

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

YKK CORPORATION,
Petitioner,

v.

3M INNOVATIVE PROPERTIES CO.,
Patent Owner.

IPR2020-00699
Patent 10,165,833 B2

Before BARRY L. GROSSMAN, KEVIN W. CHERRY, and
MATTHEW S. MEYERS, *Administrative Patent Judges*.

MEYERS, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining Some Challenged Claims Unpatentable
Denying Patent Owner's Revised Contingent Motion to Amend
35 U.S.C. § 318(a)

I. INTRODUCTION

A. *Background and Summary*

YKK Corporation (“Petitioner”) filed a petition, on March 10, 2020, for *inter partes* review (Paper 1 (“Pet.”)) challenging claims 1–20 of U.S. Patent No. 10,165,833 B2 (Ex. 1001, “the ’833 patent”). *See* 35 U.S.C. § 311. 3M Innovative Properties Co. (“Patent Owner”) timely filed a Preliminary Response to the Petition. Paper 7 (“Preliminary Response” or “Prelim. Resp.”).

Pursuant to 35 U.S.C. § 314, we instituted an *inter partes* review of all challenged claims on all grounds presented in the Petition. Paper 8 (“Inst. Dec.”). After institution, Patent Owner filed a Patent Owner Response (Paper 15, “PO Resp.”) as well as a Contingent Motion to Amend (Paper 16, “MTA”). Petitioner filed a Reply to Patent Owner’s Response (Paper 19, “Pet. Reply”), and an opposition to Patent Owner’s Motion to Amend (Paper 20, “MTA Opp.”).

On April 8, 2021, pursuant to Patent Owner’s request (*see* MTA 2), we issued Preliminary Guidance on Patent Owner’s Motion to Amend. Paper 21 (“PG”). Patent Owner then filed a Revised Contingent Motion to Amend (Paper 23, “RMTA”), along with a Sur-reply (Paper 22, “PO Sur-reply”). Petitioner opposed Patent Owner’s Revised MTA. Paper 25 (“RMTA Opp.”). Patent Owner filed a reply in support of its Revised MTA. Paper 32 (“RMTA Reply”). Petitioner then filed a Sur-reply related to the Revised Contingent Motion to Amend. Paper 34 (“RMTA Sur-reply”).

On July 14, 2021, we conducted an oral hearing.¹ A copy of the transcript (Paper 38, “Tr.”) is included in the record.

We have jurisdiction under 35 U.S.C. § 6(b), and we issue this Final Written Decision pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. As explained below, we conclude that Petitioner has shown by a preponderance of the evidence that claims 1–11 and 13–20 of the ’833 patent are unpatentable, but has not shown that claim 12 of the ’833 patent is unpatentable. We also determine that Petitioner has met the burden to show, by a preponderance of the evidence on this trial record that, all the proposed claims in the revised motion to amend, including independent claim 28 and dependent claims 29 and 30, as set forth in Patent Owner’s Revised Contingent Motion to Amend, are unpatentable. Accordingly, for the reasons given below, we conclude that claims 1–11 and 13–20 are unpatentable and should be canceled. Petitioner has also shown by a preponderance of the evidence that all of the proposed substitute claims that are the subject of Patent Owner’s Revised Contingent Motion to Amend are unpatentable.

¹ Petitioner requested, and was granted, permission to participate in the oral hearing as a LEAP practitioner. Paper 37.

B. Real Parties in Interest

Petitioner identifies itself and YKK Corporation of America as the real parties in interest. Pet. 1

Patent Owner identifies itself and 3M Company as the real parties in interest. Paper 5, 1.

C. Related Matters

Petitioner states that “[t]here are no related matters under 37 C.F.R. § 42.8(b)(2)” concerning the ’833 patent. Pet. 1. Petitioner does not identify any other matters known to it related to the ’833 patent pending before the U.S. Patent Office. *Id.*; *see also* Paper 5, 1 (“There are no related matters known to Patent Owner.”).

D. The ’833 Patent (Ex. 1001)

The ’833 patent is titled “MECHANICAL FASTENER, FASTENING SYSTEM, AND DISPOSABLE ABSORBENT ARTICLE.” Ex. 1001, (54). According to the ’833 patent, “[m]echanical fasteners, which are also called hook and loop fasteners, typically include a plurality of closely spaced upstanding projections with loop-engaging heads useful as hook members, and loop members typically include a plurality of woven, nonwoven, or knitted loops.” *Id.* at 1:17–21. The ’833 patent is directed to “disposable absorbent articles” that include “a mechanical fastener with a relatively low basis weight compared to conventional mechanical fasteners and fastening systems and also provides disposable absorbent articles that contain the mechanical fastener.” *Id.* at 1:57–61.

The ’833 patent explains that “[d]ecreasing the basis weight of the mechanical fastener results in lower manufacturing cost and advantageously

decreases the amount of thermoplastic that is discarded . . . when a disposable absorbent article including the mechanical fastener is thrown away.” *Id.* at 1:61–65. To that end, the ’833 patent discloses a mechanical fastener having a low basis weight and “comparable or better engagement to loop materials than higher-basis-weight mechanical fasteners as measured by shear and peel testing.” *Id.* at 1:65–2:2.

Figure 1 of the ’833 patent, reproduced below, illustrates a mechanical fastener including multiple, upstanding fastening elements 11 attached to a thermoplastic backing 14. *Id.* at 3:21–24.

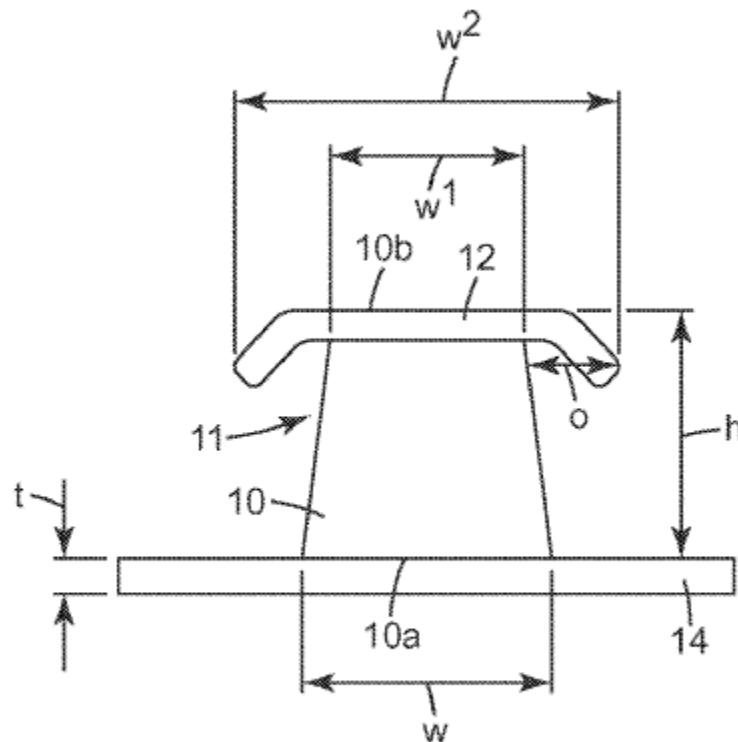


Fig. 1

As shown in Figure 1 (above), the multiple, upstanding fastening elements 11 have posts 10 with proximal ends 10a attached to the thermoplastic backing 14 and distal ends 10b comprising a cap 12 with a larger area than a

cross-sectional area of the post 10. *Id.* at 3:24–29. Cap 12 extends an overhang distance “o” beyond the post. *Id.* at 3:29–30. The height “h” of the upstanding fastening element is the distance between the thermoplastic backing 14 and the distal end 10b of the upstanding fastening element 11. *Id.* at 3:30–33. The thickness “t” of the thermoplastic backing 14, the width “w” of the post at its base, the width “w¹” of the post just below the cap, and the width “w²” of the cap are also shown in Figure 1. *Id.* at 3:33–36.

The '833 patent further discloses that, in some embodiments, the mechanical fastener “is made by a method that includes stretching the initially formed thermoplastic backing to achieve a backing thickness in a range from 20 μm to 80 μm .” *Id.* at 8:54–57. And, in some embodiments, “the stretching increases at least one of the thermoplastic backing’s length (‘L’) or width (‘W’) at least 1.5 times (in some embodiments, at least 2, 2.5, or 3 times).” *Id.* at 9:5–8. “Stretching can be carried out to an extent so that the desired basis weight of the mechanical fastener can be achieved.” *Id.* at 9:16–18.

The '833 patent discloses experimental results for various examples of fasteners that were measured and tested, as shown in Tables 1–8. Table 1, reproduced below, depicts Examples 1–19 as well as Comparative Examples 1 and 2 and Illustrative Examples 1–5.

TABLE 1

Example	Density (number/cm ²)	Cap Shape (round or oval)	Bumped Cap	Grooved Cap
Example 1	542	oval	no	yes
Example 2	542	oval	yes	yes
Example 3	271	oval	yes	yes
Example 4	271	oval	yes	yes
Example 5	542	oval	no	yes
Example 6	542	oval	yes	yes
Example 7	271	round	yes	no
Example 8	542	oval	no	yes
Example 9	542	oval	yes	yes
Example 10	542	round	no	no
Example 11	542	round	yes	no
Example 12	271	round	yes	no
Example 13	542	round	no	no
Example 14	542	round	yes	no
Example 15	542	round	yes	no
Example 16	542	round	no	no
Example 17	542	round	yes	no
Example 18	542	oval	no	yes
Example 19	542	oval	yes	yes
Comp. Ex. 1	248	oval	no	yes
Comp. Ex. 2	294	round	no	no
Illustrative Ex. 1	271	oval	yes	yes
Illustrative Ex. 2	271	oval	yes	yes
Illustrative Ex. 3	248	oval	yes	yes
Illustrative Ex. 4	542	oval	yes	yes
Illustrative Ex. 5	542	oval	yes	yes

The '833 patent explains that “[t]he mechanical fastener strips with densities of 271/cm² were prepared by machine stretching of corresponding 542/cm² strips in the machine direction with a draw ratio of 2:1.” *Id.* at 19:2–5. As shown in Table 1 (above), the fasteners of Examples 3, 4, 7, and 12 have densities of 271/cm² and thus, according to the '833 patent, were prepared by machine stretching.

