

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 CHRISTOPHER M. KAISER, ELIZABETH M. ROESEL, and
AVELYN ROSS, *Administrative Patent Judges*.

ROESEL, *Administrative Patent Judge*.

JUDGMENT

Final Written Decision

Determining Some Challenged Claims Unpatentable
Granting In Part Patent Owner's Motion to Amend
Granting In Part Patent Owner's Motion to Exclude
Denying Petitioner's Motion to Exclude
35 U.S.C. § 318(a)

I. INTRODUCTION

A. *Background and Summary*

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.”). The Board instituted an *inter partes* review. Paper 14 (“Institution Decision,” “Inst. Dec.”).

After institution, Patent Owner filed a Response (Paper 21, “PO Resp.”), Petitioner filed a Reply (Paper 25, “Pet. Reply”), and Patent Owner filed a Sur-reply (Paper 38, “PO Sur-reply”). Patent Owner also filed a Contingent Motion to Amend (Paper 22, “MTA”), and Petitioner filed an Opposition (Paper 24, “Opposition” or “MTA Opp.”). At Patent Owner’s request, we issued Preliminary Guidance on the Motion to Amend. Paper 28 (“Prelim. Guidance”). Thereafter, Patent Owner filed a Reply (Paper 39, “MTA Reply”), and Petitioner filed a Sur-reply (Paper 43, “MTA Sur-reply”). Each party filed a motion to exclude. Paper 42 (“PO MTE”); Paper 51 (“Pet. MTE”). We held an oral hearing on January 22, 2025, and a transcript is in the record. Paper 59 (“Tr.”).

We have jurisdiction under 35 U.S.C. § 6. This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a) (2024). For the reasons discussed below, we determine that Petitioner has shown by a preponderance of the evidence that claims 1, 2, and 4–22 of the ’142 Patent are unpatentable, and Petitioner has not shown that claim 23 is unpatentable. We grant Patent Owner’s Motion to Amend as to substitute claims 25 and 26, and we deny the Motion to Amend as to substitute claims 24 and 27.

We grant-in-part Patent Owner's motion to exclude and deny Petitioner's motion to exclude.

B. Related Matters

Petitioner states that it is not aware of any related matter under 37 C.F.R. § 42.8(b)(2). Pet. 2. Patent Owner likewise states that it is not aware of any related matters. Paper 48 (Patent Owner's Updated Mandatory Notices).

C. The '142 Patent (Ex. 1001)

The '142 Patent was issued April 5, 2022, based on an application filed May 7, 2020, and a provisional application filed May 10, 2019. Ex. 1001, codes (21), (22), (45), (60). The title is "Smooth and Low Density Paperboard Structures and Methods for Manufacturing the Same." *Id.* at code (54). The '142 Patent explains that 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.

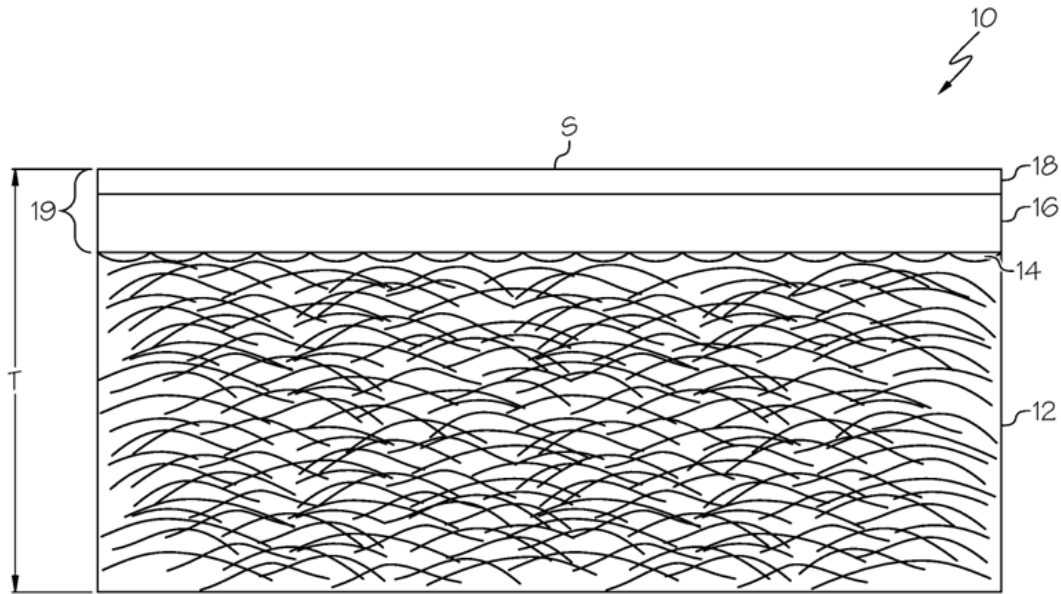


FIG. 1

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.

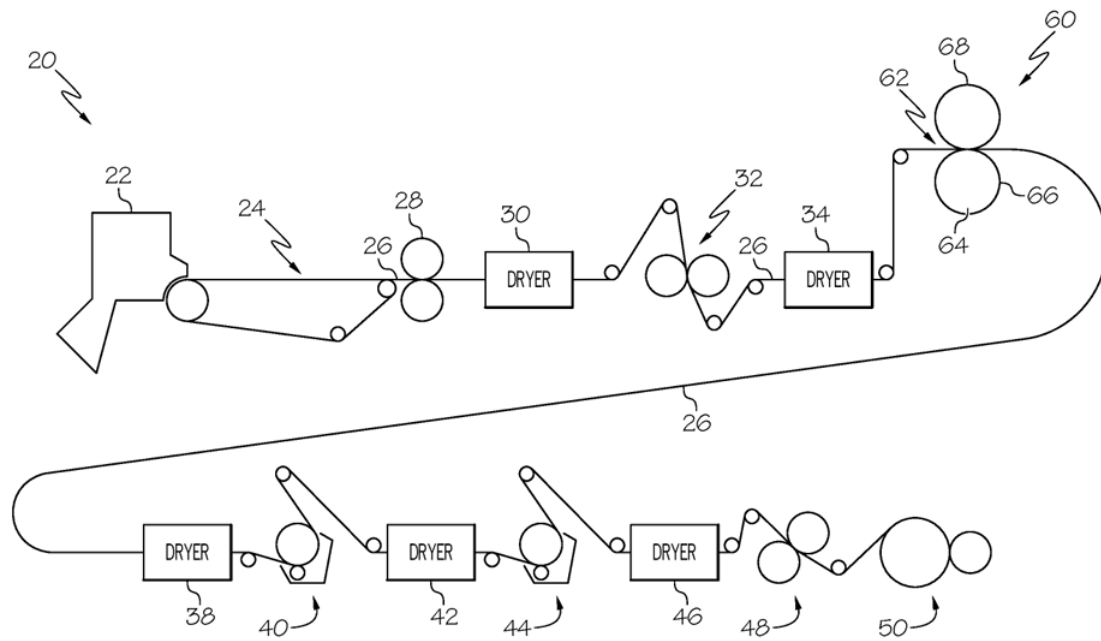


FIG. 2

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 Fourdrinier¹ 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.

¹ A Fourdrinier is a paper machine with a horizontal, moving, fine mesh, woven wire cloth, or plastic fabric upon which pulp slurry is deposited, forming a web. See <https://www.sciencedirect.com/topics/engineering/fourdrinier>; see also Ex. 1004 ¶ 26 (Petitioner’s asserted reference describes a Fourdrinier as including “a moving screen of extremely fine mesh”).

After being calendered, paperboard substrate 12² passes through dryer 38, first coater 40, dryer 42, second coater 44, dryer 46, and gloss 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.

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

D. 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, 12:33–55.³

E. Asserted Challenges to Patentability

Petitioner asserts the following challenges to patentability:

³ 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.

Claim(s) Challenged	35 U.S.C. §	References/Basis
1, 2, 5–23	103	Fugitt, ⁴ Papermaking ⁵
1, 2, 4	103	Fugitt, Papermaking, Gratton ⁶
4	103	Fugitt, Papermaking, Papermaking II ⁷

Pet. 5–6.⁸

F. Testimonial Evidence

The record includes the declaration and deposition testimonies of Petitioner’s witnesses, Carl Zotterman (Exs. 1003, 2005) and Anders Wirén (Exs. 1016, 2011), and Patent Owner’s witness, Charles Klass (Exs. 1012, 2003, 2004, 2012).

⁴ Ex. 1004, US 2009/0236062 A1, published September 24, 2009 (“Fugitt”).

⁵ 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. In some instances, the parties cite to Exhibit 1005, when the cited pages 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.

⁶ Ex. 1006, M. Gratton, et al., *Temperature-Gradient Calendering of Foodboard*, January 1988 TAPPI Journal 81–86 (“Gratton”).

⁷ 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”).

⁸ 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.

II. PATENTABILITY OF CHALLENGED CLAIMS

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 Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (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) (2024) (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.⁹ *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

⁹ Here, the record does not include allegations or evidence of objective indicia of nonobviousness.

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’ witnesses, 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, with three to five years of experience in paperboard manufacturing, or 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). “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)).

Below we address the term “hot-hard calender.” No other claim term requires express construction for purposes of resolving the controversy.

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. Prior to institution, Patent Owner argued 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.

In the Institution Decision, we agreed with Petitioner that the term “hot-hard calender” does not exclude a calender in which both the thermo-

roller and the counter roller are heated to an elevated temperature. Inst. Dec. 19–23; Pet. 8. Neither party disputes that construction. *See* Tr. 29:6–8 (Patent Owner does not challenge the Board’s claim construction.). For the reasons discussed below, we adopt the same claim construction as provided in the Institution Decision.

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, we find no 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.

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 the 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 six invention examples, the hot-hard calender includes one thermo-roller and one or two counter rollers, and the surface temperature of the thermo-roller is 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). The '142 Patent's examples also include a gloss-type calender, where “roller surface temperatures were maintained at around 200°F.” *Id.* at 7:2–3, 7:35–40, 8:5–11, 8:43–49, 9:13–18, 9:50–55. When discussing the comparative examples, the '142 Patent states that “the roller surface temperatures” were “much lower at 200°F.” *Id.* at 10:21–24.

The '142 Patent does not expressly mention heating a counter roller of a hot-hard calender and does not discuss the surface temperature of the counter roller of the hot-hard calender. But nowhere does the '142 Patent describe or suggest that the counter roller should *not* be heated to an elevated temperature. Under the applicable legal standard for claim construction, the '142 Patent's silence about whether the counter roller is heated is not enough to justify reading a negative limitation into the claim. *Ethicon*, 847 Fed. App'x at 907.

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 and Mr. Klass agree that Fugitt discloses that “the rolls (plural) of the calender may be ‘steam heated’” and argues that “the counter-roller in Fugitt . . . is heated.” MTA 6 (citing Ex. 1004 ¶ 26); Ex. 2003 ¶ 57.

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 interpretation and did not argue that the term “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.

