

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

BILLERUD AKTIEBOLAG (PUBL),
Petitioner,

v.

WESTROCK MWV, LLC,
Patent Owner.

IPR2023-01206
Patent 11,293,142 B2

Before DONNA M. PRAISS, CHRISTOPHER M. KAISER, and
ELIZABETH M. ROESEL, *Administrative Patent Judges*.

ROESEL, *Administrative Patent Judge*.

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

I. INTRODUCTION

Billerud Aktiebolag (publ) (“Petitioner”) filed a Petition (Paper 1, “Pet.”) requesting *inter partes* review of claims 1, 2, and 4–23 of U.S. Patent No. 11,293,142 B2 (Ex. 1001, “the ’142 Patent”). WestRock MWV, LLC (“Patent Owner”) filed a Preliminary Response (Paper 13, “Prelim. Resp.”).

We have authority to determine whether to institute an *inter partes* review. 35 U.S.C. § 314 (2018); 37 C.F.R. § 42.4(a) (2023). An *inter partes* review may not be instituted “unless . . . the information presented in the petition . . . and any response . . . shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” 35 U.S.C. § 314(a). Institution of *inter partes* review is discretionary. *See Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1367 (Fed. Cir. 2016) (“[T]he PTO is permitted, but never compelled, to institute an IPR proceeding.”). For the reasons discussed below, the facts do not warrant exercise of discretion to deny institution, and the reasonable likelihood standard is met. We, therefore, grant institution of an *inter partes* review.

II. BACKGROUND

A. *The ’142 Patent (Ex. 1001)*

The ’142 Patent is titled “Smooth and Low Density Paperboard Structures and Methods for Manufacturing the Same.” Ex. 1001, code (54). As explained in the ’142 Patent, paperboard is used in various packaging applications such as beverage cartons and boxes. *Id.* at 1:21–23. For such applications, a smooth printing surface and low density are both desirable, but “preparing a smooth paperboard using conventional processes generally requires substantially increasing paperboard density.” *Id.* at 1:23–37.

Figure 1 is reproduced below.

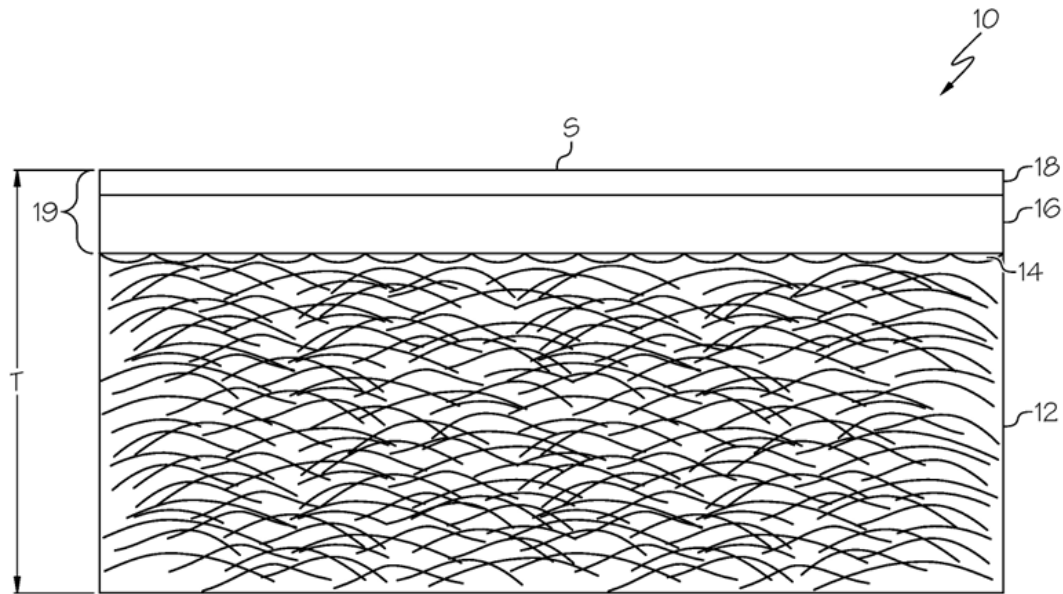


FIG. 1

Figure 1 is a cross-section of a paperboard structure. Ex. 1001, 2:19–20. As shown in Figure 1, paperboard structure 10 has caliper thickness T and upper surface S upon which text or graphics may be printed. *Id.* at 2:56–60. The paperboard structure includes paperboard substrate 12 and coating structure 19, which includes basecoat 14, topcoat 18, and one or more intermediate coating layers 16. *Id.* at 2:60–62, 3:25–27.

Figure 2 is reproduced below.

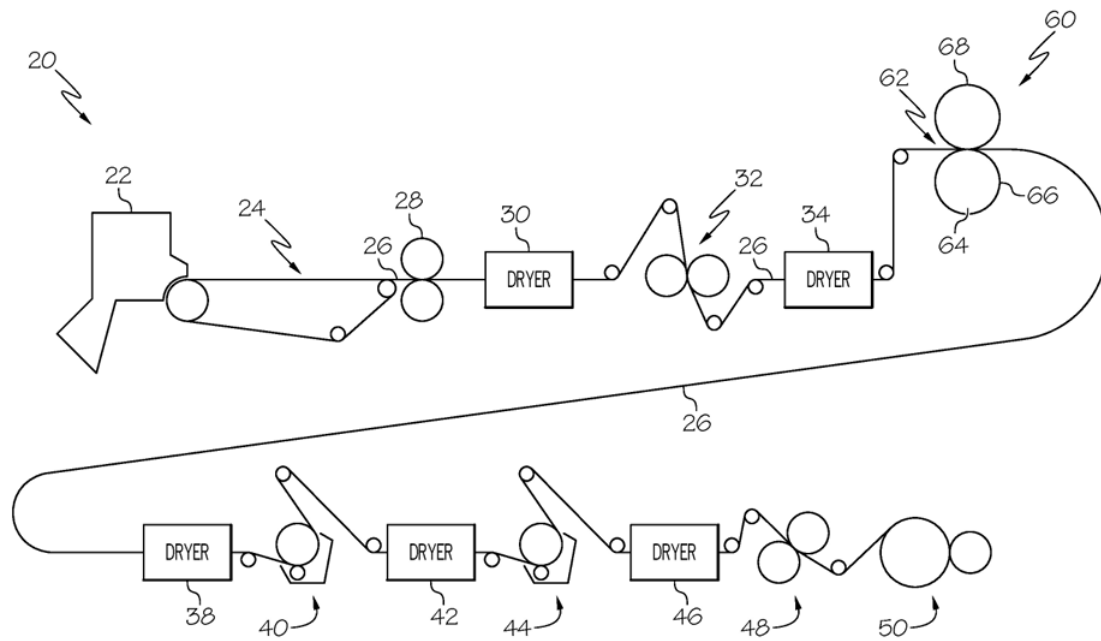


FIG. 2

Figure 2 illustrates a method for manufacturing a paperboard structure. Ex. 1001, 2:21–23. As shown in Figure 2, method 20 begins at head box 22, which discharges a fiber slurry onto Fourdrinier 24 to form paperboard substrate 26, which passes through wet press 28, dryer 30, size press 32, and dryer 34. *Id.* at 5:27–36. Paperboard substrate 26 then passes through hot-hard calender 60 to yield a calendered paperboard substrate. *Id.* at 5:37–38. Hot-hard calender 60 includes nip 62 defined by thermo-roller 64 and counter roller 68, which are made from “suitably hard materials,” such as steel and together apply a nip load to the paperboard substrate 26. *Id.* at 5:39–45. Thermo-roller 64 includes contact surface 66 which is heated to an elevated temperature. *Id.* at 5:45–47, 5:63–6:4.