E. Illustrative Claim

The '833 patent includes twenty claims, and Petitioner challenges claims 1–20. Claim 1, the sole independent claim, is illustrative and reads as follows:

1. A mechanical fastener comprising:

a thermoplastic backing; and
multiple, upstanding fastening elements that have a post with a proximal end attached to the thermoplastic backing and a distal end comprising a cap larger in area than a cross-sectional area of the post,

wherein the multiple, upstanding fastening elements have a height of at least 40 micrometers and up to 300 micrometers, and wherein a basis weight of the mechanical fastener is in a range from 25 grams per square meter to 75 grams per square meter.

Ex. 1001, 26:12–22.

F. Instituted Grounds of Unpatentability

We instituted *inter partes* review of all challenged claims based on the thirteen grounds of unpatentability (Pet. 6–7, 30–67), which are provided in the table below:

Claims Challenged	35 U.S.C. §	Reference(s)
1–5, 8–10, 13, 15–19	103(a) ²	Petersen-1 ^{3,4}
11	103(a)	Petersen-1, AAPA (“AAPA”)

² The Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) (“AIA”), amended 35 U.S.C. § 103. Because the challenged claims of the ’833 patent have an effective filing date before the effective date of the applicable AIA amendments, we refer to the pre-AIA version of 35 U.S.C. § 103 in this Decision.

³ We adopt Patent Owner’s reference to Petersen as “Petersen-1” to differentiate Petersen-1 from Petersen-2. *See, e.g.*, Prelim. Resp. 13.

⁴ Petersen et al., US 2005/0202205 A1, published Sept. 15, 2005 (Ex. 1003).

Claims Challenged	35 U.S.C. §	Reference(s)
1–5, 8, 10, 13, 15–19 ⁵	103(a)	Petersen-1, Miller, ⁶ Daio-Seishi ⁷
11	103(a)	Petersen-1, Miller, Daio-Seishi, AAPA
6, 7	103(a)	Petersen-1, Miller
9	103(a)	Petersen-1, Buzzell ⁸
9	103(a)	Petersen-1, Miller, Daio-Seishi, Buzzell
11, 12, 14	103(a)	Petersen-1, Busam ⁹
11, 12, 14	103(a)	Petersen-1, Miller, Daio-Seishi, Busam
15	103(a)	Petersen-1, Ausen, ¹⁰ Wood ¹¹
15	103(a)	Petersen-1, Miller, Daio-Seishi, Ausen, Wood

⁵ Although the table on pages 6–7 and the heading on page 58 of the Petition list claims “8–10” as challenged under this ground, Petitioner does not specifically address claim 9 under this heading.

⁶ Miller et al., US 5,845,375, issued Dec. 8, 1998 (Ex. 1004).

⁷ Japanese Unexamined Patent Application Publication No. JP 2005–319142 A, published Nov. 17, 2005 (Ex. 1005). Daio-Seishi is a Japanese-language publication (Ex. 1005) that was filed with an English-language translation (Ex. 1006) and an affidavit attesting to the accuracy of the translation, as required by 37 C.F.R. § 42.63(b) (*id.* at 21). Our citations to Daio-Seishi are to the certified English translation (Ex. 1006).

⁸ Buzzell et al., US 6,035,498, published Mar. 14, 2000 (Ex. 1007).

⁹ Busam, EP 0 848 938 A1, published June 24, 1998 (Ex. 1010).

¹⁰ Ausen et al., US 2004/0068848 A1, published Apr. 15, 2004 (Ex. 1008).

¹¹ Wood, US 5,531,732, issued July 2, 1996 (Ex. 1009).

Claims Challenged	35 U.S.C. §	Reference(s)
20	103(a)	Petersen-1, Ausen
20	103(a)	Petersen-1, Miller, Daio-Seishi, Ausen

Petitioner also relies on the declaration of Mukerrem Cakmak, Ph.D. (Ex. 1002) to support its Petition. Patent Owner relies on the declaration of Mark Kline (Ex. 2008) to support its Response. Dr. Cakmak was cross-examined. *See* Ex. 2009 (deposition transcript of Dr. Cakmak). Mr. Kline was also cross-examined. *See* Ex. 1024 (deposition transcript of Mr. Kline). Patent Owner also submits a second declaration of Mr. Kline (Ex. 2014) to support its Revised Contingent Motion to Amend. Mr. Kline was also cross-examined in response to the second declaration. *See* Ex. 1046 (second deposition transcript of Mr. Kline).

II. ANALYSIS

A. Principles of Law

“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”)). This burden of persuasion never shifts to Patent Owner. *See Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015) (discussing the burden of proof in *inter partes* review).

A patent claim is unpatentable under 35 U.S.C. § 103(a) 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 on the basis of underlying factual determinations including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) when in evidence, objective evidence of nonobviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

In analyzing the obviousness of a combination of prior art elements, it can be important to identify a reason that would have prompted one of skill in the art “to combine . . . known elements in the fashion claimed by the patent at issue.” *KSR*, 550 U.S. at 418. A precise teaching directed to the specific subject matter of a challenged claim is not necessary to establish obviousness. *Id.* Rather, “any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed.” *Id.* at 420. Accordingly, a party who petitions the Board for a determination of unpatentability based on obviousness must show that “a skilled artisan would have been motivated to combine the teachings of the prior art references to achieve the claimed invention, and that the skilled artisan would have had a reasonable expectation of success in doing so.” *In re Magnum Oil Tools Int’l, Ltd.*, 829 F.3d 1364, 1381 (Fed. Cir. 2016) (internal quotation marks and citations omitted).

“[W]here there is a range disclosed in the prior art, and the claimed invention falls within that range, the burden of production falls upon the

patentee to come forward with evidence” of teaching away, unexpected results, or other pertinent evidence of nonobviousness. *Galderma Labs., L.P. v. Tolmar, Inc.*, 737 F.3d 731, 738 (Fed. Cir. 2013); *see Ormco Corp. v. Align Tech., Inc.*, 463 F.3d 1299, 1311 (Fed. Cir. 2006) (“Where a claimed range overlaps with a range disclosed in the prior art, there is a presumption of obviousness. The presumption can be rebutted if it can be shown that the prior art teaches away from the claimed range, or the claimed range produces new and unexpected results.”) (internal citations omitted).

Our reviewing court has held that this burden-shifting framework applies in the context of *inter partes* review proceedings. *E.I. DuPont de Nemours & Co. v. Synvina C.V.*, 904 F.3d 996 (Fed. Cir. 2018). The court further expounded on these cases:

The point of our overlapping range cases is that, in the absence of evidence indicating that there is something special or critical about the claimed range, an overlap suffices to show that the claimed range was disclosed in—and therefore obvious in light of—the prior art. Our use of the term “presumption” or the phrase “burden-shifting framework” is merely a recognition of the practical reality that a patent challenger would have every incentive to point out the existence of an overlapping range, and virtually none to differentiate the claimed range from what was disclosed in the prior art. Importantly, the language employed in our overlapping range cases does not shift the burden of persuasion to the patentee to prove nonobviousness by, for example, pointing to evidence of criticality or unexpected results. All our case law states is that, absent a reason to conclude otherwise, a factfinder is justified in concluding that a disclosed range does just that—discloses the entire range.

Id. at 1008. Once a patent owner presents evidence of unexpected results, “[t]he factfinder then assesses that evidence, along with all other evidence of record, to determine whether a patent challenger has carried its burden of

persuasion to prove that the claimed range was obvious.” *Id.* at 1007. In order to rebut a presumption of obviousness, the patentee must come forward with “sufficient evidence of unexpected results over the *entire* claimed range” and “cannot rely on a single point within a large range to prove unexpected results for the entire range.” *In re Patel*, 566 F. App’x 1005, 1011–12 (Fed. Cir. 2014) (citing *In re Peterson*, 315 F.3d 1325, 1330 (Fed. Cir. 2003); *In re Geisler*, 116 F.3d 1465, 1469–70 (Fed. Cir. 1997)). Thus, the burden of persuasion remains on a petitioner, but the burden of production falls on a patent owner to show unexpected results over the entire claimed range.

B. Level of Ordinary Skill in the Art

The level of skill in the art is a factual determination that provides a primary guarantee of objectivity in an obviousness analysis. *Al-Site Corp. v. VSI Int’l Inc.*, 174 F.3d 1308, 1324 (Fed. Cir. 1999) (citing *Graham*, 383 U.S. at 17–18; *Ryko Mfg. Co. v. Nu-Star, Inc.*, 950 F.2d 714, 718 (Fed. Cir. 1991)).

Relying on the declaration testimony of Dr. Cakmak, Petitioner asserts Petitioner asserts that at the time of the invention, one of ordinary skill in the art would have had

a Bachelor’s degree in Mechanical, Chemical, Materials Science, and/or Polymer Science Engineering or other related technical university degree, plus at least two years of relevant experience, or, absent such a degree, at least four years of relevant experience. Here, “relevant experience,” refers to practical research and development of technologies in material engineering, polymer engineering or other relevant experience.

Pet. 28 (citing Ex. 1002 ¶ 89; Ex. 1001, Abstract).