Mr. Klass testifies that a person of ordinary skill would readily infer from the ’142 Patent’s disclosed embodiments and examples that the counter roller is not heated. Ex. 2003 ¶¶ 34, 58. 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.

Referring to Figure 2 of the ’142 Patent, Mr. Klass testifies that “to avoid unnecessary densification of the paperboard substrate, the uncoated side would not be heated in the hot-hard calender.” Ex. 2003 ¶ 34. But Mr. Klass does not point to any such teaching in the ’142 Patent. We see no disclosure or suggestion in the ’142 Patent that heating the counter roller would increase the density of the paperboard substrate or otherwise produce undesirable results.

Mr. Klass directs us to the ’142 Patent’s disclosure of “roller surface temperatures” (plural) when describing the gloss-type calender and the comparative examples. Ex. 1001, 7:2–3, 7:35–40, 8:5–11, 8:43–49, 9:13–18, 9:50–55, 10:21–24; Ex. 2003 ¶¶ 35, 59. These disclosures do not amount to lexicography or disclaimer sufficient to support reading a negative limitation into the claim. *Ethicon*, 847 Fed. App’x at 907.

Mr. Klass opines that “[s]imple logic predicates that calling one roller a ‘thermo-roller’ and specifying its surface temperature range, while referring to the other roller as ‘counter roller’ without any mention of its surface temperature, means that only the thermo-roller is heated to the elevated temperature.” Ex. 2003 ¶ 55. We are not persuaded. The ’142 Patent uses the term “counter roller” when describing both a hot-hard

calender and a gloss-type calender. Ex. 1001, 6:47–48, 7:17–18, 7:54–55, 8:25–26, 8:62–63, 9:32–33 (describing a hot-hard calender); *id.* at 6:66–7:3, 7:36–40, 8:6–11, 8:44–49, 9:14–18, 9:51–55 (describing a gloss-type calender). Mr. Klass testifies that the counter roller of the gloss-type calender is heated, while the counter roller of the hot-hard calender is not heated. Ex. 2003 ¶¶ 34, 35, 59. Therefore, Mr. Klass’s “simple logic” does not support reading a negative limitation into the claim.

For these 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. Overview of the Asserted 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), ¶ 2.¹⁰ 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.

¹⁰ Petitioner asserts that Fugitt and the ’142 Patent are commonly owned by the same entity. Pet. 21; Tr. 5:3–4. 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>.

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.

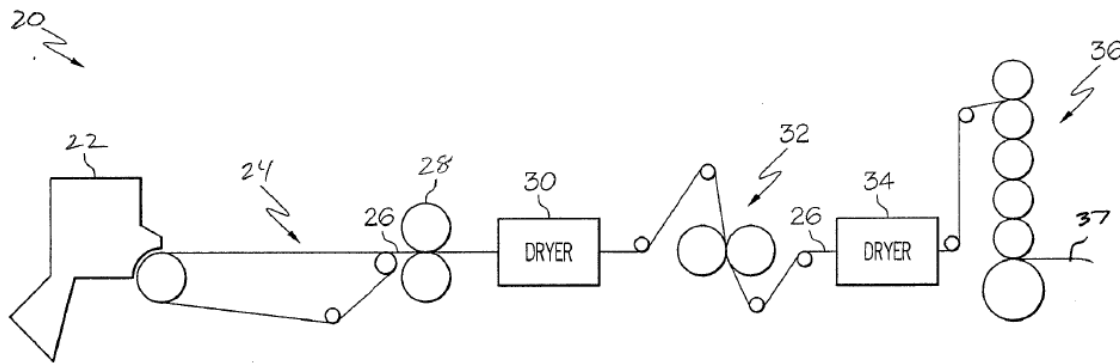


Fig. 11

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.

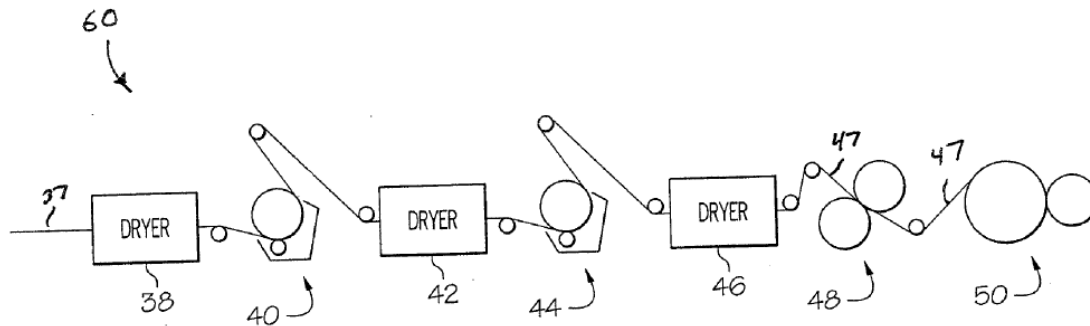


Fig. 12

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 “[h]ard-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 food board.” Ex. 1006, 81. According to Gratton, “[t]emperature-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.¹¹ 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.

E. *Petitioner’s First Challenge*

Petitioner challenges claims 1, 2, and 5–23 based on Fugitt and Papermaking. Pet. 28–54. Patent Owner opposes. PO Resp. 15–28. We address the disputed issues below.

¹¹ 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”).

1. Claim 1

Petitioner contends that *Fugitt* teaches all elements of claim 1, except for “a contact surface of said thermo-roller is heated to an elevated temperature of at least 250°F,” for which Petitioner relies on a combination of *Fugitt* and *Papermaking*. Pet. 29–36. 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. Pet. 36–38.

Patent Owner disputes Petitioner’s contentions, arguing that the combination of *Fugitt* and *Papermaking* does not teach the contact surface temperature of claim 1 and that Petitioner has not shown that a contact surface temperature of at least 250°F would yield the paperboard properties described in *Fugitt*. PO Resp. 15–18.

For the reasons that follow, we find that a preponderance of the evidence supports Petitioner.

It is undisputed that *Fugitt* teaches all elements of claim 1, except for “a contact surface of said thermo-roller is heated to an elevated temperature of at least 250°F.” Petitioner shows persuasively that the temperature limitation is taught by the combination of *Fugitt* and *Papermaking*. Pet. 32–34. *Fugitt* discloses that “[t]he rolls of the calender may be steam heated.” Ex. 1004 ¶ 26. In a section titled “Heated Rolls,” *Papermaking* discloses that “Steam can be used up to 170°C [338°F] surface temperature.” Ex. 1010, 95, 98. Petitioner is thus correct 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. Based on these disclosures, we are persuaded by Mr. Zotterman’s testimony that it would have been “obvious to heat the thermo-roller of *Fugitt* to at least 250°F.” Ex. 1003 ¶ 159.

Petitioner shows persuasively that it would have been obvious to combine Fugitt and Papermaking because of Papermaking’s status as a “trusted handbook[,]” because both references disclose a method of manufacturing a paperboard structure with hot calendering,” and “because of the known advantages of heated rollers.” Pet. 36–37; Ex. 1003 ¶¶ 157, 159, 162. Petitioner’s contention is supported by Papermaking’s disclosures that, for cartonboard, “[p]recalendering is used before the coater to reduce roughness and porosity” and “[h]igh thermo roll temperatures (in some cases over 200°C) result in bulk savings because of the temperature gradient.” Ex. 1005, 80–82; *see also* Pet. 38; Ex. 1003 ¶ 164 (citing these disclosures).

Papermaking’s disclosed range of “up to 170°C [338°F]” for steam-heated rolls (Ex. 1010, 98), overlaps the claimed range of “at least 250°F.” Patent Owner agrees. Tr. 27:11–13. “If the relevant comparison between a disputed claim limitation and the prior art pertains to a range of overlapping values, ‘. . . even a slight overlap in range establishes a prima facie case of obviousness.’” *Genentech, Inc. v. Hospira, Inc.*, 946 F.3d 1333, 1341 (Fed. Cir. 2020) (citing *In re Peterson*, 315 F.3d 1325, 1329 (Fed. Cir. 2003)). “[S]uch an overlap creates a presumption of obviousness, and . . . the burden of production falls upon the patentee to come forward with pertinent evidence that the overlapping range would not have been obvious in light of the prior art.” *Id.* (citing *E.I. DuPont de Nemours & Co. v. Synvina C.V.*, 904 F.3d 996, 1006, 1008 (Fed. Cir. 2018)).

“One way in which the patentee may rebut the presumption of obviousness is by showing ‘that there is something special or critical about the claimed range.’” *Genentech*, 946 F.3d at 1341 (citing *DuPont*, 904 F.3d at 1006, 1008). Patent Owner does not persuade us there is anything special or critical about a roller contact surface temperature of at least 250°F. Patent

Owner and Mr. Klass assert that “the hot-hard calendering disclosed in the ’142 Patent yields a better tradeoff between density and surface smoothness than with traditional calendering.” PO Resp. 6; Ex. 2003 ¶ 38. As support for that assertion, Patent Owner and Mr. Klass rely on data in the ’142 Patent comparing the invention examples with the prior art, including the Y_2 and Y_3 curves in Figures 7 and 8. PO Resp. 6–8; Ex. 2003 ¶¶ 38–40.

The data in the ’142 Patent are not sufficient to meet Patent Owner’s burden of production because they do not compare the claimed invention to Fugitt. *See Genentech*, 946 F.3d at 1341. Patent Owner does not dispute Petitioner’s contention that Example 3 of Fugitt discloses a method for making paperboard having a basis weight, caliper thickness, and smoothness as recited in claim 1. Pet. 35 (citing Ex. 1004 ¶ 57); PO Resp. 12 (conceding that Fugitt’s Example 3 “is an example of a paperboard structure that falls under the Y_2 curve of Claim 1 of the ’142 Patent”); Ex. 2003 ¶¶ 45, 70–72 (same). Patent Owner does not show that a roller contact surface temperature of at least 250°F produces anything special or critical as compared with Fugitt.

“Another way in which the presumption [of obviousness] can be rebutted is by showing that a process parameter, such as temperature, was not recognized as ‘result-effective.’” *Genentech*, 946 F.3d at 1341 (citing *DuPont*, 904 F.3d at 1006, 1008). Mr. Zotterman testifies that “it is routine optimization in the art to explore the temperature of thermo-rollers as a result-effective variable.” Ex. 1003 ¶ 111; *see also id.* ¶ 25 (opining that adjusting roll temperatures to optimize paperboard properties was within the level of ordinary skill in the art). Mr. Klass’s testimony supports that roller contact surface temperature was recognized as a result-effective parameter in the prior art. Ex. 2003 ¶ 94 (“If one of ordinary skill in the art desires to

change one of these factors, e.g., the roller temperature in the *Fugitt* process, he or she knows that such an alteration can completely change the paper product coming out of the process.”). Patent Owner agrees that it was known in the art that increasing the temperature would increase the smoothness of the paperboard. Tr. 28:10–22. Accordingly, Patent Owner does not show that roller contact surface temperature was not recognized as a result-effective parameter.