After being calendered, paperboard substrate 12¹ passes through dryer 38, first coater 40, dryer 42, second coater 44, dryer 46, and gloss

¹ Although Figure 2 identifies the paperboard substrate with reference numeral 26, the description sometimes refers to “paperboard substrate 12.”

calender 48, and then onto reel 50. Ex. 1001, 6:5–17. First coater 40 applies basecoat 14, and second coater 44 applies topcoat 18. *Id.*

The '142 Patent includes six invention examples and six comparative examples. Ex. 1001, 6:33–11:60, Figs. 4–10. According to the '142 Patent, these examples show that “a comparably smooth paperboard structure may be manufactured using the disclosed method.” *Id.* at 11:14–17.

The '142 Patent theorizes that “calendering paperboard substrates at significantly higher temperatures may compensate for lower nip loads in achieving a desired smoothness.” *Id.* at 11:20–23.

Figures 7 and 8 are plots of basis weight versus caliper and show curves for two functions,

$$Y_2 = 3.71 + 13.14X - 0.1602X^2 \text{ and}$$

$$Y_3 = 3.63 + 12.85X - 0.1566X^2,$$

where Y is the basis weight in pounds per ream (3000 square feet), and X is the caliper thickness in points, where one point equals one thousandth of an inch. Ex. 1001, 1:57–65, 2:41–46, 11:44–46, Figs. 7, 8. According to the '142 Patent, all six invention examples fall below the Y_2 curve, five of the invention examples fall below the Y_3 curve, and all of the prior art falls above the Y_2 curve. *Id.* at 11:46–51. Figures 9 and 10 are similar to Figures 7 and 8, except they show curves for slightly different functions, Y_2' and Y_3' . *Id.* at 2:47–52, 11:52–60, Figs. 9, 10.

B. Illustrative Claim

Claim 1 is the sole independent claim and is reproduced below:

1. A method for manufacturing a paperboard structure comprising:

passing a paperboard substrate through a hot-hard calender to yield a calendered paperboard substrate, said hot-hard

calender comprising a nip defined by a thereto-roller [*sic*, thermo-roller] and a counter roller, wherein a contact surface of said thermo-roller is heated to an elevated temperature of at least 250°F.;

applying a basecoat to said calendered paperboard substrate to yield a basecoated paperboard substrate, said basecoat comprising a basecoat binder and a basecoat pigment; and

applying a topcoat to said basecoated paperboard substrate,

wherein said paperboard structure has a basis weight, a caliper thickness and a Parker Print Surf (PPS 10S) smoothness, said Parker Print Surf (PPS 10S) smoothness being at most 3 microns, said basis weight being at most Y_2 pounds per 3000 ft², wherein Y_2 is a function of said caliper thickness (X) in points and is calculated as follows:

$$Y_2 = 3.71 \div [\textit{sic}, +] 13.14X - 0.1602X^2.$$

Ex. 1001, 12:33–55.²

C. Asserted Challenges and Evidence

Petitioner raises the following challenges to patentability.

² As printed in Exhibit 1001, claims 1, 22, and 23 appear to contain printing errors, which we have corrected when quoting the claim language. At column 12, line 39, “thereto-roller” should be --thermo-roller--. At each of column 12, line 55 (claim 1), column 14, line 23 (claim 22), and column 14, line 32 (claim 23), “÷” should be --+--. These errors are apparent from the file history. Ex. 1002, 83, 85–86. We note that 35 U.S.C. § 254 provides a mechanism for requesting correction of a patent where the mistake(s) is/are “incurred through the fault of the Patent and Trademark Office.” 35 U.S.C. § 254; *see also* 37 C.F.R. § 1.322; MPEP § 1480.

Claim(s) Challenged	35 U.S.C. §	References/Basis
1, 2, 5–23	103	Fugitt, ³ Papermaking ⁴
1, 2, 4	103	Fugitt, Papermaking, Gratton ⁵
4	103	Fugitt, Papermaking, Papermaking II ⁶

Pet. 5–6.⁷ Petitioner submits the Declaration of Carl Zotterman (Ex. 1003), and Patent Owner submits the Declaration of Charles Klass (Ex. 2003).

³ Ex. 1004, US 2009/0236062 A1, published September 24, 2009 (“Fugitt”).

⁴ Exs. 1005, 1010, *Papermaking Science and Technology, Book 10: Papermaking Part 3, Finishing* (Pentti Rautiatinen, ed., 2nd ed. 2009). Exhibit 1005 includes pages 1–85, and Exhibit 1010 includes pages 86–172, which together comprise Chapter 1. Exhibit 1005 was filed with the Petition, and Exhibit 1010 was filed more than two months after the Petition. As a consequence, the Board reset the deadline for filing a Preliminary Response. See Paper 12. In some instances, the Petition cites to Exhibit 1005, when the cited pages are not included Exhibit 1005, but are included in Exhibit 1010. We consider Exhibits 1005 and 1010 together as a single reference referred to herein as “Papermaking,” and we cite to the exhibit number that actually contains the cited pages.

⁵ M. Gratton, et al., *Temperature-Gradient Calendering of Foodboard*, January 1988 TAPPI Journal 81–86 (“Gratton”).

⁶ Ex. 1007, *Papermaking Science and Technology Book 11: Pigment Coating and Surface Sizing of Paper* (Esa Lehtinen, ed. 2000). Exhibit 1007 includes pages 581–83, which is an excerpt from Chapter 28, Coating of Boards (“Papermaking II”).

⁷ As summarized on page 6 of the Petition, Petitioner’s first challenge includes claims 1 and 5–23; however, Petitioner’s detailed explanation of the first challenge includes claims 1, 2, and 5–23. Pet. 28, 39–40.

D. Overview of the Prior Art

1. Fugitt (Ex. 1004)

Fugitt is titled “Method For Coating Dry Finish Paperboard” and discloses “methods for coating dry-finish paperboard that result in smooth paperboard structures.” Ex. 1004, code (54), ¶ 2.⁸ Fugitt states that wet stack calendering and multi-layer coating are known ways of producing a smooth surface, but these methods have drawbacks, including densification and increased cost and weight, respectively. *Id.* ¶¶ 5, 6. According to Fugitt, it would be desirable “to produce a finished paper or board having a smooth surface . . . without the need for densification, thereby maintaining maximum thickness with the minimum cellulose fiber usage.” *Id.* ¶ 6. Fugitt discloses a continuous paperboard production process that utilizes a dry stack calender and does not use a wet stack calender. *Id.* ¶¶ 7, 8, 25.

Figure 11 is reproduced below.

⁸ Petitioner asserts that Fugitt and the ’142 Patent are commonly owned by the same entity. Pet. 21. Fugitt lists MeadWestvaco Corporation as a correspondence address (Ex. 1004, code (76), and the ’142 Patent lists WestRock MWV, LLC as the assignee (Ex. 1001, code (73)). We understand that WestRock was formed in July 2015 after the merger of MeadWestvaco and another company, RockTenn. *See* <https://en.wikipedia.org/wiki/WestRock>.