Patent Owner agrees with Petitioner’s assessment with regard to education, “as well as ‘relevant experience.’” PO Resp. 8 (citing Pet. 28). However, Patent Owner contends that Petitioner’s definition of “relevant experience” is “overbroad and not sufficiently related to the field of the invention.” *Id.* at 8–9. According to Patent Owner, one of ordinary skill in the art would have had “would have had at least one to two years of relevant experience in the design, development, or manufacture of ***hook and loop fasteners*** in addition to the listed academic qualifications or at least four years of experience in this field absent these academic qualifications.” *Id.* at 9 (citing Ex. 1001, 1:17–2:12; Ex. 2008 ¶ 13). Patent Owner explains that “a POSITA with such relevant experience would have understood that hook and loop fasteners often exhibited more complex and unpredictable behaviors than one not familiar with the technology might surmise.” *Id.* (citing Ex. 2008 ¶¶ 14, 31).

To the extent necessary, and as we did in the Institution Decision, we apply the assessment offered by Petitioner as it is consistent with the ’833 patent and the asserted prior art. However, we note that under either party’s definition for “relevant experience,” we determine that our outcome would not differ in this case.

C. Claim Construction

In interpreting the claims of the ’833 patent, we “us[e] the same claim construction standard that would be used to construe the claim[s] in a civil action under 35 U.S.C. [§] 282(b).” *See* 37 C.F.R. § 42.100(b) (2019). The claim construction standard includes construing claims in accordance with the ordinary and customary meaning of such claims as would have been understood by one of ordinary skill in the art in light of the written

description and the prosecution history pertaining to the patent. *See id.*; *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–14 (Fed. Cir. 2005) (en banc).

Petitioner proposes claim constructions for six claim terms: (1) “mechanical fastener”; (2) “height” of the “upstanding fastening elements”; (3) “basis weight of the mechanical fastener”; (4) “stretch-induced molecular orientation”; (5) “loop material”; and (6) “density” of the “upstanding fastening elements.” Pet. 29–33. In response, “Patent Owner does not contest the formal constructions proposed by Petitioner for explicitly identified terms, and does not believe that they are material to any issues raised in this response.” PO Resp. 9–10.

We determine, as we did in the Institution Decision, that no explicit construction of these terms is needed to resolve the issues presented by the arguments and evidence of record. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (per curiam) (claim terms need to be construed “only to the extent necessary to resolve the controversy” (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

*D. Obviousness over Petersen-1 (Ground 1:
Claims 1–5, 8–10, 13, and 15–19)*

Petitioner asserts that claims 1–5, 8–10, 13, and 15–19 are unpatentable as obvious over Petersen-1. Pet. 35–56. Petitioner also relies on the testimony of Dr. Cakmak to support its arguments. *Id.*

1. Overview of Cited Reference

a. Petersen-1 (Ex. 1003)

Petersen-1 is directed to “methods of manufacturing a stretched mechanical fastening web laminate and to stretched mechanical fastening

web laminates which are obtainable by such method.” Ex. 1003 ¶ 1.

Petersen-1 also relates to disposable absorbent articles, e.g., diapers, sanitary napkins, “comprising a portion of the mechanical fastening web laminate obtained from the corresponding mechanical fastening web laminate, for example, by cutting.” *Id.*

Figure 3b is reproduced below and depicts a cross-sectional view of sanitary napkin 50. *Id.* ¶ 112.

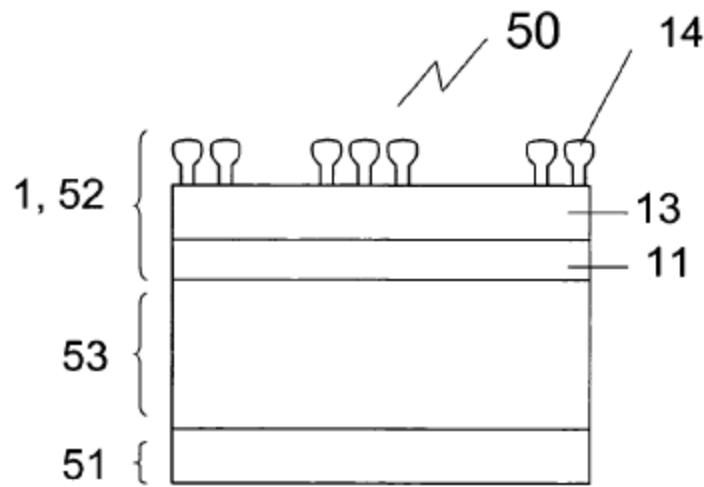


Fig. 3b

Petersen-1’s sanitary napkin 50

comprises an absorbent core 53 sandwiched between top sheet 51 and back sheet 52 which is composed of a portion of the stretched mechanical fastening web 1 of the present invention. Such portion of the web 1 comprises a fibrous web layer 11 and a thermoplastic web layer 13 bearing a multitude of male fastening elements 14 which are arranged in strip-shaped areas in CD.

Id.

Petersen-1’s method of manufacturing a stretched mechanical fastening involves stretching “precursor web laminate 10 monoaxially or biaxially thereby decreasing the basis weight of the fibrous web layer 11 and

the thickness of the thermoplastic web layer 13 from their respective initial values to provide a stretched mechanical fastening laminate 1 having a basis weight of less than $100 \text{ g} \cdot \text{m}^{-2}$.” *Id.* ¶ 14. According to Petersen-1:

the thickness of the thermoplastic web layer 13 of the stretched mechanical fastening web laminate 1 is less than the thickness of the corresponding thermoplastic web layer 13 of the precursor laminate 10. Surprisingly the male fastening elements 14 are generally not substantially deformed upon stretching and at any rate not to an extent that would render them non-functional with respect to the corresponding female fastening material.

Id. ¶ 31.

2. *Analysis of Claim 1*

Petitioners assert that claim 1 is unpatentable as obvious over Petersen-1. Pet. 35–56. We incorporate our findings above with respect to the teachings of Petersen-1.

Claim 1 of the ’833 patent recites “[a] mechanical fastener” comprising “a thermoplastic backing” and “multiple, upstanding fastening elements that have a post with a proximal end attached to the thermoplastic backing and a distal end comprising a cap larger in area than a cross-sectional area of the post.” Ex. 1001, 26:12–17. And, after having analyzed the entirety of the trial record, we determine that Petitioner has shown by a preponderance of the evidence that these elements are disclosed by Petersen-1. Pet. 35–36.

Claim 1 also requires that “the multiple, upstanding fastening elements have a height of at least 40 micrometers and up to 300 micrometers” and “a basis weight of the mechanical fastener is in a range from 25 grams per square meter to 75 grams per square meter.” Ex. 1001,

26:17–22. Patent Owner contests Petitioner’s challenge only with respect to the whether Petersen-1 renders obvious the height and weight limitations of claim 1. PO Resp. 10–42; Sur-Reply 1–13.

We, therefore, focus our analysis—as the parties do—on the limitations requiring “the multiple, upstanding fastening elements have a height of at least 40 micrometers and up to 300 micrometers” and “a basis weight of the mechanical fastener is in a range from 25 grams per square meter to 75 grams per square meter.”

With respect to the “height” limitation, Petitioner asserts that “Petersen discloses both a range of heights for the ‘male fastening elements 14’ that overlap the claimed range and specific examples very near this range.” Pet. 37. First, Petitioner asserts that Petersen-1 discloses “pin-type mechanical fastening elements having a height of 446 μm .” *Id.* (citing Ex. 1003 ¶ 158). According to Petitioner, after capping, “the resulting capped height would be about 335 micrometers, which is close to the claimed range ‘of at least 40 micrometers and up to 300 micrometers.’” *Id.* at 39 (citing Ex. 1002 ¶¶ 93–94). Petitioner further contends that “Petersen[-1] also discloses an overlapping range of heights of the male fastening elements 14 of between 40 and 2,000 micrometers.” *Id.* (citing Ex. 1003 ¶ 66). Petitioner asserts that because “Petersen[-1] discloses that the height of the capped elements may be between 40 and 2[000] micrometers, which *overlaps* the claimed range, Petersen[-1] meets the claimed range.” *Id.* at 39–40. To support its argument, Petitioner contends that:

- (1) it is not inventive to optimize the claimed ranges based on the general principles of operation of hook and loop fasteners known at the time of filing, (2) the ’833 patent fails to provide sufficient evidence to back up its assertions, (3) the alleged

unexpected benefits are not commensurate in scope with the claims, and (4) Petersen already discloses the alleged unexpected benefits.

Id. at 40 (citing *id.* at 8–16; Ex. 1002 ¶¶ 28–37, 46–62, 97–99). Petitioner provides additional evidence to support its position that one of ordinary skill in the art would have had reason and motivation to use lower heights and basis weights within the ranges disclosed by Petersen-1. *Id.* at 41–43.

With respect to the “basis weight” limitation, Petitioner asserts that “Petersen[-1] discloses both specific examples of basis weights within the claimed range, 58 g/m², and an overlapping range.” Pet. 43 (citing Ex. 1003, Table 1). According to Petitioner:

Examples 6, 7, and 9 of Petersen[-1] have calculated respective basis weights of between approximately 33–42.25, 33.3–48.75, and 39.7–61.25 grams/m². These values were obtained by subtracting the respective basis weight of the stretched fibrous web layer 11 (calculated by applying the ratios in Petersen[-1] ¶[0083] to the pre-stretched basis weights in Petersen[-1] Table 3) from the respective basis weights of the stretched mechanical fastening web laminate 11. *See* Ex.1003 at ¶¶[0083] (the ratio of basis weights), [0173]–[0181] (manufacturing methods), and Table 3. *See* Ex.1002 (Cakmak Decl.) at ¶¶[0094]–[0096].