Still another way to “rebut a prima facie case of obviousness [is] by showing that the prior art teaches away from the claimed invention in any material respect.” *Peterson*, 315 F.3d at 1331. Although Patent Owner presents other teaching away arguments (PO Resp. 30), Patent Owner does not argue that the prior art teaches away from a roller contact surface temperature of at least 250°F. Accordingly, Patent Owner has not met its burden of coming forward with evidence that the overlapping range would not have been obvious in light of the prior art. *Genentech*, 946 F.3d at 1341.

“[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); *Genentech*, 946 F.3d at 1341; *DuPont*, 904 F.3d at 1006. *Fugitt* teaches a hot-hard calender with steam-heated rolls, and *Papermaking* teaches that steam-heated rolls have a surface temperature up to 338°F. Ex. 1004 ¶ 26; Ex. 1010, 98. We credit Mr. Zotterman’s testimony that, “[a]rmed with that knowledge, it would be a routine exercise (i.e., routine optimization) to explore the effects of different temperatures of the roller upon the web being passed over it – from ambient temperature to the highest operational temperature that can be achieved by the roller.” Ex. 1003 ¶ 111. Mr. Klass does not disagree that exploring the

effects of different temperatures is routine. Instead, he testifies that “one cannot simply change the temperature without having other effects on the system.” Ex. 2003 ¶ 98. Mr. Klass’s testimony is not sufficient to rebut Mr. Zotterman’s testimony about routine optimization because it fails to show that discovering an optimum or workable temperature range would have required more than an ordinarily skilled artisan’s routine experimentation.

Patent Owner argues that Petitioner has not shown “anywhere in the asserted art that a roller contact surface temperature of at least 250°F has yielded the smoothness, caliper, and basis weight described in Fugitt.” PO Resp. 17–18. Mr. Klass similarly asserts that “Petitioner and Zotterman have not proven that altering the temperature in Fugitt would still result in properties under the Y_2 curve as recited in Claim 1.” Ex. 2003 ¶ 98. These arguments do not apply the correct legal standard. Petitioner shows that Fugitt discloses all elements of claim 1, except for the temperature limitation, and Papermaking discloses a temperature range that overlaps the claimed range. Petitioner’s showing is sufficient to shift the burden of production to Patent Owner to come forward with evidence that the claimed temperature range would not have been obvious. *Genentech*, 946 F.3d at 1341; *DuPont*, 904 F.3d at 1006, 1008. As discussed above, Patent Owner’s evidence is not sufficient to discharge that burden of production.

Accordingly, we determine that Petitioner prevails on its challenge to claim 1 based on Fugitt and Papermaking.

2. *Claim 2*

We do not address Petitioner’s challenge to claim 2 based on Fugitt and Papermaking because we determine that Petitioner meets its burden to

show unpatentability of claim 2 based on Fugitt, Papermaking, and Gratton, as discussed in Section II.F.2 below.

3. *Claim 15*

Claim 15 depends indirectly from claim 1 via claims 13 and 11, and describes the composition of the basecoat pigment.¹² 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 15, 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.” PO Resp. 21.

In the Institution Decision, we stated that “the Petition may not be sufficient to state a prima facie case for claim 15” and “we do not understand the Petition as raising an overlapping ranges theory for claim 15.” Inst. Dec. 29. We now recognize these statements are incorrect.

We agree with Petitioner that “a detailed explanation of the fact that 50% is within the range of 10–60% is not necessary. It is self-evident.” Pet. Reply 22–23. The Petition and Mr. Zotterman’s testimony are sufficient to show that Fugitt’s “a 50:50 pigment blend” of calcium carbonate and clay falls within, i.e., overlaps, the claimed range of about 10 to about 60 percent

¹² Petitioner contends that Fugitt discloses the limitations of intervening claims 11 and 13. Pet. 45–47. Patent Owner does not present arguments for claims 11 and 13 separate from its arguments for claim 1.

ground calcium carbonate by weight. Pet. 47–48; Ex. 1003 ¶ 142; *see also* Ex. 1012, 156:15–24 (Mr. Klass agreeing that fifty percent calcium carbonate is within the claimed range). This overlap establishes a presumption of obviousness for claim 15 and shifts the burden of production to Patent Owner. *Genentech*, 946 F.3d at 1341; *DuPont*, 904 F.3d at 1006, 1008; *Peterson*, 315 F.3d at 1329.

Patent Owner does not show that there is anything special or critical about the claimed range of pigment composition (10–60 wt.% calcium carbonate), that pigment composition was not recognized as a result-effective variable, or that the prior art teaches away from the claimed range. *Genentech*, 946 F.3d at 1341; *DuPont*, 904 F.3d at 1006, 1008; *Peterson*, 315 F.3d at 1331. Accordingly, Patent Owner has not met its burden of production.

By way of sur-reply, Patent Owner argues that Petitioner has not proven that Fugitt’s “50:50 pigment blend” is by weight. PO Sur-reply 14–15 (referring to Ex. 1004 ¶ 44). We disagree. Fugitt discloses that the pigment blend contains “50 percent by weight . . . ground calcium carbonate” and “50 percent by weight . . . clay.” Ex. 1004 ¶ 50; *see* Tr. 19:12–17 (Petitioner’s argument referring to this disclosure).

Accordingly, we determine that Petitioner prevails on its challenge to claim 15 based on Fugitt and Papermaking.

4. *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 a person of ordinary skill in the art applies the general knowledge from Papermaking to Fugitt, he would obtain “[b]ulk savings, i.e. a higher caliper thickness at the same grammage” and a paperboard having “a basis weight (120) that is below the function Y_3' (130.21).” Pet. 53–54 (showing calculation of Y_3' and citing Ex. 1003 ¶¶ 151–155).¹³

Patent Owner argues that Petitioner’s calculation of Y_3' for Fugitt’s Example 3 relies on impermissible hindsight. PO Resp. 21–24. Patent Owner also argues that Mr. Zotterman improperly mixes data from Fugitt and Papermaking in an attempt to show another example within claim 23. *Id.* at 25–28.

We determine that Petitioner does not meet its burden for claim 23.

It is undisputed that Fugitt’s Example 3 does not satisfy the Y_3' equation in claim 23. Pet. 54 (presenting Y_3' calculation based on caliper thickness of 12.2 instead of 12.0, as disclosed in Fugitt); PO Resp. 22 (“Example 3 in Fugitt . . . lies outside the range recited in Claim 23” (citing Ex. 1004 ¶ 57)); Ex. 2003 ¶ 130 (same); Ex. 2004 ¶ 55 (same).

¹³ “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).

In an attempt to show obviousness, Petitioner and Mr. Zotterman back-calculate the value of X (caliper thickness) that would be needed for the value of Y_3' (per the claim 23 equation) to be greater than Fugitt's basis weight of 130.0 lbs/3000 ft². Pet. 54 ("A caliper thickness being 12.2 instead of 12.0, i.e. only 1.6 % higher, yields a paperboard having a basis weight (120) [*sic*, (130)] that is below the function Y_3' (130.21).");¹⁴ Ex. 1003 ¶ 151 (same); *see also* Pet. Reply 24 (arguing that "a thickness increase of 1.6% . . . is what is needed to meet the Y_3 equation of claim 23"). Patent Owner explains persuasively that "if one works backwards from the 130 basis weight given in Fugitt, and algebraically solves the Y_3' equation to calculate the X value (caliper) for the Petitioner's desired result, the answer would be 12.2, rounded up to the nearest tenth of a caliper point." PO Resp. 23; *see also* Ex. 2004 ¶¶ 58, 59. We agree with Patent Owner and Mr. Klass that Petitioner's back-calculation relies on impermissible hindsight. PO Resp. 21–24; Ex. 2003 ¶ 130; Ex. 2004 ¶¶ 55–59; *see* Tr. 23:7–9 ("JUDGE ROESEL: Why 12.2? MR. MEYERS: That's just - because that got us below the Y_2 curve.").

Petitioner's back-calculation is not supported by Papermaking, as Petitioner and Mr. Zotterman contend. Pet. 53–54; Ex. 1003 ¶¶ 150–152. Papermaking discloses that "[a] modern cartonboard line as a rule has one hot hard-nip precalender before the coating section, especially in Asia. High thermo roll temperatures (in some cases over 200°C) result in bulk savings because of the temperature gradient." Ex. 1005, 82; Pet. 53 (quoting this

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

disclosure); Ex. 1003 ¶ 150 (same).¹⁵ Petitioner does not explain how or why this excerpt from Papermaking would have led a person of ordinary skill in the art to increase the bulk and caliper thickness of Fugitt's Example 3. The paperboard in that example is already "low density," i.e., high bulk. Ex. 1004 ¶ 53; *see also id.* ¶ 27 (disclosing that "the bulk of the paperboard substrate is not affected to any great extent by the calendering action and the losses in caliper due to densification are minimal prior to coating"). Petitioner does not persuade us that a person of ordinary skill in the art would have expected to achieve increased bulk and caliper thickness beyond the level disclosed Fugitt's Example 3. Although the difference between Fugitt's Example 3 and claim 23 may be small (1.6% difference in caliper thickness, per Petitioner), Petitioner does not present non-hindsight-biased reasoning or evidence sufficient to bridge that difference.

Petitioner appears to advance an alternative obviousness theory when it contends that "it would be obvious to exchang[e] the SBS in *Fugitt* for FBB [in *Papermaking*] to increase bulk, i.e. decrease density at a given caliper." Pet. 53 (citing Ex. 1005, 80, Fig. 62); *see also* Pet. Reply 25–26 (arguing that a bulk improvement that meets the Y_3' equation "was well within the range that the POSITA would expect from replacing Fugitt's SBS with FBB").¹⁶ Mr. Zotterman testifies that Papermaking teaches FBB "with a bulk as high as 1.7 cm³/g (corresponding to a basis weight of 130 lbs/3000ft² and caliper of 14.2) with a smoothness of 2.0 PPS s10."

¹⁵ In this excerpt from Papermaking, the thermo roll temperature (200°C, 392°F) exceeds the maximum temperature for steam-heated rolls, as used in Fugitt's process. Ex. 1004 ¶ 26; Ex. 1010, 98.

¹⁶ SBS refers to solid bleached sulfate board (Ex. 1004 ¶ 53), and FBB refers to folding boxboard (Ex. 1005, 80).

Ex. 1003 ¶¶ 153, 154 (citing Ex. 1005, 80, Fig. 62). We agree with Patent Owner that Mr. Zotterman improperly mixes data from Fugitt and Papermaking in an attempt to show another example within claim 23. PO Resp. 25–28. Mr. Zotterman’s calculation of 14.2 caliper points is based on data for SBS from Fugitt’s Example 3 (a basis weight of 130 lbs/3000ft²) and data for FBB from Papermaking’s Figure 62 (a bulk as high as 1.7 cm³/g). Ex. 1003 ¶¶ 154, 155; Ex. 2003 ¶¶ 60–68; PO Resp. 25–26; Pet. Reply 26.