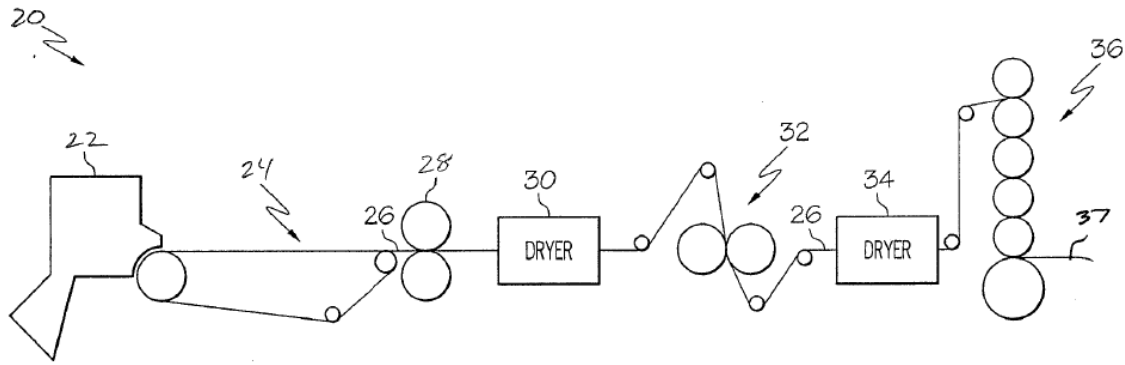


Fig. 11

Fugitt Figure 11 shows a process for preparing a dry finish paperboard substrate. Ex. 1004 ¶ 21. As shown in Figure 11, process 20 begins at head box 22, which discharges a slurry of cellulosic fiber onto Fourdrinier machine 24 to form web 26. *Id.* ¶ 26. Web 26 then passes through wet press 28, dryer 30, size press 32, and dryer 34. *Id.* ¶ 26, Fig. 12. Web 26 then passes through dry stack calender 36 to form paperboard substrate 37. *Id.* According to Fugitt, “[t]he rolls of the calender may be steam heated” and “[t]he nip loads and number of nips of the calender may be substantially reduced to minimize or avoid reduction in caliper thickness.” *Id.* ¶ 26.

Figure 12 is reproduced below.

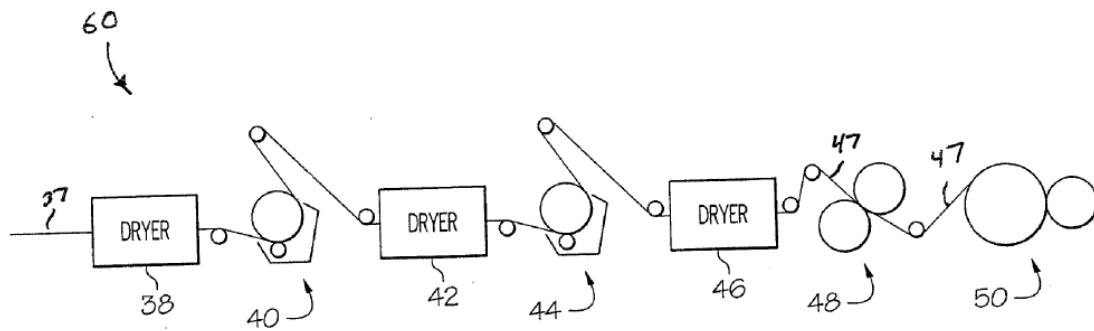


Fig. 12

Fugitt Figure 12 shows a process for coating the dry-finish paperboard substrate of Figure 11. Ex. 1004 ¶ 22. As shown in Figure 12, process 60 includes passing paperboard substrate 37 through dryer 38, first coater 40, dryer 42, second coater 44, dryer 46, and gloss calender 48 before it is rolled onto a reel 50. *Id.* ¶ 41, Fig. 12. First coater 40 applies a basecoat, and second coater 44 applies a topcoat. *Id.* ¶ 41.

2. Papermaking (Exs. 1005, 1010)

Papermaking is part of a twenty-volume book series published in 2009 by the Paper Engineers' Association (Helsinki, Finland) in cooperation with the Finnish Paper Engineers' Association, TAPPI (Technical Association of the Paper & Pulp Industry), and Fapet Oy (publisher, Helsinki, Finland). Pet. 26; Ex. 1005, 1–3, 7 (title pages, Forward, Preface). Chapter 1 of Book 10 is titled “Calendering” and includes sections titled “Calendering process,” “Calender types,” “Calendering process application areas,” and “Calender construction.” *Id.* at 10, 11 (Chapter 1 table of contents, sections 2–5).

By way of introduction, Papermaking explains that “Calendering is a unit process where the thickness of paper or board is reduced by applying the compression forces formed between two or multiple rollers or a combination of a belt and a roller.” Ex. 1005, 14. The section titled “Calender types” discloses that “Hard-nip calenders are used for a variety of paper and board grades. In this calendering process, the web is pressed between two or more hard rolls.” *Id.* at 35. Papermaking includes the following description of the hard-nip calendering process:

In the hard-nip calendering process, the pressure between the nip rolls affects the web. The control parameters are linear pressure between the rolls and the roll surface temperature. The

number of nips can also be used as a control parameter. Traditionally, hard-nip calenders have had heating systems that were unable to influence the surface temperature of the rolls and the process. In today's two-nip hard calenders with heated rolls that are able to operate at elevated temperatures, the temperature has become an active parameter.

Id. at 36.

3. *Gratton (Ex. 1006)*

Gratton is an article titled "Temperature-gradient calendering of foodboard." Ex. 1006, 81. According to Gratton, "Temperature-gradient calendering produces smooth, glossy surfaces with less bulk reduction than conventional machine calendering." *Id.* Gratton states that temperature-gradient ("TG") calendering "was shown to work well for newsprint," and the objective of his study "was to determine whether there are benefits in applying the TG-calendering technique to food boards and other heavy paper products." *Id.* Gratton compares the temperature profiles through the thickness of a web as it passes through conventional and TG calender nips and shows that, for TG calendering, there is a steep temperature gradient from the roll surface toward the center of the web. *Id.* (Figure 1 caption). Gratton compares the properties of food boards calendered using TG calendering and conventional calendering. *Id.* at 81–85 (Figures 2–8, Tables I–III). Gratton concludes that "[w]hen calendered to the same bulk, the TG-calendered board showed a much higher Hunter gloss and a lower Parker Print-Surf roughness than the conventionally calendered board." *Id.* at 85.

4. *Papermaking II (Ex. 1007)*

Papermaking II is part of a nineteen-volume book series published in 2000 by Fapet Oy in cooperation with the Finnish Paper Engineers'

Association and TAPPI.⁹ Ex. 1007 (title pages). Exhibit 1007 includes just three pages from Book 11, and these pages include sections titled “Introduction to board coating” and “Surface sizing.” *Id.* at 581, 583. Papermaking II discloses that starch is applied on the board surface as part of the surface sizing process. *Id.* at 583.

III. REQUEST FOR DENIAL UNDER 35 U.S.C. § 325(d)

A. Background

When deciding whether to institute an *inter partes* review, we “may take into account whether, and reject the petition or request because, the same or substantially the same prior art or arguments previously were presented to the Office.” 35 U.S.C. § 325(d).

In applying § 325(d), we use a two-part framework: (1) whether the same or substantially the same art previously was presented to the Office or whether the same or substantially the same arguments previously were presented to the Office; and (2) if either condition of the first part of the framework is satisfied, whether the petitioner has demonstrated that the Office erred in a manner material to the patentability of challenged claims. *Advanced Bionics, LLC v. MED-EL Elektromedizinische Geräte GmbH*, IPR2019-01469, Paper 6 at 8 (PTAB Feb. 13, 2020) (precedential). We also consider the non-exclusive factors set forth in *Becton, Dickinson and Co. v. B. Braun Melsungen AG*, IPR2017-01586, Paper 8 (PTAB Dec. 15, 2017) (precedential in relevant part), which “provide useful insight into how to

⁹ Although Petitioner states that Papermaking and Papermaking II are part of the same book series (Pet. 65), Papermaking II appears to be part of the “original 19-part book series” published in 2000, and Papermaking is part of a second, updated edition published in 2009. Ex. 1005, 1–3; Ex. 1007 (title page, “a series of 19 books”).

apply the framework” under § 325(d). *Advanced Bionics*, Paper 6 at 9.