Id. at 44. Petitioner further asserts that Petersen-1 “discloses an overlapping range” of “preferably between 5–90 g/m², more preferably between 7–85 g/m² and especially preferably between 10–80 g/m².” *Id.* at 44–45 (quoting Ex. 1003 ¶ 83). According to Petitioner, “[t]he Petersen[-1] ranges for basis weights are almost identical to that recited in claim 1 and, thus, the reference discloses the claimed range with sufficient specificity to anticipate.” *Id.* at 45.

In response, Patent Owner argues that Petitioner’s theory of obviousness under Ground 1 is deficient because “there are no examples in

Petersen-1 that disclose the combination of a hook height of 40–300 μm and a basis weight of 25–75 g/m².” PO Resp. 12 (citing Pet. 38–39, 44).

Patent Owner’s argument is unavailing. First, as noted above, Petitioner presents evidence that Petersen-1 discloses “*both a range of heights for the ‘male fastening elements 14’ that overlap the claimed range and specific examples very near this range.*” Pet. 37 (emphases added). More particularly, Petitioner identifies that Petersen-1 discloses “an overlapping range of heights of the male fastening elements 14 of between 40 and 2,000 micrometers.” *Id.* at 39 (citing Ex. 1003 ¶ 66). Petitioner also identifies that Petersen-1 discloses overlapping “ranges for basis weights [that] are almost identical to that recited in claim 1.” *Id.* at 44–45 (citing Ex. 1003 ¶ 83). Thus, Patent Owner’s argument that Ground 1 is deficient solely because Petersen-1 fails to include a single example that “satisf[ies] all of the claimed limitations” (PO Resp. 14) is not persuasive.

After considering both parties’ arguments, we are persuaded that Petitioner has established obviousness of claim 1 under a theory of overlapping ranges. Pet. 4–16, 37–46. The Federal Circuit has held that “where 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.” *E.I. DuPont de Nemours & Co. v. Synvina CV*, 904 F.3d 996, 1006 (Fed. Cir. 2018) (quoting *In re Aller*, 220 F.2d 454, 456 (CCPA 1955)). In *E.I. Dupont*, the Federal Circuit—in an appeal from an *inter partes* review—held that an overlap of ranges of a claimed composition with the ranges disclosed in the prior art “creates a presumption of obviousness.” *Id.* (citing *Galderma Labs, L.P. v. Tolmar, Inc.*, 737 F.3d 731, 737–38 (Fed. Cir. 2013)). The patentee can rebut that presumption if the modification of

the parameter “produce[s] a new and unexpected result which is different in kind and not merely in degree from the results of the prior art.” *Id.* (quoting *Aller*, 220 F.2d at 456). Alternatively, a patentee may rebut the presumption of obviousness by showing the prior art taught away from the claimed range or that the change to a parameter was not recognized as “result-effective.”

Id. In sum,

“where there is a range disclosed in the prior art, and the claimed invention falls within that range, the burden of production falls upon the patentee to come forward with evidence” of teaching away, unexpected results or criticality, or other pertinent objective indicia indicating that the overlapping range would not have been obvious in light of that prior art.

Id. at 1008 (quoting *Galderma*, 737 F.3d at 738).

As explained above, we find Petersen-1 discloses “[a] mechanical fastener” comprising “upstanding fastening elements,” i.e., hooks, with a “height of at least 40 micrometers and up to 300 micrometers” and “a basis weight of the mechanical fastener is in a range from 25 grams per square meter to 75 grams per square meter” in light of the overlapping height and basis weights ranges taught by Petersen-1. There is, therefore, a rebuttable presumption that the claims would have been obvious unless Patent Owner can come forward with evidence that the claimed ranges would not have been obvious. *Id.* Patent Owner was put on notice of this burden of production in the Institution Decision. Dec. 29–30.

To satisfy its burden of production, Patent Owner provides evidence of nonobviousness based on alleged criticality and unexpected results. PO Resp. 14–40; PO Sur-reply 1–13. More particularly, Patent Owner argues that “Petersen-1’s disclosure of broad, generic ranges fails to establish obviousness” because “the ’833 patent demonstrates the criticality of the

claimed height range.” PO Resp. 14. To support its position, Patent Owner argues that (i) Petitioner and Dr. Cakmak “completely ignore key evidence presented in the ’833 patent” (*id.* at 16–24); (ii) Petitioner’s supporting expert, Dr. Cakmak, “offers no actual evidence to support his bare assertions,” and as such, Dr. Cakmak’s declaration should be given “no weight” (*id.* at 24–30); and (iii) “Petitioner’s arguments attacking the demonstrated criticality of the claimed range for hook height are misleading and mistaken” (*id.* at 30–40). We address each argument in turn.

a. Petitioner and Dr. Cakmak “completely ignore key evidence presented in the ’833 patent” (PO Resp. 16–24)

Patent Owner asserts that Petitioner and Dr. Cakmak “ignore the evidence provided in the ’833 patent that explains why the shear performance of fasteners having the claimed properties was surprisingly superior to what was expected.” PO Resp. 16. Patent Owner asserts that the ’833 patent discloses that

[i]t has been conventionally thought that increasing hook density and increasing hook height may be useful for increasing engagement with a loop material (see, e.g., [Petersen-2]), and such changes tend to increase the basis weight of mechanical fastening members. It has now been found that mechanical fasteners according to the present disclosure provide surprisingly high shear and peel performance against low-loft loop materials despite their low basis weights.

Ex. 1001, 15:42–51. And, consistent with this disclosure, Patent Owner contends that

[t]he ’833 patent unequivocally teaches that the conventional wisdom in the art at the time of invention was that increasing shear performance of a fastener was positively correlated to increasing hook height. In other words, a fastener having relatively shorter hooks would have been expected at the

time to have lower fastening strength when compared to a fastener having taller hooks.

PO Resp. 18–19; PO Sur-reply 2.

We are not persuaded by Patent Owner’s arguments. Patent Owner relies on the opinions of its expert, Mr. Kline, which appear to be predicated on a view that the ’833 patent’s disclosure regarding the conventional wisdom in the art at the time of invention, i.e., “shear performance of a fastener was positively correlated to increasing hook height,” was a universal teaching with respect to hook heights without regard for loop material. PO Resp. 18–19 (citing Ex. 2008 ¶¶ 55–56); *see also* PO Sur-reply 15 (“[I]ncreased hook height was positively correlated with increased engagement performance across the spectrum of potential loop materials.”). However, Patent Owner’s assertions based on Mr. Kline’s statements are inconsistent with the overall teachings of the ’833 patent and mischaracterize its teachings to support Patent Owner’s position regarding the “conventional wisdom” at the time of the invention.

In this regard, the ’833 patent discloses that “[i]t has now been found that mechanical fasteners according to the present disclosure provide surprisingly high shear and peel performance *against low-loft loop materials* despite their low basis weights.” Ex. 1001, 15:48–51 (emphasis added). And, all of the data presented in the ’833 patent (*see, e.g.*, Ex. 1001, Tables 3, 5, 6) are based on exemplary upstanding fastening elements, i.e., hooks, being tested against “low-loft nonwoven loop material[s].” *See* Ex. 1001, 22:17–36 (describing Samples, 1, 2, and 3 as being composed of a “low-loft nonwoven loop material”).

In his deposition, Mr. Kline states that “[l]oft tends to refer to thickness, so low loft is often used by many people as a synonym for low thickness.” Ex. 1024, 47:7–9. And, when asked whether the thickness of the loft material had an impact on fastening performance (*id.* at 48:23–25), Mr. Kline testified that “it has been easier to make a hook and loop fastener work with thick, lofty materials for the loop.” *Id.* at 49:1–3. We further weigh Mr. Kline’s opinion against his testimony that other than what is stated in his declaration, he did not give loft loop thickness significant consideration. *Id.* at 60:1–62:3; *see id.* at 62:1–3 (“Beyond what’s referred to in there, I did not give it significant consideration.”); *see also* Pet. Reply 5 (citing Ex. 1024, 48:10–15, 161:5–13) (“Mr. Kline was unable to point to any statement in his declaration where low loft loop materials were even addressed.”). Consequently, we find Mr. Kline’s failure to address any potential relationship between hook geometry and loft geometry in his declaration undermines Patent Owner’s position regarding unexpected results, i.e., shear performance of a fastener was positively correlated to the hook height.

Instead, we credit Dr. Cakmak’s declaration that “different corresponding loop materials also have an influence on fastening strength.” Ex. 1002 ¶ 56; Pet. 6. More particularly, Dr. Cakmak states:

Fastening between upstanding elements (i.e. the hooks of a hook and loop fastening system) and a corresponding loop material is influenced by the geometries of the upstanding elements and the corresponding loop material. The geometry of the upstanding elements may be defined, for example, by the density (number per unit area) of the upstanding elements, the shape and dimensions of a shaft portion of the upstanding elements (e.g., height, width/and or diameter), as well as the dimensions and the

shape of the tip thereof. The geometries of the loop material may be defined by the diameter and density of fibers (e.g. nonwoven fibers), and the depth of the fibrous structure.

Id. ¶ 29. Based on this understanding, Dr. Cakmak opines that it would have been “relatively straightforward to find out the optimum density and shape of the upstanding elements given the parameters of a corresponding loop material.” *Id.* ¶ 30.

We find Dr. Cakmak’s opinion credible and supported by the current record. For example, Dr. Cakmak cites to Petersen-1 for a teaching that “[t]he dimensions of the individual male fastening elements 14 can be varied widely depending on the application and the structure and loftiness of the complementary female fastening material.” Ex. 1002 ¶ 98 (quoting Ex. 1003 ¶ 66). Similarly, Dr. Cakmak opines that Daio-Seishi teaches that one of ordinary skill in the art at the time of the invention would have understood the interplay between hook heights and loop material and appreciated that “different heights of male members may be selected for the most appropriate fastening strength.” *Id.* ¶ 113 (citing Ex. 1006 ¶ 10); *see also* Ex. 1006 ¶ 49 (“The height *h* of the hook parts 32 can be set at one’s discretion according to the female member and the fastening properties.”). We also note that based on his experience, Mr. Kline acknowledges that he “would expect that there would be an optimum value and that might be interactive with the type of loop.” Ex. 1024, 137:24 –138:1.

