. 1348, 1359 (2018) (holding a petitioner “is entitled to a final written decision addressing all of the claims it has challenged”); *Boston Sci. Scimed, Inc. v. Cook Grp. Inc.*, 809 F. App’x 984, 990 (Fed. Cir. 2020) (nonprecedential) (“We agree that the Board need not address [alternative grounds] that are not necessary to the resolution of the proceeding.”).

III. PATENT OWNER’S MOTION TO STRIKE

On June 1, 2021, with authorization, Patent Owner filed a Motion to Strike. Paper 29 (“Motion”). The Motion seeks to strike “evidence submitted by Petitioner for the first time on Reply,” including the Reply

Declaration of Dr. Robert Wanat (Ex. 1062, “Reply Declaration”), as well as evidence relied on in that Declaration (Exhibits 1054–1060 and 1064–1065). *Id.* at 1, 4. Petitioner filed its Opposition to the Motion to Strike on June 15, 2021. Paper 30 (“Response”).

Patent Owner argues that the Reply Declaration includes “new argument and cite[s] new evidence that could have – and should have – been submitted with the Petition.” *Id.* at 1. Patent Owner also argues that we should strike newly-submitted evidence (Exhibits 1054–1060 and 1064–1065) used to support the Reply Declaration. *Id.*

Under the Board’s rules, a petitioner’s reply “may only respond to arguments raised in the corresponding . . . patent owner response” or address the institution decision. 37 C.F.R. § 42.23(b) (2019); *see also Ariosa Diagnostics v. Verinata Health, Inc.*, 805 F.3d 1359, 1367 (Fed. Cir. 2015) (discussing how, in an *inter partes* review proceeding, a petitioner’s reply is “limited to a true rebuttal role” (citing 37 C.F.R. §§ 42.104(b)(5), 42.23(b))). “Petitioner may not submit new evidence or argument in reply that it could have presented earlier, e.g. to make out a *prima facie* case of unpatentability. A party also may submit rebuttal evidence in support of its reply.” *See Consolidated Trial Practice Guide*, 73 (2019)¹¹ (citing *Belden Inc. v. Berk-Tek LLC*, 805 F.3d 1064, 1077–78 (Fed. Cir. 2015)). We address each of Patent Owner’s concerns below.

A. Alleged New Motivation to Combine

Patent Owner argues that the Reply Declaration, for the first time, “set[s] forth a new motivation to combine” Motion 1 (citing Ex. 1062 ¶¶ 9–12). Petitioner argues that “[t]ellingly, [Patent Owner] does not even

¹¹ Available at <https://www.uspto.gov/TrialPracticeGuideConsolidated>.

identify any motivation that is supposedly ‘new.’” Response 2. Petitioner asserts that the Reply Declaration is in response to Patent Owner’s arguments and specifically those asserting “that there would be no motivation to combine Kronzer and Oez-US because they solve ‘fundamentally different problems using fundamentally different technologies.’” *Id.* at 3 (quoting Ex. 1062 ¶ 7).

Patent Owner does not identify what purported new motivation to combine Petitioner introduces. *See generally* Motion. Indeed, Patent Owner does not specifically identify which new theories Dr. Wanat proffers and cites only generally to paragraphs 9–12 of the Reply Declaration. Motion 1. Accordingly, we find Patent Owner has failed to establish that it is entitled to the requested relief. 37 C.F.R. § 42.20(c) (“The moving party has the burden of proof to establish that it is entitled to the requested relief.”). In any event, we do not rely upon Dr. Wanat’s additional testimony in determining whether Petitioner has shown an adequate reason to combine Kronzer and Oez-US. Accordingly, we dismiss this aspect of Patent Owner’s Motion as moot.

B. Alleged New Arguments Regarding Use of TiO₂

Patent Owner argues that the Petition fails to cite any evidence for its allegation that using TiO₂ in Kronzer would have been predictable to the person of ordinary skill in the art and that we should now preclude Petitioner from providing new evidentiary support. Motion 2 (citing Ex. 1062 ¶¶ 17–40). Patent Owner contends that we should also strike Petitioner’s argument (and evidence) “that ready to use formulations exist that include titanium dioxide, which Petitioner asserts somehow supports the predictability of titanium dioxide.” *Id.* at 3 (citing Ex. 1062 ¶ 38). Patent Owner further contends that Petitioner’s arguments that a person of ordinary skill in the art

“would **also** know to include other (unidentified) additives to Kronzer in order to make the composition work” are untimely. *Id.* at 2 (citing Ex. 1062 ¶¶ 17–40).

Petitioner asserts that “Dr. Wanat’s position that using TiO₂ in transfer sheets would have led to predictable results is entirely consistent with the arguments and evidence presented in the Petition.” Response 4 (citing Pet. 66–69; Ex. 1020 ¶¶ 85, 220–224). Petitioner explains that Dr. Wanat’s further positions regarding the use of additives and ready-to-use formulations were in direct response to Patent Owner’s arguments that TiO₂ could not be used predictably. *Id.* at 7–8.

We are not persuaded that Petitioner’s arguments are improper rebuttal arguments. In the Petition, Petitioner explains that because the combination “merely involved combining well-known elements (*i.e.*, polymers and pigments) using well-known polymer science/manufacturing techniques” the results would have been predictable to the person of ordinary skill in the art. Pet. 69 (citing Ex. 1020 ¶ 224). In its Response, Patent Owner argued that including a pigment would, in fact, have been unpredictable to one of ordinary skill in the art because the inclusion of pigments “can pose significant technical challenges” including changing “the viscosity and flow properties of the third layer at transfer temperatures” and changing “solid state characteristics of the third layer, such as modulus, elasticity, and flexibility.” PO Resp. 44–45. Patent Owner further argues that finding a “‘drop in’ replacement” replacement for a pigment is “extremely rare.” *Id.* at 44. Therefore, Dr. Wanat’s testimony that the skilled artisan would have understood how to account for the “technical challenges” Patent Owner identified through use of additives and testimony

that “drop-in replacements” were in fact available, properly responds to arguments raised by Patent Owner.