Moreover, Petitioner’s contention that it would have been obvious to replace Fugitt’s SBS with Papermaking’s FBB (Pet. 53; Pet. Reply 25–26) does not meet Petitioner’s burden to prove obviousness. Claim 23 depends from claim 1 and recites a method for manufacturing a paperboard structure having certain properties. Ex. 1001, 12:33–55, 14:25–32. Petitioner contends that Fugitt discloses the method steps of claim 1, but fails to show that Fugitt’s method could be used to make FBB with the recited properties. It is undisputed that FBB is a different type of paperboard than the SBS board disclosed in Fugitt Example 3. Ex. 1004 ¶ 53; Ex. 1005, 80 (“FBB has the highest bulk thanks to the mechanical or chemimechanical pulp used in the middle layer of the base board. . . . SBS is made from chemical pulp, exclusively.”); Ex. 2003 ¶ 75; Ex. 2004 ¶ 32; Ex. 2005, 32:3–34:24 (Mr. Zotterman’s testimony that SBS board is made by a kraft process, is a wood-free product, and has different bulk characteristics than FBB). Petitioner admits that it selected Papermaking’s FBB because it had a caliper that satisfies the Y₃’ curve of claim 23, which is impermissible hindsight. Tr. 24:13–18.

Accordingly, we determine that Petitioner does not prevail on its challenge to claim 23 based on Fugitt and Papermaking.

5. *Claims 5–14 and 16–22*

Claims 5–14 and 16–22 depend, directly or indirectly, from claim 1. Petitioner contends that Fugitt and Papermaking both disclose the limitation of claim 5, 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. 40–52. Patent Owner does not present arguments for claims 5–14 and 16–22 separate from its arguments for claim 1. *See* PO Resp. 15–28 (opposing Petitioner’s challenge to claims 1, 2, 15, and 23 based on Fugitt and Papermaking).

Based on Petitioner’s undisputed arguments and evidence for dependent claims 5–14 and 16–22 (Pet. 40–52), we find that a preponderance of the evidence supports Petitioner.

F. *Petitioner’s Second Challenge*

Petitioner challenges claims 1, 2, and 4 based on Fugitt, Papermaking, and Gratton. Pet. 54–65. Patent Owner opposes. PO Resp. 28–36.

1. *Claim 1*

We do not address Petitioner’s challenge to claim 1 based on Fugitt, Papermaking, and Gratton because we determine that Petitioner meets its burden to show unpatentability of claim 1 based on Fugitt and Papermaking, as discussed in Section II.E.1 above.

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, 12:56–59; *see also id.* at 5:53–56

(explaining “pli”). The ’142 Patent discloses that “traditional calendering conditions” include a nip load of “350 pli,” which falls within the claim 2 range. Ex. 1001, 10:18–24. We do not rely on this disclosure as admitted prior art, but merely as background information. *See* Ex. 1003 ¶ 63 (discussing this disclosure).

Petitioner contends that it would have been obvious “to combine Fugitt with Papermaking to arrive at claim 2 because a nip load range that ‘may even exceed’ 571 pli,” as disclosed in Papermaking, “reads on about 20 to about 500 pli, especially considering that both ranges are open ranges.” Pet. 39–40 (citing Ex. 1005, 82). Petitioner contends that “[c]laim 2 is also obvious because in Gratton temperature-gradient (TG) calendering was conducted using nip loads of 20, 40, 60, 80 and 100 kN/m,” which convert to 114.2, 228.4, 342.6, 456.8, and 571.0 pli, respectively. Pet. 63–64 (citing Ex. 1006, 86).

Patent Owner argues that Papermaking’s nip load of 100 kN/m (571 pli) is “far outside the range recited in Claim 2.” PO Resp. 18. Patent Owner also argues against Petitioner’s combination of Fugitt, Papermaking, and Gratton. PO Resp. 28–35.

For the reasons that follow, we find that a preponderance of the evidence supports Petitioner.

Fugitt does not provide a numerical range of nip loads beyond disclosing that “[t]he nip loads and number of nips of the calender may be substantially reduced to minimize or avoid reduction in caliper thickness.” Ex. 1004 ¶ 26.

Papermaking discloses that a “modern cartonboard line . . . has one hot hard-nip precalender before the coating section” and “[t]he linear [nip]

load may even exceed 100 kN/m,” which converts to 571 pli. Ex. 1005, 82; *see* Pet. 39 (citing this disclosure).¹⁷

Gratton compares TG calendering with conventional calendering at nip loads of 20, 40, 60, 80, and 100 kN/m, which convert to 114.2, 228.4, 342.6, 456.8, and 571.0 pli, respectively. Ex. 1006, 86; Pet. 63–64 (citing this disclosure); Ex. 2003 ¶¶ 89, 182 (showing unit conversion).

Petitioner shows persuasively that it would have been obvious to combine the teachings of Fugitt, Papermaking, and Gratton because all three references disclose a method of manufacturing a paperboard structure with hot calendering and “because of the known advantages of heated rollers.” Pet. 61–62; Ex. 1003 ¶¶ 189, 192, 198. Petitioner’s contention is supported by Gratton’s disclosure that TG calendering “produces smooth, glossy surfaces with less bulk reduction than conventional machine calendering.” Ex. 1006, 81 (tagline); *see also* Pet. 58, 63; Ex. 1003 ¶¶ 173, 196 (citing this disclosure). Patent Owner does not dispute Petitioner’s implicit contention that it would have been obvious to combine Gratton’s nip load values (Ex. 1006, 86) with the paperboard production process of Fugitt (Ex. 1004 ¶ 26, Fig. 11) in view of Papermaking (Ex. 1010, 98). Pet. 61–64; Ex. 1003 ¶¶ 182, 183, 189.

Gratton’s nip loads of 20, 40, 60, 80, and 100 kN/m (corresponding to 114.2, 228.4, 342.6, 456.8, and 571.0 pli) overlap the claimed range of “about 20 pli to about 500 pli.” This overlap establishes a presumption of

¹⁷ Papermaking also discloses a linear nip load “from 10 to 40 kN/m [(kilonewton/meter) 57.1 to 228.6 pli]” for lightweight coated (LWC) paper. Ex. 1005, 72; *see* Pet. 39 (citing this disclosure). We do not rely on this disclosure for the reasons stated in the Institution Decision. Inst. Dec. 27–28. And Petitioner does not rely on it in the reply brief. *See* Pet. Reply 21 (addressing claim 2 and Papermaking).

obviousness for claim 2 and shifts the burden of production to Patent Owner. *Genentech*, 946 F.3d at 1341; *DuPont*, 904 F.3d at 1006, 1008; *Peterson*, 315 F.3d at 1329. A presumption of obviousness is further supported by Mr. Zotterman’s testimony that it was within the level of ordinary skill in the art to adjust nip load to optimize paperboard properties. Ex. 1003 ¶ 25.

Patent Owner does not show that there is anything special or critical about the claimed nip load range, that nip load was not recognized as a result-effective variable, or that the prior art teaches away from the claimed range. *Genentech*, 946 F.3d at 1341; *DuPont*, 904 F.3d at 1006, 1008; *Peterson*, 315 F.3d at 1331. Accordingly, Patent Owner has not met its burden of production.

When arguing against the combination of Fugitt, Papermaking, and Gratton, Patent Owner focuses on the roller temperature and heating medium, saying nothing about nip load. PO Resp. 28–35. For this combination of references, Patent Owner presents no argument about the nip load limitation of claim 2. *Id.* at 36 (stating “the same arguments provided above with respect to Claim 1 also apply to Claims 2 and 4”); PO Sur-reply 21 (again relying on claim 1 arguments for claims 2 and 4). Accordingly, Petitioner has established that it would have been obvious to apply Gratton’s nip load values to the paperboard production process of Fugitt and Papermaking.

3. *Claim 4*

We do not address Petitioner’s challenge to claim 4 based on Fugitt, Papermaking, and Gratton because we determine that Petitioner meets its burden to show unpatentability of claim 4 based on Fugitt, Papermaking, and Papermaking II, as discussed in Section II.G below.

G. 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).

Patent Owner does not present arguments for claim 4 separate from its arguments for claim 1. PO Resp. 36 (arguing that “the same arguments” apply).

Based on Petitioner’s undisputed arguments and evidence for dependent claim 4 (Pet. 65–67), we find that a preponderance of the evidence supports Petitioner.

III. MOTION TO AMEND

Patent Owner’s contingent Motion to Amend proposes substitute claims 24–27 to replace original claims 1, 2, 6, and 7, if they are found unpatentable. MTA 1. As discussed above, we determine that Petitioner shows by a preponderance of the evidence that original claims 1, 2, and 4–22 are unpatentable. We therefore proceed to address Patent Owner’s Motion to Amend.

A. Proposed Substitute Claims

Proposed substitute claims 24–27 are reproduced below, with brackets indicating deleted text and underscoring indicating added text, as compared with original claims 1, 2, 6, and 7.

24. 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 thermo-roller and a counter roller, wherein a contact surface of only said [thereto-roller] thermo-roller is heated to an elevated temperature of at least 250°F[.], and wherein the counter roller is not heated to the elevated temperature, 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 to about 500 pli;

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:

$$Y_2 = 3.71 [\div] \pm 13.14X - 0.1602X^2.$$

25. The method of claim 1 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 to about [500] 90 pli.

26. The method of claim 1 wherein at least one of said thermo-roller and said counter roller comprises a metallic material, and wherein said elevated temperature is at least about 480°F.

27. The method of claim 1 wherein said basecoat is applied to only one side of said calendered paperboard substrate, wherein the contact surface of only said thermo-roller is heated to the elevated temperature, wherein the counter roller is not heated to said elevated temperature, and wherein said elevated temperature is at least 400°F.

MTA App. A, 1–2 (proposed substitutes for claims 1, 2, 6, and 7, respectively). Proposed substitute claims 25–27 depend from original claim 1, not proposed substitute claim 24. Tr. 48:3–16. Patent Owner’s claim listing in Appendix A does not include proposed substitutes for dependent claims 4, 5 and 8–22 to change their dependency. MTA App. A; Tr. 48:9–16.

B. Statutory and Regulatory Requirements

“Before considering the patentability of any substitute claims, . . . the Board first must determine whether the motion to amend meets the statutory and regulatory requirements set forth in 35 U.S.C. § 316(d) and 37 C.F.R. § 42.121.” *Lectrosonics, Inc. v. Zaxcom, Inc.*, IPR2018-01129, Paper 15 at 4 (PTAB Feb. 25, 2019) (precedential) (“*Lectrosonics*”). We address these requirements below.

First, the Motion to Amend proposes no more than one substitute claim for each challenged claim, which is a reasonable number of substitute claims. 35 U.S.C. § 316(d)(1)(B); *Lectrosonics*, Paper 15 at 4–5 (citing 37 C.F.R. § 42.121(a)(3)). Petitioner does not argue otherwise.

Second, Patent Owner presents the claim amendments in an attempt to add features to further distinguish the proposed substitute claims as

patentable over the references asserted in the instituted grounds. MTA 5–24. Accordingly, the proposed substitute claims respond to a ground of unpatentability involved in this trial. *Lectrosonics*, Paper 15 at 5–6. Petitioner does not argue otherwise.