Dr. Cakmak’s opinion is also corroborated by other contemporaneous art provided by Patent Owner. For example, Sasaki describes that it was known in the mechanical fastener art “that an engaging force can be enhanced by using [a specific] female material in combination with a male material which is provided, at a specific density, with hooks having a

specific configuration.” Ex. 2003, 1:65–2:5. Similarly, Durrance teaches that “[o]ne skilled in the art will recognize that the shape, density and polymer composition of the hooks and loops may be selected to obtain the desired level of securement.” Ex. 2001, 4:60–64.

Based on the evidence of record, we are not persuaded that Petitioner and Dr. Cakmak ignore key evidence in the ’833 patent. Instead, we find the record supports Petitioner’s assertion that one of ordinary skill in the art at the time of the invention would have appreciated that “[s]hear and peel strength are dependent largely on the geometries of the upstanding elements (*i.e.*, the hook portion) and a corresponding loop material.” Pet. 5 (citing Ex. 1002 ¶28).

We also are not persuaded by Patent Owner’s assertion that “[t]he data presented in the ’833 patent for the example fasteners demonstrates this unexpectedly good shear performance.” PO Resp. 19 (citing Ex. 2008 ¶ 57). More particularly, Patent Owner argues that the data show “the average shear performance of fasteners having hook heights within the claimed range was superior to the average performance of fasteners having hook heights outside of the claimed range for each of the tested sample loop materials.” *Id.* at 20–21. Based on these data, Patent Owner contends that “the ’833 patent demonstrates the criticality and the nonobviousness of the claimed hook height range.” *Id.* at 15. We disagree.

Instead, we agree with Petitioner that the data relied upon by Patent Owner in the ’833 patent fails to account for numerous parameters that impact fastening performance and resulting shear strength. For example, a review of Table 3 of the ’833 patent reveals that all of Examples 1–19 are encompassed by claim 1, *i.e.*, each of Examples 1–19 has a capped post

height within the claimed range of “at least 40 micrometers and up to 300 micrometers” and a basis weight that falls within the claimed range of “25 grams per square meter to 75 grams per square meter.” Ex. 1001, Table 3. However, several of these examples nevertheless demonstrate relatively poor shear strength performance. *Id.* at Table 6.

In particular, Examples 18 and 19 have capped post heights of 135 and 130 micrometers, respectively, and both have a basis weight of 55 g/m². *Id.* at Table 3. Thus, both Examples 18 and 19 have a capped post height that falls within the claimed height range of 40 to 300 micrometers and a basis weight that fall within the range of 25 to 75 grams per square meter. Yet, Examples 18 and 19 demonstrate some of the worst shear strength performance in Table 6 of the '833 patent. Specifically, Examples 18 and 19 received a “Maximum Load” rating of 945 and 1430, respectively, for Sample 1. *Id.* at Table 6. Indeed, Example 18 scored the second-lowest rating for shear strength, beating only Illustrative Example 5 (928 gf for Sample 1). *Id.* Given this evidence of examples within the claimed ranges failing to produce an unexpected result, i.e., a higher shear strength than other examples falling outside the claimed ranges, we are persuaded by Dr. Cakmak’s testimony that “other important differences” (Ex. 1002, ¶ 50) may be affecting the resulting shear strength.

The '833 patent provides additional evidence that other differences may affect the resulting shear strength. For example, the '833 patent identifies that Examples 4 and 5 “show that shear performance is unexpectedly improved upon stretching the thermoplastic backing and decreasing its thickness even though the density of the upstanding elements is reduced by half.” Ex. 1001, 16:17–21. Thus, we cannot rule out that the

better fastening performance, i.e., increased shear strength performance, was due to differences in fastener parameters other than the claimed weight and height ranges, such as the thickness of the thermoplastic backing and density of the upstanding elements. *Id.* And, as Petitioner points out, during deposition,

Mr. Kline conceded he did not account for the impact on fastening performance for parameters beyond basis weight and height, notwithstanding that such measurements are in the '833 patent, including *hook density, cap shape, cap thickness, cap diameter, backing thickness, pre-capped post height, post diameter, backing thickness, cap overhang, and bending index.*

Pet. Reply 13–14 (citing Ex. 1024, 115:4–120:13). We also note that none of these parameters were held constant between the experiments conducted according to the prior art processes and the experiments conducted according to various hook heights tested in Examples 1–19 of the '833 patent. *See* Pet. 11 (citing Ex. 1002 ¶¶ 47–52) (“As Dr. Cakmak notes, the '833 patent lacks sufficient data and does not describe an experimental protocol that systematically varies key variables.”). For this reason, the record does not establish a sufficient nexus between the weight and height ranges in claim 1 and the alleged unexpected results.

Furthermore, we find that Patent Owner fails to demonstrate unexpected results or criticality across the entire claimed height range of “at least 40 micrometers and up to 300 micrometers.” *See* PO Resp. 33–34 (citing Ex. 2008 ¶ 82) (“Patent Owner’s assertion of unexpected results is based on its discovery that fasteners having hooks with shorter hook heights (i.e., under 300 micrometers) exhibited *comparable or better* shear engagement performance in comparison to fasteners having taller hooks (i.e., over 300 micrometers).”). Patent Owner relies on Examples 1–19 in

the '833 patent to support its assertion of unexpected results, yet the experimental results offered only provide data for a height range of 117 micrometers up to 247 micrometers. *See* Ex. 1001 at Table 3.¹² *See In re Peterson*, 315 F.3d at 1331 (affirming obviousness where the applicant claimed an alloy with 1–3% rhenium, yet presented unexpected results only for 2% rhenium, and evidence suggested that 3% rhenium possessed inferior properties); *In re Grasselli*, 713 F.2d 731, 743 (Fed. Cir. 1983) (concluding that unexpected results “limited to sodium only” were not commensurate in scope with claims to a catalyst having “an alkali metal”). Thus, there is no credible evidence that the alleged unexpected results could be obtained over the entire scope of hook heights encompassed by the range recited in claim 1 of the '833 patent.

Additionally, Patent Owner has not shown or explained why any increase in resulting shear strength compared to the prior art would be considered a “difference in kind” rather than merely a “difference in degree.” *See Bristol-Myers Squibb Co. v. Teva Pharm. USA, Inc.*, 752 F.3d 967, 977 (Fed. Cir. 2014) (“When assessing unexpected properties, therefore, we must evaluate the significance and ‘kind’ of expected results along with the unexpected results.”) (citation omitted). Patent Owner asserts that “the data presented in the '833 patent for the example fasteners

¹² The range recited in claim 1 requires a range with a difference of 260 μm between endpoints, but the '833 patent only presented experimental data for a range with a difference of 130 μm between endpoints. Ex. 1001, 26:18–20, Table 3. Stated differently, no experimental data exists for the claimed range from 40 μm to 116 μm and 248 μm up to 300 μm . *See id.* at Table 3. Thus, the '833 patent provides data for approximately one half of the claimed range.

demonstrates this unexpected shear performance that is surprisingly uncorrelated with hook height.” PO Sur-reply 6. Patent Owner contends that this unexpected shear performance is demonstrated based on the test results of “[t]wenty-six example fasteners, some having hook heights within the claimed range and some having hook heights falling outside the claimed range,” which “were tested against three nonwoven loop materials creating a dataset of 78 individual test results.” *Id.* (citing Ex. 1001, 22:17–23:13). Thus, Patent Owner concludes that “this ‘is an unexpected difference in kind that supports nonobviousness.’” *Id.* at 8 (citing *Allergan, Inc. v. Sandoz Inc.*, 796 F.3d 1293, 1306 (Fed. Cir. 2015)).

However, Patent Owner’s argument is not persuasive at least because the twenty-six example fasteners relied upon were not simply tested against “three nonwoven loop materials”; but rather, tested against three “low-loft nonwoven loop material[s].” *See* Ex. 1001, 22:17–36 (describing Samples, 1, 2, and 3 as being composed of a “low-loft nonwoven loop material”). As discussed above, we find that one of ordinary skill in the art would have understood the relationship between “the geometries of the upstanding elements (i.e., the hook portion) and a corresponding loop material.” Pet. 5 (citing Ex. 1002 ¶ 28). From this, we find there is no indication of any unexpected results from the hook heights within the claimed range as opposed to those disclosed in Petersen-1 based on the data presented in the ’833 patent and on the present record. *In re Applied Materials, Inc.*, 692 F.3d 1289, 1298 (Fed. Cir. 2012) (“Evidence that the variables interacted in an unpredictable or unexpected way could render the combination nonobvious.”) (citing *KSR*, 550 U.S. at 421).

b. Dr. Cakmak “offers no actual evidence to support his bare assertions,” and as such, Dr. Cakmak’s declaration should be given “no weight” (PO Resp. 24–30)

We are not persuaded by Patent Owner’s argument that Dr. Cakmak provides “***no actual evidence***” to support Petitioner’s theory that

“[i]t would have been known that each of these variables of height, density and basis weight, together with the structure of the loop material, has a generally predictable effect on the hook and loop fastener performance” and thus . . . it would require no more than routine optimization to design a fastener having adequate performance.

PO Resp. 24 (quoting Ex. 1002 ¶ 42); Ex. 2008 ¶¶ 64–65.