Those non-exclusive factors include:

- (a) the similarities and material differences between the asserted art and the prior art involved during examination;
- (b) the cumulative nature of the asserted art and the prior art evaluated during examination;
- (c) the extent to which the asserted art was evaluated during examination, including whether the prior art was the basis for rejection;
- (d) the extent of the overlap between the arguments made during examination and the manner in which Petitioner relies on the prior art or Patent Owner distinguishes the prior art;
- (e) whether Petitioner has pointed out sufficiently how the Examiner erred in its evaluation of the asserted prior art; and
- (f) the extent to which additional evidence and facts presented in the Petition warrant reconsideration of the prior art or arguments.

Becton, Dickinson, Paper 8 at 17–18. “If, after review of factors (a), (b), and (d), it is determined that the same or substantially the same art or arguments previously were presented to the Office, then factors (c), (e), and (f) relate to whether the petitioner has demonstrated a material error by the Office.”

Advanced Bionics, Paper 6 at 10.

B. Analysis

1. Advanced Bionics Part I

Part I of the *Advanced Bionics* framework asks whether the same or substantially the same art was previously presented to the Office or whether the same or substantially the same arguments were previously presented to the Office. *Advanced Bionics*, Paper 6 at 8.

Petitioner acknowledges that Fugitt was previously considered by the Office, but argues that Papermaking, Gratton, and Papermaking II were not

previously considered and that Fugitt was not considered in combination with any other reference. Pet. 14. Petitioner contends that the combination of Fugitt and Papermaking or Gratton addresses a shortcoming of Fugitt that Patent Owner and the Examiner relied on for patentability. Pet. 14–15 (discussing the roller temperature of claim 1).

Patent Owner argues that Papermaking is cumulative to Mohan,¹⁰ which was included on an Information Disclosure Statement and is listed among the references cited in the '142 Patent. Prelim. Resp. 6–7, 22–23; Ex. 1001, code (56); Ex. 1002, 55–56. Patent Owner argues that the same reasoning applies to Petitioner's other references, Gratton and Papermaking II. *Id.* at 35–36.

We agree with Patent Owner that Papermaking is cumulative to Mohan. Petitioner relies on Papermaking to teach claim 1's recitation that "a contact surface of said thermo-roller is heated to an elevated temperature of at least 250°F." Pet. 32–34. Mohan discloses hot hard calendering of paper and paperboard to improve smoothness, where calender rolls have "a roll surface temperature of 250–400°F. during calendering of the web." Ex. 2002, 1:7–10, 4:46–57.

Patent Owner argues that "Mohan already disclosed the very teaching for which Petitioner is now citing Papermaking" and further argues that Mohan's multi-roll calender stack is "more similar to the calender stack in Fugitt . . . than is the two-roll pre-calender nip of Papermaking." Prelim. Resp. 23, 29–30 (citing Ex. 1004 ¶ 26, Fig. 11; Ex. 1005, 86; Ex. 2002, 4:23–57, Fig. 2B).¹¹ Patent Owner asserts that Petitioner relies on Gratton to

¹⁰ Ex. 2002, US 6,274,001 B1, issued August 14, 2001.

¹¹ Throughout this Decision, we omit the italicization of the names of the references when quoting from the briefs and declarations.

show the roller temperature of claim 1 and relies on Papermaking II only for dependent claim 4. *Id.* at 35–36; *see* Pet. 58–59 (relying on Gratton to show the roller temperature of claim 1); Pet. 66–67 (addressing claim 4 and Papermaking II).

Patent Owner persuades us that, at least for claim 1, the Petition presents the same or substantially the same art as was previously presented to the Office during examination and that Part I of the *Advanced Bionics* framework is met.

2. *Advanced Bionics Part II*

Part II of the *Advanced Bionics* framework asks whether the petitioner has demonstrated that the Office erred in a manner material to the patentability of challenged claims. *Advanced Bionics*, Paper 6 at 8.

Petitioner argues that the Examiner erred in three ways: (1) by not considering Fugitt in combination with other prior art, (2) by not performing a supplemental search focused on temperature after the claims were amended with the 250°F limitation, and (3) by accepting applicant’s argument that the recited temperature was “significantly hotter” than was disclosed in the prior art. Pet. 16.

Patent Owner argues that “it would *not* have been obvious to use calender roll temperatures of at least 250°F in the Fugitt process to arrive at the paperboard product recited in Claim 1, regardless of whether the roller temperature teaching is derived from Papermaking or Mohan.” Prelim. Resp. 24.

We are persuaded by Petitioner’s first and third arguments asserting Examiner error. Pet. 16. As originally filed, claim 1 recited a thermo-roller heated to an elevated temperature, and dependent claim 3 recited that the

“elevated temperature is at least 250°F.” Ex. 1002, 35. The Examiner rejected claim 1 as anticipated by Fugitt and rejected claims 1–3 as obvious over Fugitt. *Id.* at 73–75. The Examiner relied on Fugitt’s teaching of steam-heated calender rolls and asserted that it would have been obvious to optimize the temperature to obtain the desired smoothness. *Id.* at 74–75 (citing Ex. 1004 ¶ 26). In response, the applicant amended claim 1 to include original claim 3’s recitation “of at least 250°F” and argued that this “is significantly hotter than traditional temperatures” and “not disclosed or suggested by Fugitt.” *Id.* at 83, 88. The Examiner allowed amended claim 1 and its dependent claims (*id.* at 104), stating

The primary reason for allowance is that the cited prior art does not disclose a method for manufacturing a paperboard structure per steps claimed, the method including passing a paperboard substrate through a nip of a hot-hard calender, wherein the nip is defined by a thermo-roller and a counter roller, and wherein the contact surface of the thermo-roller is heated to an elevated temperature of at least 250°F.

Id. at 103.

The parties agree that the roller surface temperature was “critical to patentability” and “at the heart of the Examiner’s reasons for allowance.” Pet. 15; Prelim. Resp. 24; *see also* Pet. 22–23 (asserting that the roller temperature was “the only distinguishing feature” over Fugitt). We agree with Petitioner that the Examiner erred by not considering Fugitt in combination with other prior art and by accepting applicant’s argument that the recited temperature was “significantly hotter” than was disclosed in the prior art. Pet. 16. Patent Owner does not dispute that applicant’s argument was incorrect, conceding that a roller temperature of at least 250°F is taught by both Papermaking and Mohan. Prelim. Resp. 22–24, 34. Although Patent Owner argues patentability based on *other aspects* of claim 1 (Prelim.

Resp. 25), Patent Owner’s argument does not refute Petitioner’s showing that the Examiner erred by not considering Fugitt in combination with other prior art that admittedly shows the feature “at the heart of the Examiner’s reasons for allowance.” Pet. 15; Prelim. Resp. 24.

IV. REASONABLE LIKELIHOOD UNDER 35 U.S.C. § 314(a)

A. *Legal Standards*

“In an [*inter partes* review], the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable.” *Harmonic*, 815 F.3d at 1363 (citing 35 U.S.C. § 312(a)(3) (requiring *inter partes* review petitions to identify “with particularity . . . the evidence that supports the grounds for the challenge to each claim”)); *see also* 37 C.F.R. § 42.104(b) (requiring a petition for *inter partes* review to identify how the challenged claim is to be construed and where each element of the claim is found in the prior art patents or printed publications relied upon).

A patent claim is unpatentable under 35 U.S.C. § 103 if the differences between the claimed subject matter 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 based on 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) when presented, objective evidence of nonobviousness, i.e., secondary considerations. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

Additionally, the obviousness inquiry typically requires an analysis of “whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue.” *KSR*, 550 U.S. at 418 (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) (requiring “articulated reasoning with some rational underpinning to support the legal conclusion of obviousness”)). Petitioner cannot satisfy its burden of proving obviousness by employing “mere conclusory statements,” but “must instead articulate specific reasoning, based on evidence of record, to support the legal conclusion of obviousness.” *In re Magnum Oil Tools Int’l, Ltd.*, 829 F.3d 1364, 1380 (Fed. Cir. 2016).