Third, “[a] motion to amend may not present substitute claims that enlarge the scope of the claims of the challenged patent or introduce new subject matter.” *Lectrosonics*, Paper 15 at 6–8 (citing 35 U.S.C. § 316(d)(3); 37 C.F.R. § 41.121(a)(2)(ii)). Patent Owner argues that its proposed substitute claims 24–27 contain only narrowing amendments. MTA 2–3. Petitioner does not argue that Patent Owner’s amendment enlarges the scope of the claims. We determine that proposed substitute claims 24–27 are narrower in scope than original claims 1, 2, 6, and 7 and that Patent Owner’s amendment does not enlarge the scope of the claims.

Fourth, the parties’ dispute about whether the proposed substitute claims introduce new matter is addressed in Section III.D below.

Finally, the Motion to Amend includes a claim listing, as required by 37 C.F.R. § 42.121(b). MTA App. A, 1–2.

In view of the above and for the reasons discussed in Section III.D below, we determine that the Motion to Amend meets the statutory and regulatory requirements of 35 U.S.C. § 316(d) and 37 C.F.R. § 42.121.

C. Claim Construction

The claim construction standard is set forth in Section II.C above. Neither party proposes any express constructions for purposes of the Motion to Amend. We determine that no claim term requires express construction for purposes of resolving the motion.

D. New Matter and Written Description

Patent Owner bears the burden to show written description support for the proposed substitute claims. *B.E. Tech., L.L.C. v. Google, Inc.*, No. 2015-1827, 2016 WL 6803057, at *7 (Fed. Cir. Nov. 17, 2016).

The '142 Patent claims the benefit of U.S. Provisional Application No. 62/846,278, filed May 10, 2019 (“the Provisional application,” Ex. 2009). Ex. 1001, code (60). Patent Owner asserts there is support in both the original disclosure for the '142 Patent and the Provisional application for each limitation Patent Owner proposes to add to the claims. MTA App. A, 2–6.

Petitioner argues that the proposed claims lack written description support and introduce new matter. MTA Opp. 3–12.

We address the disputed limitations below. For the limitations not specifically discussed below, we find that Patent Owner establishes written description support in the Provisional application, which has essentially the same disclosure as the '142 Patent.

1. Claims 24 and 27—counter roller not heated

Claim 24 recites passing a paperboard substrate through a hot-hard calender comprising a nip defined by a thermo-roller and a counter roller, where “only” the thermo-roller is heated to an elevated temperature of at least 250°F, “and wherein the counter roller is not heated to the elevated temperature.” MTA App. A, 1. Claim 27 similarly recites “wherein the contact surface of only said thermo-roller is heated to the elevated temperature, wherein the counter roller is not heated to said elevated temperature.” *Id.* at 2.

Patent Owner contends there is written description support for these added limitations. MTA App. A, 3–4 (citing Prelim. Resp. 11–18; Inst. Dec. 22); MTA Reply 1–4.

Petitioner contends there is no written description support for “the counter roller is not heated to the elevated temperature,” as recited in claim 24. MTA Opp. 5. Specifically, Petitioner contends, “nowhere in the ’142 Patent is there any disclosure, discussion or mention of any alternatives, or advantages or disadvantages of heating the counter roller or not heating the counter roller to the elevated temperature, or heating the counter [roller] to any temperature.” *Id.* at 7.

In the Preliminary Guidance, we indicated that the written description issue was a close one, and our preliminary view was that Patent Owner had established written description support. Prelim. Guidance 6–7. We revisit this issue on the complete record now before us.

Claims 24 and 27 recite that the counter roller is not heated to the elevated temperature. This recitation is properly viewed as a negative limitation. *See Healthier Choices Mgmt. Corp. v. Philip Morris Prods. S.A.*, No. 2023-1529, 2024 WL 4866805, at *4 (Fed. Cir. Nov. 22, 2024) (“Our court has identified claim constructions that exclude a particular element as having a negative limitation.” (citations and quotes omitted)). That is how we characterized the limitation in the Preliminary Guidance, and Patent Owner does not dispute that characterization. Prelim. Guidance 6; MTA Reply 2 (adopting the reasoning in the Board’s Preliminary Guidance).

For negative claim limitations, there is adequate written description support when the specification describes a reason to exclude the relevant element. *Novartis Pharma Corp. v. Accord Healthcare, Inc.*, 38 F.4th 1013, 1017 (Fed. Cir. 2022); *Santarus, Inc. v. Par Pharm., Inc.*, 694 F.3d 1344,

1351 (Fed. Cir. 2012). The reason could be, for example, that the specification discusses disadvantages of the element or distinguishes the element from alternatives to it. *Novartis*, 38 F.4th at 1017.

“[T]he hallmark of written description is disclosure.” *Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010). “Silence is generally not disclosure.” *Novartis*, 38 F.4th at 1017. “While a negative limitation need not be recited in the specification *in haec verba*, there generally must be something in the specification that conveys to a skilled artisan that the inventor intended the exclusion, such as a discussion of disadvantages or alternatives.” *Id.*

Testimony from a skilled artisan may be helpful, but as our reviewing court explains, such testimony cannot supplant the need for disclosure.

When the specification is itself silent regarding a negative limitation, testimony from a skilled artisan as to possibilities or probabilities that the recited element would be excluded would not suffice, lest such testimony could effectively eliminate the written description requirement. If silence were generally sufficient, all negative limitations would be supported by a silent specification. If, however, a patent owner could establish that a particular limitation would always be understood by skilled artisans as being necessarily excluded from a particular claimed method or apparatus if that limitation is not mentioned, the written description requirement would be satisfied despite the specification’s silence.

Novartis, 38 F.4th at 1017–18.

The Provisional application 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. 2009, 27 (Abstract), ¶¶ 6, 7; *see also id.* ¶ 32 (describing Figure 2 embodiment). The Provisional application 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.* ¶ 32. The Provisional application 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.* ¶¶ 32, 34. In the Provisional application’s six invention 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.* ¶¶ 39, 46, 53, 60, 67, 74, 81 (Table 1). The six invention examples also include a gloss-type calender, where “roller surface temperatures were maintained at around 200°F.” *Id.* ¶¶ 43, 50, 57, 64, 71, 78. When discussing the comparative examples, the Provisional application states that “the roller surface temperatures” were “much lower at 200°F.” *Id.* ¶ 80.

Patent Owner and Mr. Klass do not direct us to any portion of the Provisional application or the ’142 Patent that describes a reason not to heat the counter roller of the hot-hard calender to the elevated temperature. *Novartis*, 38 F.4th at 1017. Nowhere does the Provisional application suggest that the counter roller should *not* be heated to the elevated temperature. For example, there is no mention of any disadvantages of heating the counter roller to the elevated temperature.

Referring to Figure 2 of the ’142 Patent, Mr. Klass testifies that “to avoid unnecessary densification of the paperboard substrate, the uncoated side would not be heated in the hot-hard calender.” Ex. 2003 ¶ 34. But Mr. Klass does not point to any such teaching in the ’142 Patent or the Provisional application. We see no suggestion in the ’142 Patent or the Provisional application that heating the counter roller would increase the density of the paperboard substrate or otherwise produce undesirable results.

Mr. Klass testifies that “[t]he ’142 Patent never refers to the counter-roller as being heated or having an elevated temperature. A person having ordinary skill can therefore safely conclude that the counter-roller 68 is not heated.” Ex. 2003 ¶ 35 (referring to Figure 2). Similarly, Mr. Klass testifies that “there is no mention of heating any counter-roller of a hot-hard calender, nor is the temperature of the surface of any counter-roller discussed for a hot-hard calender.” *Id.* ¶ 58. Mr. Klass’s testimony does not meet the applicable legal standard for written description. The ’142 Patent’s silence about whether the counter roller is heated to the elevated temperature is not enough to convey to a skilled artisan that the inventor intended the exclusion. *Novartis*, 38 F.4th at 1017.

In the Preliminary Guidance, we stated that the patent examples and Mr. Klass’s testimony support a reasonable inference that the skilled artisan would have understood the ’142 Patent as disclosing two alternatives: an unheated counter roller (as in the hot-hard calender) and a heated counter roller (as in the gloss-type calender). Prelim. Guidance 7. We relied on Mr. Klass’s testimony that the ’142 Patent’s description of a hot-hard calender and a gloss-type calender “substantiates that any counter rollers in the hot-hard calender are not heated to the elevated temperature.” Ex. 2003 ¶¶ 35, 59; Prelim. Guidance 7 (quoting this testimony).

Upon further consideration, we determine that neither the patent examples nor Mr. Klass’s testimony is sufficient to show written description support for the negative limitation. Proposed substitute claims 24 and 27 do not recite that the counter roller is unheated, as we said in the Preliminary Guidance. Rather, they recite that the counter roller is *not heated to the elevated temperature*, which is 250°F (claim 24) or 400°F (claim 27). Even if the patent examples disclose both heated and unheated counter rollers,

they do not suggest that the counter roller should not be heated to the elevated temperature, and they are silent as to a reason not to heat the counter roller of the hot-hard calender to the elevated temperature. *Novartis*, 38 F.4th at 1017.

Moreover, upon further consideration, we find that Mr. Klass’s testimony does not meet the standard in *Novartis*, 38 F.4th at 1017–18. Mr. Klass testifies that “[i]nformation about the heating of the hot-hard calender can be inferred from what the ’142 Patent says about the optional gloss calender.” Ex. 2003 ¶ 59. He does not opine that heating the hot-hard calender’s counter roller to the elevated temperature “would always be understood by skilled artisans as being necessarily excluded” from the claimed method, if such heating is not mentioned. *Novartis*, 38 F.4th at 1017–18. Mr. Klass’s testimony is more akin to possibilities or probabilities than to the categorical circumstances posited in *Novartis*.

Based on the complete record now before us, we determine that Patent Owner has not met its burden to show written description support for the limitation of claims 24 and 27 about not heating the counter roller to the elevated temperature.

2. *Claim 25—nip load of about 20 to 90 pli*

Claim 25 recites “applying a nip load to said paperboard substrate ranging from about 20 pli to about 90 pli.” MTA App. A, 2. Claim 25 replaces claim 2’s upper limit of 500 pli with an upper limit of 90 pli. *Id.* at 4.

Patent Owner contends the 90 pli limit “is specifically called out as the nip load in the hot-hard calender in three of six detailed examples in

the '142 Patent specification.” MTA App. A, 4–5 (citing Ex. 1001, 7:52–57, 8:23–28, 8:60–65; Ex. 2009 ¶¶ 53, 60, 67); *see also* MTA Reply 3.

Petitioner argues that “[m]erely disclosing various nip load ranges and a possible upper limit, e.g. 90 pli, is insufficient written support” and that “disclosing specific endpoints such as a nip load of 20 pli and 90 pli is insufficient written description for claiming a nip load of about 20 pli to 90 pli.” MTA Opp. 11.

In the Preliminary Guidance, we provided our preliminary view that Patent Owner had established written description support for claim 25. Prelim. Guidance 7–9. We revisit this issue on the complete record now before us.