It is well-established that “where 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.” *In re Aller*, 220 F.2d at 456. However, the parameter to be optimized must have been recognized by those skilled in the art to be a “result-effective variable.” *In re Antonie*, 559 F.2d 618, 620 (CCPA 1977). “While the absence of any disclosure regarding the relationship between the variable and the affected property may preclude a finding that the variable is result-effective, the prior art need not provide the exact method of optimization for the variable to be result-effective.” *In re Applied Materials, Inc.*, 692 F.3d at 1297. Rather, “[a] recognition in the prior art that a property is affected by the variable is sufficient to find the variable result-effective.” *Id.* Moreover, where multiple result-effective variables are combined, “[e]vidence that the variables interacted in an unpredictable or unexpected way could render the combination nonobvious.” *Id.* at 1298 (citing *KSR*, 550 U.S. at 421)). Applying these principles, we find that Petitioner has demonstrated that hook height is a result-effective

variable that would have been optimized as a matter of routine experimentation.

As discussed above, there is no dispute that the height range disclosed in Petersen-1, i.e., between 40 μm and 2,000 μm (Ex. 1003 ¶ 66), overlaps the claimed range of “of at least 40 micrometers and up to 300 micrometers” (Ex. 1001, 26:18–20), thereby disclosing the “general conditions of the claim.” *Applied Materials, Inc.*, 692 F.3d at 1295 (noting that any overlap between the claimed and disclosed ranges serves to disclose the “general conditions” of the claim).

Patent Owner argues that Dr. Cakmak provides “*no actual evidence*” to demonstrate that “height, density and basis weight, together with the structure of the loop material, has a generally predictable effect on the hook and loop fastener performance.” PO Resp. 24. However, we find Dr. Cakmak’s opinion to be credible and adequately supported by the evidence. For example, Dr. Cakmak cites to Petersen-1 for the understanding that “[t]he dimensions of the individual male fastening elements 14 can be varied widely depending on the application and the structure and loftiness of the complementary female fastening material.” Ex. 1002 ¶ 98 (quoting Ex. 1003 ¶ 66); *see also id.* ¶ 99 (relying on additional references to support “providing an additional benefit, particularly with thinner sheets as would be desirable in, e.g., sanitary napkins.”). Dr. Cakmak’s opinion is also supported by citation to Daio-Seishi for the teaching with respect to “how different heights of male members may be selected for the most appropriate fastening strength.” *Id.* ¶ 113 (citing Ex. 1006 ¶ 10).

Additionally, the evidence of record persuasively demonstrates that the height, density, and basis weight of upstanding fastening elements are

result-effective variables for mechanical fasteners. *See, e.g.*, Ex. 1003 ¶ 104 (“The shape and density of the male fastening elements 14 can be varied so that a sanitary napkin . . . can be reliably secured.”); *id.* ¶ 49 (“The thermoplastic material used for the formation of the male fastening elements 14 may be selected to impart specific properties to them.”); Ex. 1006 ¶ 48 (“The height *h* of the hook parts 32 can be set at one’s discretion according to the female member and the fastening properties.”); *id.* (“The number density of hook parts 32 can be set at one’s discretion, but if they are too sparse or too dense, the effect of differences in shape and height on fastening characteristics will be weakened.”); Ex. 2001, 4:60–64 (“One skilled in the art will recognize that the shape, density and polymer composition of the hooks and loops may be selected to obtain the desired level of securement between the fastening components and the mating fastening components.”); Ex. 2003, 4:5–12 (discussing the use of “male material having such hooks of a specific configuration at a specific density in combination with a female material” to achieve a particular objective); Ex. 1007, 12:34–43. *See E.I. DuPont*, 904 F.3d at 1006 (noting that a variable is “result-effective” if it was recognized in the prior art that a “property is affected by the variable”).

Given that the record establishes that height, density, and basis weight are result-effective variables and the general conditions of the claim are disclosed in Petersen-1, Petitioner has satisfied its burden to show that it would not have been inventive to optimize multiple mechanical fastener variables, such as height and basis weight, within the ranges recited in claim 1, in order to design a fastener having adequate performance. Petitioner also provides multiple rationales for why one of ordinary skill in the art at the time of the invention would be motivated to optimize such

variables through routine experimentation. Pet. 15–16 (citing Ex. 1002 ¶¶ 59–62), Pet. 40–43 (citing Ex. 1002 ¶¶ 28–37, 46–62, 97–99).

Patent Owner further argues that neither Petitioner nor Dr. Cakmak grapple with the conventional understanding that one of ordinary skill in the art would have had prior to the invention—and before performing testing—that increasing the hook height (e.g., from 300 to 400 micrometers) would have been expected to increase the shear engagement performance of the fastener, as evidenced by, e.g., Petersen-2, Durrance, Nortman, and Sasaki. PO Resp. 27 (citing Exs. 1014; 2001; 2002; 2003; 2008 ¶ 71); PO Sur-reply 2–3.

The difficulty with Patent Owner’s position is that none of the cited references relates to hooks that engage with low-loft nonwoven loop materials or provides evidence to support the general principle that “increased hook height was positively correlated with increased engagement performance *across the spectrum of potential loop materials*.” PO Sur-reply 15 (emphasis added). According to Patent Owner, Petersen-2 “confirms the then-conventional view in the art that increasing hook height was thought to increase fastener engagement performance.” PO Resp. 21. However, the record does not indicate what kind of loop material Petersen-2 utilizes.

We find the lack of disclosure regarding loop material significant because while the ’833 patent identifies that it was “conventionally thought that increasing hook density and increasing hook height may be useful for increasing engagement with a loop material” (Ex. 1001, 15:42–45), the ’833 patent makes clear that the purported unexpected results, i.e., “surprisingly high shear and peel performance,” relate to mechanical fasteners that utilize “low-loft loop materials.” *Compare* Ex. 1001, 15:48–51 (“It has now been found that mechanical fasteners according to the present disclosure provide

surprisingly high shear and peel performance against *low-loft loop materials*” (emphasis added)).

Equally unpersuasive is Patent Owner’s reliance on Durrance, Nortman, and Sasaki to support its position regarding the conventional wisdom at the time of the invention. PO Resp. 27. More particularly, Patent Owner asserts that Durrance teaches that “[a] more aggressive hook material may comprise a material with a greater average hook height” (PO Resp. 22 (citing Ex. 2001, 4:60–67)); Nortman “describ[es] how increasing fastener hook height was thought to increase the shear force engagement strength of the fastener or fastening region” (PO Resp. 22 (citing Ex. 2002, 23:20–25, 23:58–64, 31:39–53)); and Sasaki teaches

that if the height of the hooks on a disclosed mechanical fastener suitable for use in a disposable diaper were less than 300 micrometers—that is, if they fell within the claimed height range of the ’833 patent—“the hooks cannot enter the nonwoven fabric deep enough and a sufficient engaging force is unobtainable.” (Ex. 2003 (Sasaki) at Abstract, 3:51–53.)

Id. at 22. However, like Petersen-2, none of Durrance, Nortman, or Sasaki identifies utilizing a low-loft loop material. *See generally* Exs. 2001; 2002; 2003. And, while we acknowledge that Sasaki teaches that if the height of a hook is less than 300 micrometers, the hook cannot enter the nonwoven fabric deep enough to obtain a sufficient engaging force (Ex. 2003, 3:51–53), Sasaki also describes the need to use a loop material, i.e., “female material,” in combination with “hooks of a specific configuration at a specific density” to obtain a particular objective. *Id.* at 4:5–9. For these reasons, we do not find the cited portions of Petersen-2, Durrance, Nortman, and Sasaki, establish that Petitioner and Dr. Cakmak failed to “grapple with

the conventional understanding that one of ordinary skill in the art would have had prior to the invention.”

c. “Petitioner’s arguments attacking the demonstrated criticality of the claimed range for hook height are misleading and mistaken” (PO Resp. 30–40)

Patent Owner argues that at the time of the invention, the conventional wisdom taught that an increase in hook height “was positively related to shear engagement performance,” and as such, one of ordinary skill in the art at the time of the invention would have “moved away from rather than towards the claimed hook height range” when trying to improve shear-strength. PO Resp. 30–31 (citing Ex. 2008 ¶¶ 75–76). Patent Owner explains that

[i]n applications employing a mechanical fastener, it is important to achieve adequate engagement performance with the loop material. (*See, e.g.*, Ex. 2004 (Horn) at 14:2–11 (noting that greater resistance to shear forces is beneficial in a disposable diaper, for example, “for maintaining proper fit on the wearer”); Ex. 2008, ¶76.).

Id. at 31. Patent Owner concludes that because the ’833 patent ran contrary to the convention wisdom in the art, “it would not have been a mere matter of routine optimization to arrive at the claimed hook height range.” *Id.* at 31–32 (citing Ex. 2008 ¶ 76).

For the reasons discussed above, we are not persuaded that the record supports Patent Owner’s assertions regarding the “conventional wisdom,” i.e., “increased hook height was positively correlated with increased engagement performance across the spectrum of potential loop materials.” PO Sur-reply 15. Instead, we find the record supports Petitioner’s assertion that one of ordinary skill in the art at the time of the invention would have

appreciated that “[s]hear and peel strength are dependent largely on the geometries of the upstanding elements (*i.e.*, the hook portion) and a corresponding loop material.” Pet. 5 (citing Ex. 1002 ¶28).

Patent Owner’s reliance on Horn does not alter this determination. In fact, we find that Horn supports what Petitioner and Dr. Cakmak’s identify as what one of ordinary skill in the art at the time of the invention would have understood. That is, Horn describes that shear resistance “depends on a variety of design factors, such as type of loop material, type of hook material, number of hooks (e.g., per unit area), number of loops available for catching by hooks, and the like.” Ex. 2004, 1:33–36. Given that the height range disclosed in Petersen-1 overlaps the claimed height range, we find that Petitioner has demonstrated that it would have been a matter of routine experimentation to optimize hook height as a result-effective variable. *See Applied Materials, Inc.*, 692 F.3d at 1295 (noting that any overlap between the claimed and disclosed ranges serves to disclose the “general conditions” of the claim).