B. Level of Ordinary Skill in the Art

Based on the testimony of the parties’ declarants, we determine that a person of ordinary skill in the art would have had a bachelor’s degree in paper science and engineering, chemical engineering, process engineering, mechanical engineering, or a related degree three to five years of experience in paperboard manufacturing, or a person with a master’s degree in paper science and engineering, chemical engineering, process engineering, or mechanical engineering, or a similar field with a specialization in paperboard manufacturing. Ex. 1003 ¶ 24; Ex. 2003 ¶ 26. We find that the level of ordinary skill in the art, as articulated above, is consistent with the level of technical understanding and competence reflected in the ’142 Patent Specification and the asserted prior art references.

C. Claim Construction

In an *inter partes* review, we apply the same claim construction standard as would be used by a district court to construe a claim in a civil action involving the validity or infringement of a patent. 37 C.F.R.

§ 42.100(b). Under that standard, claim terms are given their ordinary and customary meaning, as would have been understood by a person of ordinary skill in the art at the time of the invention, in light of the language of the claims, the specification, and the prosecution history of record. *Id.*; *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–19 (Fed. Cir. 2005) (en banc); *Thorner v. Sony Comput. Entm’t Am. LLC*, 669 F.3d 1362, 1365–66 (Fed. Cir. 2012).

Below we address the parties’ dispute about the term “hot-hard calender.” No other claim term requires express construction at this stage. “The Board is required to construe ‘only those terms . . . that are in controversy, and only to the extent necessary to resolve the controversy.’” *Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019) (quoting *Vivid Techs., Inc. v. Am. Sci. Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

I. “hot-hard calender”

Claim 1 recites “passing a paperboard substrate through a hot-hard calender to yield a calendered paperboard substrate, said hot-hard calender comprising a nip defined by a thermo-roller and a counter roller, wherein a contact surface of said thermo-roller is heated to an elevated temperature of at least 250°F.” Ex. 1001, 12:35–40.

Petitioner contends that “hot-hard calender” should be construed to mean “a calender defined by at least two rollers of suitable hardness (e.g., metallic material or heat-resistant resin composite) wherein at least one roller is heated to a temperature above ambient temperature.” Pet. 8.

Patent Owner argues that “hot-hard calender” should be construed to mean “a calender defined by at least two hard rollers wherein one roller is heated to the elevated temperature.” Prelim. Resp. 11.

The parties' dispute centers on whether the counter-roller can be heated to an elevated temperature. Whereas Petitioner's proposed construction encompasses a calender having one or both rollers heated to an elevated temperature, Patent Owner's construction requires that only one roller is heated. Pet. 8; Prelim. Resp. 12. For the reasons discussed below, we agree with Petitioner.

The '142 Patent describes a "hot-hard calender" as "including a nip defined by a thermo-roller and a counter roller, wherein a contact surface of the thermo-roller is heated to an elevated temperature." Ex. 1001, code (57), 1:46–52, 1:66–2:5; *see also id.* at 5:37–42 (describing Figure 2 embodiment). The '142 Patent states that the counter roller and/or the thermo-roller "may be made from a metallic material, such as steel or iron, or other suitably hard materials, such as a heat-resistant resin composite." *Id.* at 5:42–45. The '142 Patent further states that the thermo-roller includes a contact surface that is heated to an elevated temperature so as to heat the paperboard substrate as it is being calendered. *Id.* at 5:45–47, 5:63–66. In the '142 Patent's examples, the hot-hard calender includes one thermo-roller and one or two counter rollers, and the surface temperature of the thermo-roller was 480°F or 500°F. *Id.* at 6:45–50, 7:15–20, 7:52–57, 8:23–28, 8:60–65, 9:30–35, 10:40–48 (Table 1).

Patent Owner is correct that the '142 Patent does not mention heating a counter-roller of a hot-hard calender, and the surface temperature of the counter-roller is not discussed. Prelim. Resp. 12. But nowhere does the '142 Patent suggest that the counter-roller should *not* be heated to an elevated temperature. Under the applicable legal standard, the '142 Patent's silence about whether the counter-roller is heated is not enough to justify reading a negative limitation into the claim.

A claim construction that excludes a particular element is viewed as a “negative limitation.” *Ethicon LLC v. Intuitive Surgical, Inc.*, 847 Fed. App’x 901, 907 (Fed. Cir. Mar. 15, 2021). “[S]uch exclusions must find support either in ‘the words of the claim’ or through an ‘express disclaimer or independent lexicography in the written description that would justify adding that negative limitation.’” *Id.* (citing *Omega Eng’g, Inc. v. Raytek Corp.*, 334 F.3d 1314, 1323 (Fed. Cir. 2003); *CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, 1366–67 (Fed. Cir. 2002)). “The standards for finding lexicography and disavowal are exacting.” *GE Lighting Sols., LLC v. AgiLight, Inc.*, 750 F.3d 1304, 1309 (Fed. Cir. 2014). “To act as its own lexicographer, a patentee must ‘clearly set forth a definition of the disputed claim term,’ and ‘clearly express an intent to define the term.’” *Id.* (citing *Thorner*, 669 F.3d at 1365). Similarly, disclaimer or disavowal requires that the specification or prosecution history demonstrate that the invention does not include a particular feature. *Id.*

Here, Patent Owner does not point to any claim language, lexicography, or disclaimer in the ’142 Patent or its file history that would support defining a “hot-hard calender” as requiring that only one of the two rollers be heated to an elevated temperature.

Citing Mr. Klass’s testimony, Patent Owner argues that, in Figure 2 of the ’142 Patent, the uncoated side of the paperboard substrate would not be heated “to avoid unnecessary densification.” Prelim. Resp. 12 (citing Ex. 2003 ¶ 34). But Patent Owner and Mr. Klass do not point to any such teaching in the ’142 Patent. We see no suggestion in the ’142 Patent that heating the counter-roller would increase the density of the paperboard substrate or otherwise produce undesirable results.

Patent Owner points to the '142 Patent's examples where, in the gloss-type calender, "roller surface temperatures (plural) were maintained at around 200°F." Prelim. Resp. 13 (citing Ex. 1001, 7:2–3, 7:35–40, 8:5–11, 8:43–49, 9:13–18, 9:50–55). According to Patent Owner and Mr. Klass, this disclosure "substantiates that any counter rollers in the hot-hard calender are not heated to the elevated temperature." *Id.*; Ex. 2003 ¶ 59.

We can reasonably infer from the '142 Patent's disclosed embodiments and examples that the counter-rollers in the hot-hard calender are not heated to an elevated temperature. That inference, however, is not enough to support construing "hot-hard calender" as excluding a calender having a nip defined by two heated rollers. *Cadence Pharms. Inc. v. Exela PharmSci Inc.*, 780 F.3d 1364, 1369 (Fed. Cir. 2015) ("[E]ven if 'all of the embodiments discussed in the patent' included a specific limitation, it would not be 'proper to import from the patent's written description limitations that are not found in the claims themselves.'" (citing *Flo Healthcare Solutions, LLC v. Kappos*, 697 F.3d 1367, 1375 (Fed. Cir. 2012); *Silicon Graphics, Inc. v. ATI Techs., Inc.*, 607 F.3d 784, 792 (Fed. Cir. 2010))). As discussed above, there is no claim language, lexicography, or disclaimer that would support defining a "hot-hard calender" as requiring that only one of the two rollers be heated to an elevated temperature. *See Ethicon*, 847 Fed. App'x at 907.