The test for adequate written description “is whether the disclosure of the application relied upon reasonably conveys to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date.” *Ariad Pharms.*, 598 F.3d at 1351. Where a claim recites a numerical range, “a skilled artisan must be able to reasonably discern a disclosure of that range.” *Indivior UK Ltd. v. Dr. Reddy’s Lab’ys S.A.*, 18 F.4th 1323, 1328 (Fed. Cir. 2021). When a claimed range is narrower than one described in the specification, our reviewing court directs us to consider whether “the broad described range pertains to a different invention than the narrower (and subsumed) claimed range.” *RAI Strategic Holdings, Inc. v. Philip Morris Prods. S.A.*, 92 F.4th 1085, 1088, 1090 (Fed. Cir. 2024) (citing *In re Wertheim*, 541 F.2d 257, 265 (C.C.P.A. 1976)). “The specification need not expressly recite the claimed range to provide written description support.” *RAI*, 92 F.4th at 1090.

The Provisional application discloses that applying a nip load smooths the paperboard, making it “more dense (e.g., less bulky) than less smooth

paperboard” and that “low density is a desirable quality in many paperboard applications.” Ex. 2009 ¶¶ 3, 4.

The Provisional application discloses a number of exemplary nip load ranges, including “about 20 pli . . . to about 500 pli,” “about 20 pli to about 350 pli,” “about 20 pli to about 160 pli,” and “about 30 pli to about 140 pli.” Ex. 2009 ¶ 33; *see also id.* at 20 (originally-filed claims 13–16).

The Provisional application includes six invention examples and six comparative examples. Ex. 2009 ¶¶ 37–82. The paperboard substrates of Examples 1–6 were “calendered by a hot-hard calender, [and] the paperboard substrates of the Comparative Examples were calendered using a traditional calender under traditional calendering conditions.” *Id.* ¶ 80. The hot-hard calender in Examples 1–3 has a nip load of 140 pli; the hot-hard calender in Examples 4–8 has a nip load of 90 pli; and the hot-hard calender in Comparative Examples 1–6 has nip load of 350 pli. *Id.* ¶¶ 39, 46, 53, 60, 67, 74, 80; *see also id.* ¶ 81, Table 1. The Provisional application discloses that “a comparably smooth paperboard structure may be manufactured using the disclosed method (which utilizes the hot-hard calender) despite applying a significantly lower nip load.” *Id.* ¶ 82. The Provisional application states, “it is believed that calendering paperboard substrates at significantly higher temperatures may compensate for lower nip loads in achieving a desired smoothness.” *Id.* The Provisional application indicates that the disclosed method produces low density paperboard with desired smoothness. *Id.* ¶¶ 37, 83, 87.

We find that the foregoing disclosures of the Provisional application reasonably convey to those skilled in the art that the inventors had possession of the claimed nip load range of about 20 pli to about 90 pli. A lower limit of 20 pli is supported by three example ranges, “about 20 pli . . .

to about 500 pli,” “about 20 pli to about 350 pli,” and “about 20 pli to about 160 pli.” Ex. 2009 ¶ 33. The Provisional application teaches that lower nip loads result in lower density, which is desirable. *Id.* ¶¶ 4, 82. Examples 4–6 disclose a nip load of 90 pli and produced the lowest (best) smoothness values. *Id.* ¶ 81, Table 1. Ninety pounds per linear inch is the midpoint of the disclosed range, “about 20 pli to about 160 pli” (*id.* ¶ 33), and is a logical upper limit in view of the teaching that lower nip loads produce lower density (*id.* ¶¶ 4, 82) and the favorable results in Examples 4–6.

Our determination is consistent with Federal Circuit precedent. In *RAI*, the Court overturned the Board’s determination that two challenged claims lacked written description support. *RAI*, 92 F.4th at 1088–1092. The Court found that, “[w]hile the ’542 patent specification does not disclose the claimed range [about 75% to about 85%] itself, it does expressly disclose both endpoints by providing that the length of the heating member may be ‘about 75% to about 125%’ or ‘about 85% to about 115%.’” *Id.* at 1090. Here, as in *RAI*, the Provisional application does not expressly disclose the claimed range of about 20 pli to about 90 pli, but it does expressly disclose both endpoints, as discussed above. Ex. 2009 ¶¶ 60, 67, 74, 81, Table 1.

The facts of this case are distinguishable from *Indivior*, 18 F.4th 1323, cited by Petitioner. MTA Opp. 11. There, the court agreed with the Board’s determination that two claimed ranges lacked written description support. The endpoints of the first claimed range were not disclosed in the patent application, unlike the situation here. *Indivior*, 18 F.4th at 1328–29. The second claimed range was not disclosed in the patent application, and unlike the situation here, its endpoints could be obtained only by taking the sum of particular values disclosed in a table. *Id.* at 1329.

Responding to our Preliminary Guidance, Petitioner argues that “the 90 pli of Examples 4–6 is only disclosed in combination with a very high temperature (500°F)” and a skilled artisan “would conclude is that these lowest nip loads (20–90 pli) are only an option for the highest temperatures (above 480°F).” MTA Sur-reply 6. Petitioner cites no evidence or legal authority for this argument. It is not persuasive to rebut the evidence discussed above, which is consistent with the applicable legal standard.

Based on the complete record now before us, we determine that Patent Owner has met its burden to show written description support for the nip load range of claim 25.

3. *Claim 26—thermo roller temperature*

Claim 26 recites “wherein said elevated temperature is at least about 480°F.” MTA App. A, 2.

Patent Owner contends there is “ample support for the elevated temperature of at least about 480°F,” noting the temperature of 480°F in Examples 1–3, among other disclosures. MTA App. A, 5 (citing Ex. 2009 ¶¶ 34, 39, 46, 53).

Petitioner contends “disclosing heating a thermo-roller to an elevated temperature of ‘at least 400°F[’] and an example of heating a thermo-roller to an elevated temperature of ‘about 480°F’ does not support the substitute of claim 27 [*sic*, claim 26]’s ‘at least 480°F’ elevated temperature.” MTA Opp. 12.

In the Preliminary Guidance, we provided our preliminary view that Patent Owner had established written description support for claim 26. Prelim. Guidance 9. Patent Owner agrees (MTA Reply 3–4), and Petitioner

provides no further argument on the issue (*see* MTA Sur-reply). We revisit this issue on the complete record now before us.

The Provisional application discloses several examples of an “elevated temperature,” namely, “at least 250°F,” “at least 300°F,” “at least 400°F,” and “at least 500°F.” Ex. 2009 ¶ 34. The Provisional application also discloses that, for the six invention examples, the surface temperature of the thermo-roller was either 480°F (Examples 1–3) or 500°F (Examples 4–6), compared with 200°F for the comparative examples. *Id.* ¶¶ 39, 46, 53, 60, 67, 74, 81 (Table 1). The Provisional application states that “calendering paperboard substrates at significantly higher temperatures may compensate for lower nip loads in achieving a desired smoothness.” *Id.* ¶ 82.

We find that the foregoing disclosures of the Provisional application reasonably convey to those skilled in the art that the inventors had possession of the claimed elevated temperature of “at least about 480°F.” Our finding is supported by the Provisional application’s disclosure of an elevated temperature of “at least 400°F” or “at least 500°F” (Ex. 2009 ¶ 34) and Examples 1–6, which provided favorable results at elevated temperatures of either 480°F or 500°F (*id.* ¶¶ 81, 82, Tables 1, 2).

E. Challenge to Patentability Based on Lack of Enablement

Petitioner challenges proposed substitute claims 24–27 as not enabled under 35 U.S.C. § 112(a). MTA Opp. 12–13. Petitioner contends that “the ’142 patent does not teach a person of ordinary skill in the art how to make and use the full scope of the purported invention without undue experimentation.” MTA Opp. 13. According to Petitioner, the ’142 Patent does not provide sufficient enabling disclosure “to know what temperature

the counter roller should be heated or at what temperature the counter roller should be.” *Id.* (citing Ex. 1001). More particularly, Petitioner argues:

A person of ordinary skill in the art would wonder whether the counter roller of claim 24 (and as applied to claims 25–27 as well) should be at ambient temperature, heated to a temperature less than the elevated temperature or even heated to a temperature over the elevated temperature[] (Ex. 1001), as well as the effects on the paperboard for doing so.

Id.

In the Preliminary Guidance, we provided our preliminary view that Petitioner had not demonstrated a lack of enablement. Prelim. Guidance 10–11. Patent Owner agrees (MTA Reply 4–5), and Petitioner provides no further argument on the issue (*see* MTA Sur-reply).

Although Petitioner asserts that its nonenablement argument applies to all of Patent Owner’s proposed substitute claims 24–27, the substance of the argument is directed solely to the limitation of claims 24 and 27 that the counter roller is not heated to the elevated temperature. MTA Opp. 12–13. In view of our determination that this limitation lacks written description support (*see* Section III.D.1, *supra*), we do not address Petitioner’s nonenablement argument.

F. Challenges to Patentability Based on Obviousness

Petitioner challenges patentability of the proposed substitute claims as follows:

Proposed Substitute Claims Challenged	35 U.S.C. §	References
24–27	103	Fugitt, Papermaking, Gratton,

Proposed Substitute Claims Challenged	35 U.S.C. §	References
		Zakaib ¹⁸

MTA Opp. 14. In view of our determination that proposed substitute claims 24 and 27 lack written description support, we limit our analysis of Petitioner’s obviousness challenges to claims 25 and 26.

1. Claim 25

Claim 25 depends from claim 1 and recites “applying a nip load to said paperboard substrate ranging from about 20 pli to about 90 pli.” MTA App. A, 2. Claim 25 replaces claim 2’s upper limit of 500 pli with an upper limit of 90 pli. *Id.* at 4.

Petitioner contends that the nip load range in claim 25 “overlaps with the common range in the prior art.” MTA Opp. 16–17 (citing Ex. 1003 ¶ 119; Ex. 1012, 110–115).¹⁹

In the Preliminary Guidance, we provided our preliminary view that Petitioner had not shown that claim 25 is likely obvious over the asserted prior art. Prelim. Guidance 11–13. We revisit this issue on the complete record now before us.

Fugitt does not provide a numerical range of nip loads beyond disclosing that “[t]he nip loads and number of nips of the calender may be substantially reduced to minimize or avoid reduction in caliper thickness.” Ex. 1004 ¶ 26.

¹⁸ Ex. 2007, S. Zakaib et al., *Quality Improvements to Publication and Board Grades by Hot Calendering with Induction Heating*, Presented at the 1997 TAPPI Newsprint Forum, Birmingham, AL, March 1997.

¹⁹ Petitioner incorrectly cites Mr. Zotterman’s declaration testimony as Exhibit 1009 ¶ 119 instead of Exhibit 1003 ¶ 119. MTA Opp. 16.