Patent Owner further asserts that Petitioner improperly “argues that the ’833 patent fails to provide sufficient evidence to support its assertions regarding unexpected results.” PO Resp. 32 (citing Pet. 10–13). According to Patent Owner, this “is not surprising given that Petitioner’s supporting declarant lacks any experience in the relevant field,” and as such, “cannot speak to what was expected or unexpected in the art.” *Id.* at 1; *see also id.* at 28 (“This is not surprising in view of Dr. Cakmak’s lack of relevant, specific experience in the field of hook and loop fasteners.”). Patent Owner asserts that the test data provided in ’833 patent “is in line with how such testing was designed and performed within the hook and loop fastener industry”

(PO Resp. 32–33 (citing Ex. 1001, 15:42–56, 16:9–21, Tables 3, 6, 7; Ex. 2008 ¶¶ 79–80)), and “the type and amount of testing that Dr. Cakmak appears to demand far exceeds the standard within the hook and loop fastener industry at the time of the invention, and only serves to underscore his lack of relevant experience in the art.” *Id.* at 33. Thus, Patent Owner argues that Dr. Cakmak’s allegations that the ’833 patent does not do enough to show unexpected results should be given little to no weight. *Id.* at 29 (citing *Puma N. Am., Inc. v. Nike, Inc.*, IPR2019-01042, Paper 10 at 20–21 (P.T.A.B. Oct. 31, 2019) (informative)).

We have considered Patent Owner’s arguments but do not find them to be persuasive. Although Patent Owner appears to be correct that Dr. Cakmak lacks particular experience working with hook and loop fasteners, we do not agree this absence of work experience necessarily impacts the weight we should give his testimony regarding the experimental test data provided in the ’833 patent. *See* Ex. 2009, 29:13–16 (Dr. Cakmak testifying “I don’t have a specific experience testing of the hook-and-loop fasteners, but I have plenty of experience on shear and other mechanical testing of polymer products.”). In this regard, we credit Dr. Cakmak’s opinion that “from an engineering and scientific view point, the ’833 patent fails to provide sufficient data to credibly back up [Patent Owner’s] claim about ‘unexpected’ results.” Ex. 1002 ¶ 47. More particularly, we credit Dr. Cakmak’s statement that

[i]n order to discover an unexpected behavior, an experimental plan to acquire relevant data should be devised such that a systematic variation of key variables is undertaken. The data in the tables of the ’833 patent do not seem to be consistent with

this approach and one cannot reliably discern the asserted unexpected results from the data alone.

Id. From this viewpoint, we credit Dr. Cakmak’s testimony that “there appears to be no reliable correlation between shear strength and height of the upstanding fastening elements, nor does there appear to be a meaningful correlation between shear strength and thermoplastic backing thickness.” Ex. 1002 ¶ 51; *see also id.* ¶¶ 47–50, 52, (discussing the ’833 patent’s test data and providing a comparison of various different mechanical fastener parameters in the form of “Comparative Table 1”). Thus, we are not persuaded that Dr. Cakmak’s lack of specific experience with hook and loop fasteners requires his testimony with respect to the interpretation of the ’833 patent’s experimental results to be discounted.

In response to Dr. Cakmak’s conclusion that the data in the ’833 patent demonstrated “no reliable correlation between shear strength and [the] height of the upstanding fastening elements” (Ex. 1002 ¶ 51), Patent Owner argues “that this absence of an expected positive correlation is exactly what made the results of the ’833 patent unexpected, as it was contrary to the then-conventional wisdom.” PO Sur-reply 10–11. Patent Owner asserts that Mr. Kline’s analysis of the test data in the ’833 patent supports this position. *Id.* at 9–10 (citing Ex. 2008 ¶ 80). However, as discussed above, we find Patent Owner’s assertions based on Mr. Kline’s statements to be inconsistent with the overall teachings of teachings of the ’833 patent and mischaracterize its disclosure regarding the “conventional wisdom” at the time of the invention. Instead, we find the record supports Petitioner’s assertion that one of ordinary skill in the art at the time of the invention would appreciate that “[s]hear and peel strength are dependent largely on

the geometries of the upstanding elements (*i.e.*, the hook portion) and a corresponding loop material.” Pet. 5 (citing Ex. 1002 ¶28).

Patent Owner also disagrees with Dr. Cakmak’s assessment of the experimental data in the ’833 patent. PO Sur-reply 8–12. Relying on its expert, Mr. Kline, Patent Owner asserts that the data in the ’833 patent are sufficient because “a skilled artisan could still draw valid conclusions from experimental data (e.g., a correlation—or surprising lack thereof—between hook height and fastener shear engagement performance) in which multiple parameters are varied at once.” *Id.* at 12 (citing Ex. 1024, 103:18–104:9, 229:10–231:8; Ex. 2008, ¶¶ 69–70 n.2, 79–80).

The difficulty with Patent Owner’s position is that when asked whether Mr. Kline accounted for how other mechanical fastener parameters¹³ would affect resulting shear strength, Mr. Kline testified that he either: (1) did not consider the parameter (*see, e.g.*, Ex. 1024, 115:4–8), or (2) considered the parameter but did not discuss it in his declaration (*see, e.g.*, Ex. 1024, 115:9–120:13). We find Mr. Kline’s conclusion regarding “a correlation—or surprising lack thereof” to be conclusory, given that it fails to consider other parameters that may affect shear strength, and as such, insufficient to support Patent Owner’s position. *See, e.g., In re Lindner*, 457 F.2d 506, 508 (CCPA 1972) (“This court has said previously that mere lawyers’ arguments unsupported by factual evidence are insufficient to establish unexpected results. . . . Likewise, mere conclusory statements in

¹³ Other parameters include, but are not limited to, hook density and cap shape (Ex. 1001, Table 1), cap thickness and cap diameter (*id.* at Table 2), backing thickness, pre-capped post height, post diameter, and backing thickness (*id.* at Table 3), cap overhang and bending index (*id.* at Table 4).

the specification and affidavits are entitled to little weight when the Patent Office questions the efficacy of those statements.”).

We find more credible Dr. Cakmak’s opinion that “from an engineering and scientific view point, the ’833 patent fails to provide sufficient data to credibly back up [Patent Owner’s] claim about ‘unexpected’ results.” Ex. 1002 ¶ 47. Dr. Cakmak testifies that the data in the ’833 patent fail to support Patent Owner’s claim of unexpected results because they are unreliable as the data fail to provide any systematic variation of key variables. *Id.* ¶ 47; *see also* Ex. 2009, 86:19–87:5 (When asked during deposition whether a “multi-variable optimization problem is more difficult than a single variable optimization problem,” Dr. Cakmak replied that “[i]t’s just a systematic variation of the materials. That’s what you do. That’s what the engineers do.”).

After having analyzed the entirety of the trial record and assigning appropriate weight to the cited supporting evidence, we determine Petitioner has shown by a preponderance of the evidence that independent claim 1 is unpatentable over the teachings of Petersen-1.

3. *Analysis of Claims 2–5, 8–10, 13, and 15–19*

Petitioner also challenges claims 2–5, 8–10, 13, and 15–19 on the same the same ground. Pet. 46–56. Patent Owner does not separately address the patentability of claims 2, 3, 5, 8, 9, 13, and 15–18. PO Resp. 47. Patent Owner does separately address the patentability of claims provide 4, 10, and 19. *Id.* at 47–54. We first address the patentability of claims 2, 3, 5, 8, 9, 13, and 15–18 as a group. We then address the patentability of claims 4, 10, and 19, separately.

a. Claims 2, 3, 5, 8, 9, 13, and 15–18

Petitioner explains how each limitation of claims 2, 3, 5, 8, 9, and 15–18 is taught or rendered obvious by the disclosure of Petersen-1. Pet. 46–55.

Claim 2 recites “[t]he mechanical fastener of claim 1, wherein the upstanding fastening elements have a height up to 285 micrometers.” Ex. 1001, 26:23–25. Petitioner asserts that Petersen-1 “discloses all elements of claim 1, including a range of heights of upstanding elements (40 and 2,000 micrometers) which overlaps the range of claim 2 of the ’833 patent.” Pet. 46 (citing Ex. 1003 ¶ 66). Petitioner further asserts that the narrower range recited by claim “provides no unexpected results and there were strong known rationales for lowering the height of upstanding fastening elements.” *Id.* at 47 (citing Ex. 1002 ¶ 100).

Claim 3 recites “[t]he mechanical fastener of claim 1, wherein the cap extends beyond the post on at least two opposing sides of the post.” Ex. 1001, 26:26–28. Petitioner asserts that the “mushroom-type mechanical fastening elements 14” disclosed in Petersen-1 are shaped such that they teach “‘cap [which] extends beyond the post on at least two opposing sides of the post.’” Pet. 47–48 (citing Ex. 1003 ¶ 65; Ex. 1002 ¶ 101).

Claim 5 recites “[t]he mechanical fastener of claim 1, wherein the thermoplastic backing has a thickness in a range from 20 micrometers to 80 micrometers.” Ex. 1001, 26:32–34. Petitioner asserts that Petersen-1 discloses “an overlapping thickness range of ‘preferably between 5 and 200 μm and more preferably between 10 and 100 μm .’” Pet. 48 (citing Ex. 1003 ¶ 82). Petitioner further assert that “[t]he ’833 patent fails to demonstrate criticality of the thickness of the thermoplastic backing range.” *Id.* at 49; *see*

also Ex. 1002 ¶ 51 (“[T]here appears to be no reliable correlation between shear strength and height of the upstanding fastening elements, nor does there appear to be a meaningful correlation between shear strength and thermoplastic backing thickness.”).