Both parties rely on the file history as support for their respective constructions. Pet. 10; Prelim. Resp. 16–17. We find that the file history demonstrates that the term "hot-hard calender" does not exclude a calender having a nip defined by two heated rollers. The Examiner rejected application claim 1 over Fugitt, finding that "[a]t least some of the rolls in nips with counter rolls in the calender 36 are steam heated to an elevated

temperature.” Ex. 1002, 74 (citing Ex. 1004 ¶ 26). Fugitt discloses that “[t]he rolls of the calender may be steam heated.” Ex. 1004 ¶ 26. Patent Owner agrees that “Fugitt discloses more than one roll of the calender 36 may be steam heated” and argues that “the counter-roller in Fugitt . . . is heated.” Prelim. Resp. 17, 42.

It is readily apparent that, when rejecting the claims over Fugitt, the Examiner interpreted “hot-hard calender” as encompassing a calender with multiple heated rolls. Ex. 1002, 74. In responding to the rejection, the applicant did not disagree with the Examiner’s implied interpretation and did not make the claim construction argument Patent Owner now presents, i.e., that “hot-hard calender” excludes a calender having a nip defined by two heated rollers. Instead, the applicant amended claim 1 to include a minimum temperature and distinguished Fugitt on that basis. *Id.* at 83, 88 (arguing that “Paragraph 26 of Fugitt discloses that the ‘rolls of the calender may be steam heated’ . . . However, Fugitt does not disclose heating a thermo-roller to an elevated temperature of at least 250°F.”). A person of ordinary skill in the art reading the file history would understand that claim 1 does not exclude a “hot-hard calender” in which both the thermo-roller and the counter-roller are heated to an elevated temperature.

Although both parties rely on extrinsic evidence, including declaration testimony and Papermaking (Pet. 9; Prelim. Resp. 16), we find that the intrinsic evidence is sufficient to resolve the parties’ dispute, and we do not rely on extrinsic evidence.

For the foregoing reasons, we construe “hot-hard calender” as not excluding a calender in which both the thermo-roller and counter-roller are heated to an elevated temperature.

D. Petitioner's First Challenge

Petitioner challenges claims 1, 2, and 5–23 based on Fugitt and Papermaking. Pet. 28–54. Patent Owner opposes. Prelim. Resp. 42–52.

1. Claim 1

Petitioner contends that Fugitt teaches all elements of claim 1, except that “Fugitt is silent with respect to a particular temperature of the roller.” Pet. 32, 36; *see also* Pet. 29–36 (element-by-element analysis). Petitioner contends that both Fugitt and Papermaking disclose passing a paperboard substrate through a hot-hard calender having a nip defined by a thermo-roller and a counter roller. Pet. 30–32.

For claim 1’s recitation that “a contact surface of said thermo-roller is heated to an elevated temperature of at least 250°F,” Petitioner relies on a combination of teachings from Fugitt and Papermaking. Pet. 32–34. For example, Petitioner relies on Fugitt’s disclosure that “[t]he rolls of the calender may be steam heated” and Papermaking’s disclosure in a section titled “Heated Rolls” that “Steam can be used up to 170°C [338°F] surface temperature.” Pet. 32–33; Ex. 1004 ¶ 26;¹² Ex. 1010, 95, 98. Petitioner contends that a person of ordinary skill in the art would have been motivated to combine Fugitt and Papermaking to arrive at claim 1 and provides reasoning to support that contention. Pet. 36–39. For example, Petitioner contends that “[w]hile Fugitt teaches that a hot calender may be steam heated, Papermaking clarifies that one of ordinary skill in the art would understand that steam heated thermo-rollers may reach up to 338°F.” Pet. 36. Petitioner contends that a person of ordinary skill in the art would

¹² Petitioner mistakenly cites Fugitt paragraph 25 instead of paragraph 26 for the disclosure about steam heated rolls.

have been motivated to use the elevated temperatures taught by Papermaking to achieve desirable paperboard properties. Pet. 37–38.

Patent Owner argues that Fugitt does not disclose a “hot-hard calender” under its proposed construction, asserting “[t]here is not[h]ing in Fugitt that suggests only one of the rolls is heated.” Prelim. Resp. 42.

Patent Owner argues that the process of claim 1 would not have been obvious for two reasons. First, according to Patent Owner,

It is not to be expected that simply turning up the temperature in the calender stack of Fugitt to the 392–428°F temperatures disclosed in Papermaking would result in a paperboard structure having the smoothness together with the relationship of basis weight Y_2 as a function of caliper thickness as recited in Claim 1.

Id. at 44 (citing Ex. 2003 ¶ 92). Second, “it would not be obvious to one of ordinary skill in the art to turn up the temperature in the Fugitt process . . . because doing so would be costly.” *Id.* at 46 (citing Ex. 2003 ¶ 96).

For the reasons discussed above, our preliminary construction for “hot-hard calender” does not exclude a calender having a plurality of heated rolls, as disclosed by Fugitt. Ex. 1004 ¶ 26, Fig. 11 (dry stack calender 36). Patent Owner’s argument distinguishing Fugitt on that basis (Prelim. Resp. 42) is inapplicable under our preliminary construction. We also do not need to consider, for purposes of institution, the parties’ dispute about whether it would have been obvious to use a two-roll hard-nip calender, as disclosed in Papermaking, in place of Fugitt’s multi-roll calender. Pet. 37 (citing Ex. 1005, 35); Prelim. Resp. 47–48.

As we understand it, one theory of obviousness advanced by Petitioner is combining Fugitt’s teaching that “[t]he rolls of the calender may be steam heated” with Papermaking’s teaching about the surface temperature that can be obtained when using steam to heat the rolls. Pet. 32–33;

Ex. 1004 ¶ 26; Ex. 1010, 95, 98. That theory does not require increasing the temperature of Fugitt’s steam-heated rollers in order to achieve a contact surface temperature of at least 250°F, as recited in claim 1. Instead, we understand Petitioner to be relying on Papermaking to teach the temperature of the unmodified rollers of Fugitt. Under this theory, it was not necessary for Petitioner to show that the paperboard substrate properties disclosed in Fugitt would still be achieved after increasing the temperature.

Nevertheless, the Petition also relies on Papermaking’s teaching of temperatures that exceed the upper limit for steam-heated rolls, e.g., “[h]igh thermo roll temperatures (in some cases over 200°C [392°F]” or oil-heated rollers having surface that “can reach over 220°C [428°F].” Pet. 33 (citing Ex. 1005, 82; Ex. 1010, 98). Patent Owner is correct that Petitioner relies on Fugitt’s disclosure of paperboard properties (smoothness and basis weight Y_2 as a function of caliper thickness) obtained without modifying the roller surface temperature. Pet. 35–36; Prelim. Resp. 44. There is a factual issue as to whether a person of ordinary skill in the art would have expected to achieve the paperboard properties disclosed in Fugitt and recited in claim 1, if the roller temperature were increased above the level achievable by steam-heated rolls. There is also a factual issue as to whether Patent Owner’s evidence of increased energy cost would outweigh Petitioner’s asserted benefits of increased temperature. These issues are best resolved after the parties have had to the opportunity to develop the record and cross-examine the opposing experts. *See Arctic Cat Inc. v. Polaris Indus., Inc.*, 795 F. App’x 827, 833 (Fed. Cir. 2019) (“The Board must weigh the benefits and drawbacks of the modification against each other, to determine whether there would be a motivation to combine.”).

For these reasons, we determine that Petitioner shows a reasonable likelihood of prevailing on its challenge to claim 1 based on Fugitt and Papermaking.

2. Claim 2

Claim 2 depends from claim 1 and recites “wherein said passing said paperboard substrate through said hot-hard calender comprises applying a nip load to said paperboard substrate ranging from about 20 pli [pounds per linear inch] to about 500 pli.” Ex. 1001, 5:53–56, 12:56–59.

Petitioner contends that Papermaking discloses a precalendering nip load “from 10 to 40 kN/m (kilonewton/meter) [3.5 to 88 pli (pound/linear inch)]” and for cartonboard, “[t]he linear load may even exceed 100 kN/m [571 pli].” Pet. 39 (citing Ex. 1005, 72, 82).