Petitioner does not present persuasive evidence that a person of ordinary skill in the art would have reduced the nip load to the level in substitute claim 25, “about 20 pli to about 90 pli.”²⁰

Petitioner relies on Mr. Zotterman’s testimony that, in his experience, a nip load of “10–90 kN/m [57.1–513.9 pli] is common.” MTA Opp. 16 (citing Ex. 1003 ¶ 119). Mr. Zotterman’s testimony is based on two ranges disclosed in Papermaking. Ex. 1003 ¶ 119 (citing Ex. 1005, 72, 82). The first range, 10 to 40 kN/m (57.1 to 228.6 pli), is for lightweight coated (LWC) paper, which Papermaking characterizes as a “wood-containing coated paper grade[.]” Ex. 1005, 72. Petitioner fails to show that this nip load range is applicable to Fugitt’s process for making SBS board (Ex. 1004 ¶ 53),²¹ which Papermaking teaches “is made from chemical pulp, exclusively.” Ex. 1005, 80. We credit Mr. Klass’s testimony that Papermaking’s nip load range of 57.1 to 228.6 pli “is not stated as being particularly relevant to paperboard or cartonboard but is instead relevant to coated wood-containing paper grades and woodfree coated (WFC), paper grades that are both outside of the SBS context of Example 3 in *Fugitt*.” Ex. 2004 ¶ 77.

²⁰ As discussed in Section II.F.2 above, Gratton discloses nip loads of 20, 40, 60, 80 and 100 kN/m, which convert to 114.2, 228.4, 342.6, 456.8, and 571.0 pli, respectively. Ex. 1006, 86. Although Gratton’s nip loads overlap claim 2’s range, they do not overlap substitute claim 25’s range of about 20 pli to about 90 pli.

²¹ Although Fugitt defines “paperboard substrate” as “any paperboard material that is capable of being coated with a basecoat,” Petitioner relies on the SBS of Fugitt’s Example 3 to show the paperboard properties of claim 1, from which claim 25 depends. Ex. 1004 ¶¶ 24, 53, 57.

The second range cited by Mr. Zotterman is Papermaking’s disclosure that “[t]he linear load may even exceed 100 kN/m [571 pli].” Ex. 1003 ¶ 119 (citing Ex. 1005, 82). Although this range is for cartonboard (Ex. 1005, 82), it is wholly outside claim 25’s range and does not support Mr. Zotterman’s testimony that “10–90 kN/m [57.1–513.9 pli] is common.” Ex. 1003 ¶ 119.

Next, Petitioner relies on Mr. Klass’s deposition testimony about Marley,²² asserting that Mr. Klass “confirmed that Marley discloses a hot hard pre-calender in which the surface temperature of the heated roll is 300°C and the nip load is ranging from 10 N/mm [57.1 PLI] to 100 N/mm,” which converts to 571 pli. MTA Opp. 16 (citing Ex. 1012, 110–115). Marley relates to a Swedish mill for making folding boxboard (FBB). Ex. 1015, 17. As discussed in Section II.E.4 above, FBB is a different type of paperboard than Fugitt’s SBS board. Ex. 1004 ¶ 53; Ex. 1005, 80; Ex. 2003 ¶ 75; Ex. 2004 ¶ 32; Ex. 2005, 32:3–34:24. Petitioner fails to show that Marley’s nip load range for FBB is applicable to Fugitt’s process for making SBS board.

Our Preliminary Guidance states that “Petitioner does not provide a sufficient rationale for combining Marley’s nip load range with the paperboard production process of Fugitt and Papermaking.” Prelim. Guidance 13. Although Petitioner’s sur-reply responds to our Preliminary Guidance (MTA Sur-reply 10–11), Petitioner provides no argument or evidence supporting a rationale for Petitioner’s combination of Marley with

²² Ex. 1015, M. Marley, *StoraEnso Fors starts up a MHV zone controlled calender*, Paper Technology, February 2010. Petitioner incorrectly cites Marley as Exhibit 1005 instead of Exhibit 1015. MTA Opp. 16.

Fugitt and Papermaking. Accordingly, Petitioner does not persuade us that Marley's nip load range is applicable to a process for making SBS board, as taught by Fugitt in view of Papermaking.

Our Preliminary Guidance further states that Petitioner also does not "address whether a person of ordinary skill in the art would have expected to achieve the paperboard properties (smoothness and basis weight) disclosed in Fugitt and recited in claim 1 by combining Marley's nip load with the production process of Fugitt and Papermaking." Prelim. Guidance 13. Petitioner responds to that preliminary finding with four pieces of evidence, which we address below. MTA Sur-reply 10–11.

First, Petitioner relies on Fugitt's teaching that "[t]he nip loads and number of nips of the calender may be substantially reduced to minimize or avoid reduction in caliper thickness." Ex. 1004 ¶ 26. Petitioner argues that, "[b]ecause of this effect on thickness, the POSITA would expect a reduction of the nip load to the range taught b[y] *Marley* to improve the position of the basis weight in relation to the Y_2 curve defined in claim 1." MTA Sur-reply 10. Even if Petitioner's argument is persuasive to show that Fugitt's basis weight could be achieved, it says nothing about smoothness.

Second, Petitioner relies on Mr. Zotterman's deposition testimony that, in a coated board machine having a hard-nip pre-calender, "you would use the heat to improve the surface smoothness. And it would allow you to lower the nip load." Ex. 2005, 72:23–73:9. According to Mr. Zotterman, "this is fundamental. I mean, everybody working in the mill would know this. And that would be a part of the daily optimization." *Id.* at 73:10–17

(cited at MTA Sur-reply 11).²³ In this portion of his testimony, Mr. Zotterman does not discuss any numerical values for the smoothness or nip load. Mr. Zotterman's testimony is not persuasive to show that a person of ordinary skill in the art would have expected to achieve the smoothness disclosed in Fugitt and recited in claim 1 when reducing the nip load to the level recited in claim 25.

Third, Petitioner argues that Papermaking and Zakaib teach the "beneficial effect of temperature on smoothness and bulk (and hence thickness)." MTA Sur-reply 11 (cross-referencing Petitioner's argument for claim 24). Petitioner's argument is unrelated to the nip load range of claim 25 and is not persuasive to show that a person of ordinary skill in the art would have expected to achieve the smoothness disclosed in Fugitt and recited in claim 1 when reducing the nip load to the level recited in claim 25.

Fourth, Petitioner argues that the smoothness disclosed in Fugitt (PPS of 1.5 μm) "is far below the claimed upper limit of 3.0 μm , which means that only a drastic deterioration of the surface properties would move the board outside the claimed range." MTA Sur-reply 11. It is true that Fugitt's Example 3 has "a Parker Print Surf (PPS 10S) smoothness of about 1.5 microns" (Ex. 1004 ¶ 57) within claim 1's range of "at most 3 microns." But Petitioner's argument is not persuasive to show that a person of ordinary skill in the art would have expected to achieve the smoothness disclosed in Fugitt and recited in claim 1 when reducing the nip load to the level recited in claim 25. We note, for example, that none of Gratton's examples achieve the smoothness of Fugitt and claim 1, despite using nip loads above the

²³ Petitioner incorrectly cites Mr. Zotterman's deposition testimony as Exhibit 1003 instead of Exhibit 2005. MTA Sur-reply 11.

range recited in claim 25. Ex. 1006, 84 (Table II); *see* Ex. 2003 ¶ 79; Ex. 2004 ¶ 36 (Mr. Klass testifying that Gratton’s smoothness “ranges from 4.17 to 8.32 microns, whereas Claim 1 recites at most 3 microns, and Example 3 in *Fugitt* yielded 1.5 microns” and “[b]oth *Fugitt* and the ’142 patent seriously outclass *Gratton*”).

For these reasons, we determine that Petitioner has not carried its burden to show unpatentability of claim 25.

2. Claim 26

Claim 26 depends from claim 1 and recites that the elevated temperature to which a contact surface of said thermo-roller is heated “is at least about 480°F.” MTA App. A, 2; *see also* Ex. 1001, 12:33–55 (claim 1).

Petitioner directs us to Papermaking’s teaching that “Steam can be used up to 170°C [338°F] surface temperature” and that oil-heated rolls “can reach over 220°C [428°F].” MTA Opp. 17 (citing Ex. 1010, 98). Petitioner also argues that Marley “shows that 300°C [572°F] was known in the art for pre-calendering before coating of paperboard.” *Id.* (citing Ex. 1015, 17).

In the Preliminary Guidance, we provided our preliminary view that Petitioner had not shown that claim 26 is likely obvious over the asserted prior art. Prelim. Guidance 13–14. We revisit this issue on the complete record now before us.

As discussed above for claim 1, *Fugitt* discloses that “[t]he rolls of the calender may be steam heated.” Ex. 1004 ¶ 26. In a section titled “Heated Rolls,” Papermaking discloses that “Steam can be used up to 170°C [338°F] surface temperature.” Ex. 1010, 95, 98. These disclosures support our determination that it would have been obvious to heat the surface of *Fugitt*’s rolls to “at least 250°F,” as recited in claim 1.

The minimum temperature recited in claim 25, “at least about 480°F,” is significantly higher than the maximum for steam-heated rolls. Ex. 1010, 98 (“up to 170°C [338°F]”). Petitioner does not provide a sufficient rationale for modifying Fugitt’s process, which uses steam-heated rolls (having a maximum surface temperature of 338°F), with the teachings Papermaking or Marley, which disclose higher temperatures. Although Petitioner argues that oil-heated rolls can reach “can reach over 220°C [428°F]” (MTA Opp. 17; Ex. 1010, 98), Petitioner does not present a sufficient rationale for replacing Fugitt’s steam-heated rolls with oil-heated rolls or induction-heated rolls. Although Marley does not disclose the heating medium, the disclosed temperature (300°C, or 572°F) far exceeds the maximum for steam-heated rolls. Ex. 1010, 98; Ex. 1015, 17.

Responding to the Preliminary Guidance, Petitioner argues that “heat improves smoothness and preserves bulk.” MTA Sur-reply 12 (citing Ex. 1005, 40, 82). The cited disclosures do not support obviousness of claim 26. At page 40, Papermaking discloses that “[h]igh temperature produces better web surface quality, uniformity and smoothness (Figure 23), and preserves bulk and strength properties.” Ex. 1005, 40. The highest temperature shown in Figure 23 is 204°C (399°F), which is below claim 26’s range of “at least about 480°F.” *Id.* At page 82, Papermaking discloses that “[h]igh thermo roll temperatures (in some cases over 200°C) result in bulk savings because of the temperature gradient.” *Id.* at 82. Again, 200°C (392°F) is outside the claim 26 range.

Petitioner contends that Zakaib teaches that “roll surface temperatures of up to 250°C (482°F)” improve both bulk and smoothness and Gratton teaches that 210°C (410°F) “improve[s] paper surface properties with less bulk reduction.” MTA Sur-reply 12 (citing Ex. 1006, 81). Gratton’s

temperature of 210°C (410°F) is outside the claim 26 range. Ex. 1006, 81. Zakaib teaches that “[h]ot calendering provides many improvements in sheet printability, strength, bulk, elimination of two-sidedness and optimized calender configuration.” Ex. 2007, 57, Abstract. Zakaib further discloses that external induction heating allows “roll surface temperatures of up to 250°C (482°F).” *Id.* at 57.