C. Alleged New Arguments Regarding the Similarity of Layers

Patent Owner asserts that Petitioner improperly advances an argument where the third and fourth layers of Kronzer are flipped and, because of their similarity, there would be no “impact on the composition at all.” Motion 3. Petitioner argues that “the Petition expressly addresses the similarity of characteristics for Kronzer’s third and fourth layers . . . [t]hus paragraphs 44–48 of Dr. Wanat’s Reply declaration are entirely consistent within the originally filed Petition.” Response 8–9. Further, Petitioner asserts that “Dr. Wanat’s reply declaration [is] clearly directed to [Patent Owner’s] own baseless argument that ‘flipping’ Kronzer’s layer would be a ‘complete re-engineering’ of Kronzer.” *Id.* at 9.

We are persuaded that the Reply Declaration is proper rebuttal evidence. In the Petition, Petitioner argues that the combination of Kronzer and Oez-US would result in an image transfer sheet having the following structure.

Fourth Layer (ink receiving layer)
Third Layer (with white pigment as taught by Oez-US)
Second Layer (release coating)
First Layer (base sheet/backing)

Pet. 66–67 (citing Ex. 1020 ¶ 221). Petitioner further explains that “Kronzer teaches that its third and fourth layers’ include[] a thermoplastic polymer which melts in a range of from about 65°C. to about 180°C.” *Id.* at 71

(quoting Ex. 1018, 2:35–67); *see also* Ex. 1020 ¶¶ 256–258 (same).

Petitioner also explains that a person of ordinary skill in the art “would have naturally applied the image transfer steps and image orientation taught by Oez-US,” i.e., image on top of the white layer. *Id.* at 77 (discussing claims 2 and 3) (citing Ex. 1020 ¶ 261).

In its Response, Patent Owner argues that Petitioner, other than for claims 2 and 3, has not addressed which application method or combination thereof is used or how they would be applied. PO Resp. 48. Patent Owner contends that a person of ordinary skill in the art would not have applied Kronzer’s “peel later” method as there would be no reasonable expectation of success because the decorative graphic would be obscured by the white pigment. *Id.* With respect to claims 2 and 3, Patent Owner asserts that a person of ordinary skill in the art would not have followed the transfer steps and image orientation of Oez-US because “it is a complete re-engineering of Kronzer.” *Id.* at 49.

Petitioner did not need to initially address whether the ordinarily skilled artisan would have peeled first or last because the challenged claims of the ’581 patent recite an article of manufacture, not a method. It was not until the Patent Owner Response raised the issue of a lack of a reasonable expectation of success that the need for Petitioner’s argument arose. Accordingly, Dr. Wanat’s reply testimony responds to Patent Owner’s arguments and is proper rebuttal evidence. We therefore deny Patent Owner’s Motion relating to this testimony.

D. Alleged New Arguments Relating to Cross-linking

Patent Owner argues that the Reply Declaration, for the first time in, makes “new arguments about cross-linking, including new arguments regarding melting that pointed to new citations to Oez.” Motion 4 (citing

Ex. 1062 ¶¶ 49–54). According to Petitioner, the Petition and original Wanat declaration explained that

crosslinking will require a period of time at the high temperature to complete the crosslinking process and, as a result, upon initial heating of such melamine formaldehyde polymers, . . . the polymers will be in a state with very little to no crosslinking, and so there will be mobility . . . which can allow for mixing of polymers between layers to occur.

Response 10–11 (citing Pet. 24–36; Ex. 1020 ¶¶ 49–54). Furthermore, Petitioner contends that the Reply Declaration is in direct response to Patent Owner’s arguments. *Id.* at 11.

Dr. Wanat’s “new arguments” regarding melting (Ex. 1062 ¶¶ 49–54) relate to a ground we do not rely on in determining claims 1–6, 8–21, and 24–31 unpatentable. Accordingly, Patent Owner’s Motion to strike Dr. Wanat’s testimony in this regard, is dismissed as moot.

IV. CONCLUSION¹²

For the foregoing reasons, we conclude that Petitioner has satisfied its burden of demonstrating, by a preponderance of the evidence, that the subject matter of claims 1–6, 8–21, and 24–31 of the ’581 patent is unpatentable. We also deny in part and dismiss in part Patent Owner’s Motion to Strike.

¹² Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner’s attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. See 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. See 37 C.F.R. § 42.8(a)(3), (b)(2).

V. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that, Petitioner establishes by a preponderance of the evidence that claims 1–6, 8–21, and 24–31 are unpatentable; and

FURTHER ORDERED that Patent Owner’s Motion to Strike is denied in part and dismissed in part; and

FURTHER ORDERED that, because this is a Final Written Decision, parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

In summary:

Claims	35 U.S.C. §	References/ Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1–6, 8–21, 24–26	§ 103	Oez-US, ¹³ Meyer		
18, 27–31	§ 103	Oez-US, Meyer, Kronzer		
1–6, 8–21, 24–31	§ 103	Oez-PCT, Oez-US		
1–6, 8–21, 24–31	§ 103	Kronzer, Oez-US	1–6, 8–21, 24– 31	
Overall Outcome			1–6, 8–21, 24– 31	

¹³ As explained above, we do not reach Petitioner’s alternative grounds based on Oez-US and Oez-PCT. *See supra* Section II.E.

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