Patent Owner argues that “Petitioner has cherry picked numerical values from Papermaking out of context and has made unit conversion errors in its own favor.” Prelim. Resp. 50 (citing Ex. 2003 ¶ 106).

We agree with Patent Owner that the Petition applies an incorrect unit conversion. Patent Owner and Mr. Klass assert that 10 to 40 kN/m converts to 57.1 to 228.6 pli (Prelim. Resp. 49; Ex. 2003 ¶ 104), not 3.5 to 88 pli, as asserted by Petitioner and Mr. Zotterman (Pet. 39; Ex. 1003 ¶ 119). The correct unit conversion is also shown by a table provided in another part of the Petition and Zotterman declaration. Pet. 63; Ex. 1003 ¶ 182. We disagree that Petitioner’s error is “in its own favor.” Prelim. Resp. 50. With the correct unit conversion, there is greater overlap between the disclosed range and the claimed range.

Patent Owner correctly observes that Papermaking’s disclosed range “from 10 to 40 kN/m [(kilonewton/meter) 57.1 to 228.6 pli]” (Ex. 1005, 72)

“is not stated as being particularly relevant to cartonboard.” Prelim. Resp. 49. Papermaking discloses a linear nip load “from 10 to 40 kN/m [(kilonewton/meter) 57.1 to 228.6 pli]” for lightweight coated (LWC) paper, which Papermaking characterizes as a “wood-containing coated paper grade[.]” Ex. 1005, 72. The ’142 Patent, on the other hand, states that paperboard substrate is “substantially free of ground wood particles.” Ex. 1001, 3:22–24. Patent Owner is also correct that Papermaking’s disclosed range for cartonboard—“[t]he linear load may even exceed 100 kN/m [571 pli]” (Ex. 1005, 82)—is outside the range recited in claim 2. Prelim. Resp. 49 (citing Ex. 2003 ¶ 105). These facts cast doubt on the strength of Petitioner’s showing for claim 2 based on Fugitt and Papermaking.

3. *Claim 5*

Claim 5 depends from claim 1 and recites “wherein said hot-hard calender further comprises a second nip defined by said thermo-roller and a second counter roller, and wherein said passing said paperboard substrate comprises passing said paperboard substrate through said nip and said second nip.” Ex. 1001, 12:65–67.

Petitioner contends that both Fugitt and Papermaking disclose the limitation of claim 5. Pet. 40–41. Petitioner asserts that Fugitt’s dry stack calender 36 includes a second counter roller. Pet. 40 (citing Ex. 1004 ¶ 25, Fig. 11). Petitioner relies on Papermaking’s disclosure of “multi-roll calenders.” Pet. 40–41 (citing Ex. 1005, 35, 40–42).

Patent Owner argues that Fugitt does not disclose the limitation of claim 5 under its proposed construction for “hot-hard calender,” arguing that

“too many rolls are heated to an elevated temperature in Fugitt.” Prelim. Resp. 50 (citing Ex. 2003 ¶ 111).

As discussed above, we construe “hot-hard calender” as not excluding a calender in which both the thermo-roller and counter-roller are heated to an elevated temperature. Under our preliminary construction, Patent Owner’s argument is inapplicable, and Petitioner’s showing for claim 5 is sufficient for purposes of institution.

4. *Claim 15*

Claim 15 depends indirectly from claim 1 and describes the composition of the basecoat pigment. According to claim 15, “ground calcium carbonate comprises at least about 10 percent by weight of said basecoat pigment and at most about 60 percent by weight of said basecoat pigment.” Ex. 1001, 13:25–28.

Petitioner contends that Fugitt discloses the limitation of claim 5, citing Fugitt’s disclosure of “a 50:50 pigment blend” of calcium carbonate and clay. Pet. 47–48 (citing Ex. 1003 ¶ 142; Ex. 1004 ¶ 44).

Patent Owner argues that “Petitioner has not met its burden of explaining how this [50:50] number correlates to the range of 10–60 percent ground calcium carbonate by weight, as recited in Claim 15.” Prelim. Resp. 51.

We agree with Patent Owner that the Petition may not be sufficient to state a *prima facie* case for claim 15.

“[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.” *Teva Pharms. USA, Inc. v. Corcept Therapeutics, Inc.*, 18 F.4th 1377, 1382 (Fed. Cir. 2021) (citing *E.I. DuPont de Nemours & Co.*

v. Synvina C.V., 904 F.3d 996, 1006 (Fed. Cir. 2018)). “A more specific application of this general principle is that a prima facie case of obviousness typically exists when the ranges of a claimed composition overlap the ranges disclosed in the prior art.” *Id.*

At this stage, we do not understand the Petition as raising an overlapping ranges theory for claim 15. To the extent Petitioner raises such a theory in its reply brief, then Petitioner must also address timeliness and whether Fugitt discloses a range. *See Colas Sols., Inc. v. Blackledge Emulsions, Inc.*, 759 F. App’x 986, 990 (Fed. Cir. 2019) (holding that petitioner’s overlapping range theory was both untimely and unsupported, where “no ranges are disclosed” in the asserted prior art).

5. Claim 23

Claim 23 depends from claim 1 and recites:

wherein said paperboard structure has a basis weight, a caliper thickness and a Parker Print Surf (PPS 10S) smoothness, said Parker Print Surf (PPS 10S) smoothness being at most 3 microns, said basis weight being at most Y_3' pounds per 3000 ft², wherein Y_3' is a function of said caliper thickness (X) in points and is calculated as follows:

$$Y_3' = 34.83 + 8.010X - 0.01570X^2.$$

Ex. 1001, 14:25–32.

Petitioner relies on Fugitt’s disclosure of “a total basis weight of 130.0 lbs/3000 ft², a caliper of 0.012 inches (12 points) and a Parker Print Surf (PPS 10S) smoothness of about 1.5 microns.” Pet. 53 (citing Ex. 1004 ¶ 57 (Example 3)). Petitioner contends that, when the general knowledge from Papermaking is applied to Fugitt, a person of ordinary skill in the art would obtain “[b]ulk savings, i.e. a higher caliper thickness at the same grammage.” Pet. 53–54 (citing Ex. 1003 ¶ 151; Ex. 1005, 80 (Fig. 62),

82).¹³ Petitioner further contends that “[a] caliper thickness being 12.2 instead of 12.0, i.e. only 1.6 % higher, yields a paperboard having a basis weight (120) that is below the function $Y_{[3]}$ ’ (130.21).” Pet. 54 (citing Ex. 1003 ¶ 155).)¹⁴

Patent Owner argues that, “[i]n order to lower the basis weight of Fugitt Example 3, Petitioner has arbitrarily added 1.6% to the caliper points, which appears to be the epitome of hindsight reasoning.” Prelim. Resp. 52.

At this stage, we are concerned that Petitioner engages in hindsight reasoning for claim 23. It appears that Petitioner uses the equation disclosed in the ’142 Patent to determine how to modify the caliper thickness of Fugitt’s Example 3 to satisfy that equation.

6. Claims 6–14 and 16–22

Claims 6–14 and 16–22 depend, directly or indirectly, from claim 1. Petitioner contends that Papermaking discloses the limitation of claim 6, that Fugitt discloses the limitations of claims 7–14, 16–18, and 20–22, and that claim 19 would have been obvious over Fugitt in view of Papermaking. Pet. 41–52. At this stage, Patent Owner does not present arguments for claims 6–14 and 16–22 separate from its arguments for claim 1. Prelim. Resp. 51 (arguing that “the same arguments” apply). We determine that it is unnecessary to provide an explicit analysis of Petitioner’s challenge to dependent claims 6–14 and 16–22 in order to provide guidance to the parties

¹³ We understand that “grammage” is synonymous with basis weight and refers to the mass per unit area of a paper product. *See, e.g.*, Ex. 1005, 70 (Table 1 showing the units for grammage are g/m²).