But Petitioner does not show that a person of ordinary skill in the art would have expected to improve the bulk and smoothness of Fugitt’s paperboard by increasing the roll surface temperature to 482°F, as disclosed in Zakaib. On the contrary, Zakaib’s “Figure 7 shows that increasing sheet temperature reduces caliper points.” Ex. 2004 ¶ 86 (citing Ex. 2007, 61). Because caliper is related to bulk (Ex. 2005, 26:17–27:4), Zakaib’s teaching is contrary to Fugitt’s objective of minimizing bulk reduction. Ex. 1004 ¶ 27. Furthermore, Zakaib Figure 10 shows that increasing the roll temperature from 100°C (212°F) to 180°C (356°C) improved the smoothness from 7.0 PPS to 5.5 PPS in an FBB mill. Ex. 2007, 60, 62. These smoothness values are no better than Fugitt’s PPS of 1.5 microns (Ex. 1004 ¶ 57), and the roll temperatures are outside the claim 26 range.

For these reasons, we determine that Petitioner has not carried its burden to show unpatentability of claim 26.

IV. MOTIONS TO EXCLUDE

A. *Exhibits 1013 and 1014*

Patent Owner moves to exclude Petitioner’s Exhibits 1013–1015. PO MTE. Petitioner filed an opposition (Paper 50, “Pet. MTE Opp.”), and Patent Owner filed a reply (Paper 53).

Exhibit 1013 is a chart showing data and calculations purportedly based on Figure 62 of Papermaking (Ex. 1005, 80), together with an image of Figure 8 of the '142 Patent with additional data plotted on it. Ex. 1013. Exhibit 1014 is a chart showing data and calculations purportedly based on Table 1 of Gratton. Ex. 1006, 80. Petitioner introduced these exhibits at the deposition of Mr. Klass. Ex. 1012, 140:12–24, 147:18–148:6. Patent Owner filed objections to Exhibits 1013 and 1014. Paper 26. Petitioner served a declaration of Anders Wirén as supplemental evidence in response to the objections. Patent Owner deposed Mr. Wirén (Ex. 2011), and Petitioner filed Mr. Wirén's declaration (Ex. 1016) with its opposition to Patent Owner's motion to exclude.

Petitioner offers Exhibits 1013 and 1014 for purposes of proving that the prior art comes within the scope of the challenged claims. More particularly, Petitioner relies on Exhibits 1013 and 1014 to support an argument that Papermaking and Gratton disclose products that fall below the Y_2 curve in claim 1 and Figure 8 of the '142 Patent. Pet. Reply 7–10, 12–13; Pet. MTE Opp. 4, 10. Exhibits 1013 and 1014 were prepared by Mr. Wirén, a European Patent Attorney with a Swedish law firm representing Petitioner. Ex. 1016 ¶¶ 1, 3, 8; Ex. 2011, 6:20–7:7, 15:25–16:11, 23:22–25:1, 30:18–31:2. These exhibits present Mr. Wirén's technical analysis of the prior art, as compared with the challenged claims. Ex. 1016 ¶¶ 3–10; Ex. 2011, 29:16–30:14, 31:8–20, 35:19–36:3, 42:10–24.

Exhibits 1013 and 1014 are not themselves prior art. They are the testimony of Mr. Wirén about the prior art. Exhibits 1013 and 1014 are not admissible as the opinion testimony of a lay witness because they require

“scientific, technical, or other specialized knowledge.” Fed. R. Evid. 701.²⁴ Exhibits 1013 and 1014 are also not admissible as expert testimony because Mr. Wirén is not “qualified as an expert by knowledge, skill, experience, training, or education.” Fed. R. Evid. 703.

“To offer expert testimony from the perspective of a skilled artisan in a patent case—like for claim construction, validity, or infringement—a witness must at least have ordinary skill in the art. Without that skill, the witness’ opinions are neither relevant nor reliable.” *Kyocera Senco Indus. Tools Inc. v. Int’l Trade Comm’n*, 22 F.4th 1369, 1376–77 (Fed. Cir. 2022). Mr. Wirén does not meet our definition of a person of ordinary skill in the art. *See* Section II.B, *supra*. That definition is based on the undisputed testimony of Messrs. Zotterman and Klass. Ex. 1003 ¶ 24; Ex. 2003 ¶ 26. Although Mr. Wirén has a Master’s of Science in chemical engineering, he lacks any experience or specialization in paperboard manufacturing. Ex. 2011, 12:1–10, 19:6–25, 20:2–7.

We therefore agree with Patent Owner that Exhibits 1013 and 1014 are the testimony of Mr. Wirén and should be excluded from evidence because Mr. Wirén is not a person of ordinary skill in the relevant art. PO MTE 5–6, 9; *Sundance, Inc. v. DeMonte Fabricating Ltd.*, 550 F.3d 1356, 1362 (Fed. Cir. 2008) (“Unless a patent lawyer is also a qualified technical

²⁴ The rule provides:

If a witness is not testifying as an expert, testimony in the form of an opinion is limited to one that is: (a) rationally based on the witness’s perception; (b) helpful to clearly understanding the witness’s testimony or to determining a fact in issue; and (c) not based on scientific, technical, or other specialized knowledge within the scope of Rule 702.

Fed. R. Evid. 701.

expert, his testimony on these kinds of technical issues[, validity and infringement,] is improper and thus inadmissible.”).

B. Exhibit 1015

Exhibit 1015 is the Marley reference that we discuss above in connection with Petitioner’s challenges to Patent Owner’s proposed substitute claims 25 and 26. *See* Section III.F, *supra*.

Patent Owner asserts that Petitioner relies on Marley for its case-in-chief against the original and substitute claims and argues that the evidence is both untimely and irrelevant. PO MTE 12–13.

A motion to exclude is not the proper vehicle to address evidence that a party believes exceeds the proper scope of a reply. Consolidated Trial Practice Guide November 2019 (“CTPG”)²⁵ at 79. We nevertheless consider Patent Owner’s untimeliness argument.

Marley is cited for the first time in the reply brief as support for Petitioner’s challenge to claim 2. Pet. Reply 22. To the extent Petitioner relies on Marley as part of its case-in-chief against claim 2, we agree with Patent Owner that Petitioner’s reliance on Marley is untimely. We therefore do not rely on Marley as support for our determination that claim 2 is unpatentable.

Our trial practice guide provides that, in an opposition to a motion to amend, “Petitioners may respond to new issues arising from proposed substitute claims and may include evidence responsive to the amendment. 35 U.S.C. §§ 316(a), 326(a). This includes the submission of new expert declarations or additional prior art that are directed to the proposed substitute claims.” CTPG 72.

²⁵ Available at <https://www.uspto.gov/TrialPracticeGuideConsolidated>.

Patent Owner’s proposed substitute claims 25 and 26 raise new issues concerning nip load and roll surface temperature. *See* MTA 9–11 (discussing patentability of claims 25 and 26 over the prior art asserted in the Petition). It is therefore proper for Petitioner to rely on additional prior art—Marley—in its opposition to the motion to amend. CTPG 72.

Accordingly, we do not exclude Exhibit 1015, but we limit our consideration of that evidence to Patent Owner’s Motion to Amend.

C. Exhibit 2012

Petitioner moves to exclude Patent Owner’s Exhibit 2012. Pet. MTE. Patent Owner opposes (Paper 54, “PO MTE Opp.”).

Exhibit 2012 is a declaration of Mr. Klass that Patent Owner filed with its motion to exclude Petitioner’s Exhibits 1013–1015 (Paper 50). Exhibit 2012 provides Mr. Klass’s substantive response to Petitioner’s Exhibits 1013 and 1014. Ex. 2012.

Petitioner argues that Exhibit 2012 is an improper attempt to provide testimony in support of Patent Owner’s sur-reply. Pet. MTE 3–4 (citing CTPG 73). Patent Owner agrees there may be some overlap between Exhibit 2012 and Patent Owner’s sur-reply, but argues that is not a basis to exclude the evidence. PO MTE Opp. 1.

We agree with Patent Owner. A motion to exclude is not the proper vehicle to address evidence that a party believes exceeds the proper scope of a sur-reply. CTPG 79. Moreover, Exhibit 2012 is not untimely because it responds to Exhibits 1013 and 1014 that Petitioner introduced in the reply. Petitioner had the opportunity to cross-examine Mr. Klass regarding Exhibit 2012, but did not do so. PO MTE Opp. 2; *see also* Paper 46 (Board’s order extending due dates for opposition and reply to motion to

exclude, citing Ex. 3003); Ex. 3003 (Petitioner’s email to the Board seeking opportunity to cross-examine Mr. Klass before responding to Patent Owner’s motion to exclude).

Next, Petitioner argues that Exhibit 2012 lacks relevance. Pet. MTE 4–5. That argument is unpersuasive. Exhibit 2012 provides Mr. Klass’s substantive response to Exhibits 1013 and 1014 that Petitioner relies on to support an argument that prior art products fall below the Y_2 curve in claim 1 and Figure 8 of the ’142 Patent. Pet. Reply 7–10, 12–13. Although we exclude Exhibits 1013 and 1014, Petitioner’s reply arguments remain in the record.

For these reasons, we deny Petitioner’s motion to exclude Exhibit 2012.

V. CONCLUSION

In summary:

Claim(s)	35 U.S.C. §	Reference(s)/Basis	Claim(s) Shown Unpatentable	Claim(s) Not Shown Unpatentable
1, 2, 5–23	103	Fugitt, Papermaking	1, 5–22 ²⁶	23
1, 2, 4	103	Fugitt, Papermaking, Gratton	2 ²⁷	

²⁶ As discussed above, we do not reach Petitioner’s first challenge to claim 2 in view of our determination that claim 2 is unpatentable based on Fugitt, Papermaking, and Gratton.

²⁷ As discussed above, we do not reach Petitioner’s second challenge to claims 1 and 4 in view of our determinations that claim 1 is unpatentable based on Fugitt and Papermaking and that claim 4 is unpatentable based on Fugitt, Papermaking, and Papermaking II.

Claim(s)	35 U.S.C. §	Reference(s)/Basis	Claim(s) Shown Unpatentable	Claim(s) Not Shown Unpatentable
4	103	Fugitt, Papermaking, Papermaking II	4	
Overall Outcome			1, 2, 4–22	23

Motion to Amend Outcome	Claim(s)
Original Claims Cancelled by Amendment	
Substitute Claims Proposed in the Amendment	24–27
Substitute Claims: Motion to Amend Granted	25, 26
Substitute Claims: Motion to Amend Denied	24, 27
Substitute Claims: Not Reached	

VI. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that Petitioner has shown that claims 1, 2, and 4–22 of the '142 Patent are unpatentable;

FURTHER ORDERED that Petitioner has not shown that claim 23 of the '142 Patent is unpatentable;

FURTHER ORDERED that Patent Owner's Contingent Motion to Amend is *denied* as to proposed claims 24 and 27 and *granted* as to proposed substitute claims 25 and 26;

FURTHER ORDERED that Patent Owner's Motion to Exclude is *granted* as to Exhibits 1013 and 1014 and *denied* as to Exhibit 1015;

FURTHER ORDERED that Petitioner's Motion to Exclude Exhibit 2012 is *denied*; and

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

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