¹⁴ We understand “(120)” to be a typographical error, and the Petition should have stated “(130),” the total basis weight of Fugitt Example 3.

for the upcoming trial. *See* Consolidated Trial Practice Guide November 2019 (“CTPG”)¹⁵ at 64.

E. Petitioner’s Second Challenge

Petitioner challenges claims 1, 2, and 4 based on Fugitt, Papermaking, and Gratton. Pet. 54–65. Patent Owner opposes. Prelim. Resp. 52–55.

1. Claim 1

Petitioner relies on the same contentions for its second challenge to claim 1 as it presents for its first challenge, asserting that Fugitt and Papermaking disclose each limitation. Pet. 56–60. For claim 1’s recitation that “a contact surface of said thermo-roller is heated to an elevated temperature of at least 250°F,” Petitioner additionally relies on Gratton’s disclosure of “roll temperatures of 211°C [411°F], 209°C [408°F], and 207°C [405°F].” Pet. 58 (citing Ex. 1006, 84, Table II). Petitioner contends that a person of ordinary skill in the art would have been motivated to combine Fugitt, Papermaking, and Gratton to arrive at claim 1, providing essentially the same reasons as Petitioner advances for the combination of Fugitt and Papermaking. *Compare* Pet. 60–63 (second challenge), *with id.* at 36–39 (first challenge). Petitioner adds that “Gratton also discloses roll temperatures within the claimed range (210°C [410°F]) to ‘improve paper surface properties with less bulk reduction than with conventional calendering.’” Pet. 63 (quoting Ex. 1006, 81).

Patent Owner argues that Gratton does not disclose a “hot-hard calender” under its proposed construction, asserting that “[i]n Gratton, both rollers are heated to an identical temperature.” Prelim. Resp. 53 (citing

¹⁵ Available at <https://www.uspto.gov/TrialPracticeGuideConsolidated>.

Ex. 1006, Fig. 1, 86). For the reasons discussed above, our preliminary construction for “hot-hard calender” does not exclude a calender having two heated rolls, as disclosed by Gratton. Ex. 1006, 81 (Figure 1 illustrating “temperature-gradient calendering” with two rolls heated to 210°C). Patent Owner’s argument distinguishing Gratton on that basis (Prelim. Resp. 53) is inapplicable under our preliminary construction.

Patent Owner presents several arguments against the combination of Fugitt and Gratton. Prelim. Resp. 53–55. First, Patent Owner acknowledges that Gratton’s teaching of a roller temperature of 210°C and argues “it would not be obvious to modify Fugitt with Gratton . . . because the extra heat would downgrade the paperboard structure of Fugitt Example 3 out of the Y2 area of Claim 1.” *Id.* at 53–54 (citing Ex. 2003 ¶ 137). We note that a roller temperature of 210°C, as disclosed by Gratton (Ex. 1006, 81), exceeds the upper limit for steam-heated rolls, as taught by Papermaking. Ex. 1010, 98 (“Steam can be used up to 170°C surface temperature.”). Petitioner’s combination of Fugitt, Papermaking, and Gratton thus raises the same factual issue as discussed above, namely whether a person of ordinary skill in the art would have expected to achieve the paperboard properties disclosed in Fugitt and recited in claim 1, if the roller temperature were increased above the level achievable by steam-heated rolls.

Second, Patent Owner argues that Gratton’s heated rolls are for post-coating calendering, not for pre-calendering, which “argues against the combination of Fugitt and Gratton.” Prelim. Resp. 54 (citing Ex. 1003 ¶¶ 185, 186; Ex. 1006, 86; Ex. 2003 ¶ 138). After considering Patent Owner’s argument, we find that Petitioner provides a sufficient rationale for combining Fugitt with Gratton’s teachings about roll temperature. On this record, it is undisputed that Gratton describes the application of pigmented

starch in a size press upstream of the heated rollers, that the application of starch in a size press was conventional, and that Fugitt's process includes a size press upstream of a heated calender. Ex. 1003 ¶ 185; Ex. 1004, ¶ 26, Fig. 11; Ex. 1006, 86; Prelim. Resp. 54 (relying on Gratton's description and Mr. Zotterman's testimony); Ex. 2003 ¶ 128 (same). In our preliminary view, these facts do not support distinguishing the heated calenders of Fugitt and Gratton based on where they are located in the process.

Third, Patent Owner argues that Papermaking teaches away from combining Fugitt and Gratton "by associating the very rare two-heated-rolls technique of Gratton with complications and research work." Prelim. Resp. 54–55 (citing Ex. 1005, 40; Ex. 2003 ¶ 139). Patent Owner relies on the following teaching in Papermaking: "Heating up both nip rolls, however, is complicated because the other roll is a deflection-compensated roll. Because of the benefits of soft-calender technology, this kind of a calender has remained very rare in spite of the amount of research work done." Ex. 1005, 40. After considering Patent Owner's teaching away argument, we find that Petitioner provides a sufficient rationale for combining Fugitt and Gratton. Fugitt teaches a calender with multiple heated rolls. Ex. 1004 ¶ 26, Fig. 11; *see* Prelim. Resp. 42 ("Fugitt states that the rolls (plural) of the calender may be steam heated."). Petitioner does not rely on Gratton for that feature. Instead, Petitioner relies on Gratton's teachings about roll temperature and applies those teachings to Fugitt's multi-roll steam-heated calender. Pet. 58, 63; *see also* Prelim. Resp. 35, 53 ("Petitioner uses Gratton for its teaching of a roller temperature of 210°C.).

For these reasons and those stated above for Petitioner's first challenge to claim 1, we determine that Petitioner shows a reasonable

likelihood of prevailing on its challenge to claim 1 based on Fugitt, Papermaking, and Gratton.

2. Claims 2 and 4

Claims 2 and 4 depend from claim 1. Petitioner contends that Gratton discloses the limitations of claims 2 and 4. Pet. 63–65. At this stage, Patent Owner does not present arguments for claims 2 and 4 separate from its arguments for claim 1. Prelim. Resp. 55 (arguing that “the same arguments” apply). We determine that it is unnecessary to provide an explicit analysis of Petitioner’s second challenge to dependent claims 2 and 4 in order to provide guidance to the parties for the upcoming trial. *See* CTPG at 64.

F. Petitioner’s Third Challenge

Petitioner challenges claim 4 based on Fugitt, Papermaking, and Papermaking II. Pet. 65–67.

Claim 4 depends from claim 1 and recites “applying starch to said paperboard substrate prior to said passing said paperboard substrate through said hot-hard calender.” Ex. 1001, 12:62–64.

Petitioner contends that Papermaking II teaches applying starch to a paperboard surface as part of a size press treatment “to improve stiffness and surface strength of the board before coating.” Pet. 66–67 (citing Ex. 1007, 581, 583). Petitioner contends that this teaching applies to Fugitt, which discloses that a size press may be used before coating to add functional properties to the web. Pet. 67 (citing Ex. 1004 ¶ 26, Fig. 11).

At this stage, Patent Owner does not present arguments for claim 4 separate from its arguments for claim 1. Prelim. Resp. 56 (arguing that “the same arguments” apply).

We determine that Petitioner shows a reasonable likelihood of prevailing on its challenge to claim 4 based on Fugitt, Papermaking, and Papermaking II.

V. ORDER

It is

ORDERED that, pursuant to 35 U.S.C. § 314(a), an *inter partes* review of claims 1, 2, and 4–23 of the ’142 Patent is instituted commencing on the entry date of this Decision; and

FURTHER ORDERED that, pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, notice is hereby given of the institution of trial.

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Patent 11,293,142 B2

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