Claim 8 recites “[t]he mechanical fastener of claim 1, wherein the upstanding fastening elements are present on the thermoplastic backing in a density range from 248 per square centimeter to 542 square centimeter[s].” Ex. 1001, 26:43–46. Petitioner asserts that “Petersen discloses a corresponding overlapping range of “1 and 2,500 cm², more preferably between 2 and 2,000 cm² and especially preferably between 5 and 1,800 cm².” Pet. 50 (citing Ex. 1003 ¶ 84). Petitioner further asserts that “[t]he ’833 patent fails to disclose adequate evidence of criticality for the claimed density range of the fastening elements.” *Id.*; Ex. 1002 ¶ 106.

Claim 9 recites “[t]he mechanical fastener of claim 1, wherein the thermoplastic backing has stretch-induced molecular orientation in at least one direction.” Ex. 1001, 26:47–49. Petitioner asserts that “[s]tretching according to Petersen[-1] would necessarily and inherently produce the “orientation of the molecular structure caused by stretching.” Pet. 51 (citing Ex. 1002 claim chart between ¶ 106 and ¶ 107).

Claim 13 recites “[a]n absorbent article comprising the mechanical fastener of claim 1.” Ex. 1001, 27:12–13. Petitioner asserts that Petersen-1 “discloses that its mechanical fastener is ‘especially preferably used in disposable absorbent articles such as sanitary napkins or diapers.’” Pet. 52 (citing Ex. 1003 ¶ 97).

Claim 15 recites “[t]he absorbent article of claim 13, wherein the absorbent article is a pants-style diaper, and wherein the mechanical fastener

is located on a tab on a seam or side panel portion of the pants-style diaper.”
Ex. 1001, 27:22–28:2. Petitioner asserts that Petersen-1 discloses the subject matter of claim 15. Pet. 52–53. More particularly, Petitioner asserts that Petersen-1 discloses:

Stretched mechanical fastening web laminates 1. . . can be advantageously used, for example, in large area fastening tabs of disposable diapers. . . . It was found that such fastening tab can typically be directly attached to the back sheet of a diaper being formed of low loft nonwoven materials.

Id. at 52 (citing Ex. 1003 ¶ 87). Petitioner explains that one of ordinary skill in the art “would understand that a ‘back sheet’ of a diaper forms part of the ‘side panel portion’” and “would also understand that the ‘disposable diaper’ described in Petersen[-1] would include a ‘pant-style diaper.’” *Id.*; Ex. 1002 ¶ 107.

Claim 16 recites “[a]n absorbent pad having at least a top sheet, an absorbent core, and a back sheet, wherein the back sheet comprises the mechanical fastener of claim 1.” Ex. 1001, 28:3–5. Petitioner asserts that Petersen-1 discloses “[t]he stretched mechanical fastening web laminate 1 is preferably attached to the back sheet 52 and/or to side wrapping elements 54 of the sanitary napkin” Pet. 53.

Claim 17 recites “[t]he absorbent pad of claim 16, wherein the absorbent pad is attached to a top sheet of a diaper or attached to an undergarment.” Ex. 1001, 28:6–8. Petitioner asserts that Petersen-1 discloses “[t]he back sheet 52 of the sanitary napkin is on the opposite side and is intended to be placed adjacent to the wearer’s undergarments when the sanitary napkin 50 is worn.” Pet. 53 (citing Ex. 1003 ¶ 98).

Claim 18 recites

[t]he absorbent pad of claim 16, wherein the thermoplastic backing has a thickness in a range from 40 micrometers to 75 micrometers, and wherein the upstanding fastening elements have a height in a range from 150 micrometers to 300 micrometers and a cap diameter in a range from 190 micrometers to 320 micrometers, wherein the cap extends an overhang distance beyond the post in a range from 5 micrometers to 65 micrometers.

Ex. 1001, 28:9–16. Petitioner asserts that Petersen-1 discloses anticipating ranges for thickness (*see* analysis of claim 5 above) and height (*see* analysis of claims 1 and 2 above). Pet. 54.

With respect to cap diameter, Petitioner asserts that Petersen-1 discloses the range required by claim 18. *Id.* Petersen-1 discloses that

[t]he stems preferably have a cross-section with a maximum extension of between 10 μm and 250 μm . The ratio of the maximum extension of the enlarged portions of the male fastening elements 14 at the end of the stems over the maximum extension of the cross-sections of the stems preferably is between 1.5:1 and 5:1.

Ex. 1003 ¶ 66. Relying on its expert, Dr. Cakmak, Petitioner further asserts that Petersen-1 discloses “a cap diameter range of 15 to 1250 micrometers.” Pet. 54 (citing Ex. 1003 ¶ 66; Ex. 1002 ¶ 108); *See* Ex. 1002 ¶ 108 (“Applying the ratio range of 1.5:1 to 5:1 to the maximum extension of the cross-section of 10 to 250 micrometers, gives a cap diameter range of 15 to 1250 micrometers.”). Petitioner further asserts that “[t]he ’833 patent discloses no evidence of criticality of the cap diameter or the upstanding fastening elements.” *Id.* at 55.

With respect to overhang distance, Petitioner asserts that Petersen-1 discloses the range required by claim 18. Pet. 55. Petitioner asserts that “[u]sing the values cited above regarding the cap diameter, Petersen[-1]

discloses an overhang range of 2.5 to 500 micrometers.” *Id.* (citing Ex.1003 ¶ 66); *see also* Ex. 1002 ¶ 108 (“Subtracting the stem diameter from the cap diameter and dividing by two provides an overhang range of 2.5 to 500 micrometers.”). Petitioner further asserts that “[t]he ’833 patent discloses no evidence of criticality of overhang distance of the caps.” *Id.* (citing Ex. 1002 ¶ 109 (Based on analysis of the relevant test data provided in the ’833 patent, Dr. Cakmak concluded that “there is no clear logical relationship between overhang distance and average shear strength or other evidence that demonstrates criticality of the claimed range.”)).

Patent Owner does not present any argument for claims 2, 3, 5, 8, 9, 13, and 15–18 other than what we have already considered with respect to claim 1. PO Resp. 47. After considering the evidence and arguments of record, we determine that Petitioner has demonstrated by a preponderance of the evidence that claims 2, 3, 5, 8, 9, 13, and 15–18 would have been obvious in view of Petersen-1.

b. Claim 4

Claim 4 recites “wherein the height of the upstanding fastening elements is at least 100 micrometers.” Ex. 1001, 26:29–31.

Petitioner asserts that Petersen-1 “discloses an overlapping range of 40 and 2,000 micrometers.” Pet. 48 (citing *Id.* at 35–46); Ex. 1003 ¶ 66. Relying on the analysis of claim 1, Petitioner explains that “a range of ‘at least 100 micrometers’ provides no unexpected results and there were strong known rationales for making the height of upstanding fastening elements in the lower end of the Petersen range.” *Id.* (citing Ex. 1002 ¶ 102).

Given that the record establishes that the height of upstanding fastening elements is a result-effective variable and the general conditions of

the claim are disclosed in Petersen-1, Petitioner has satisfied its burden to show that it would not have been inventive to optimize the height of the upstanding fastening elements to within the narrower range recited in claim 4.

In response, Patent Owner asserts that “[t]he test result data presented in the ’833 patent contains examples of male fasteners having hook heights just above 100 micrometers that unexpectedly exhibited comparable or better shear engagement performance than fasteners having hooks with heights that exceeded 300 micrometers.” PO Resp. 48. To support its position, Patent Owner directs attention to Examples 16 and 17 which “had hook heights of 125 and 117 micrometers, respectively, and they exhibited comparable or better shear engagement performance with the three sample loop materials in comparison to Illustrative Examples 1 and 2 and Comparative Example 1, which had hook heights of 350, 330, and 386 micrometers, respectively.” *Id.* (citing Ex. 1001, Tables 3, 6; Ex. 2008, ¶ 100). According to Patent Owner,

[t]hese particular examples help illustrate the unexpected result found by Patent Owner—which, to be clear, is demonstrated by the aggregation of all of the results reported in the ’833 patent when viewed as a whole—that contrary to the then-conventional wisdom, taller hook heights were not positively correlated with increased shear engagement performance.

Id.

Having considered the arguments and evidence presented during trial, however, we are not persuaded by Patent Owner’s arguments. For the reasons discussed with respect to claim 1, we are not persuaded that the record establishes unexpected results or criticality within the broader range of claim 1, or here, within the narrower range of claim 4. Patent Owner’s

comparison of Examples 16 and 17 with Illustrative Examples 1 and 2, and Comparative Example does not alter our conclusion. Instead, we find the proposed comparison supports the understanding that other variables and differences in mechanical fastener parameters (e.g., hook density, cap shape, cap thickness, cap diameter, backing thickness, pre-capped post height, post diameter, backing thickness, cap overhang, and bending index (*see* Ex. 1001, Tables 1–5)) may affect the resulting shear strength. Ex. 1002 ¶¶ 47–56; *see also* Pet. Reply 22 (“As with all examples in the ’833 patent, numerous structural differences impacting fastening performance were unaccounted for, making such comparisons apples to oranges.”); Exs. 1031–1045.

Here, while Examples 16 and 17 had hook heights of 125 μm and 117 μm , respectively (within range), and Illustrative Examples 1 and 2 and Comparative Example 1, had hook heights of 350 μm , 330 μm , and 386 μm , respectively (outside range), neither Patent Owner nor Mr. Kline account for any other parameter that may contribute to any difference in resulting shear strength. For instance, Examples 16 and 17 have a density of upstanding fastening elements of 542 n/cm^2 , whereas Illustrative Examples 1 and 2, and Comparative Example 1, had densities of 271 n/cm^2 , 271 n/cm^2 , and 248 n/cm^2 . *See* Ex. 1001, Table 1. Thus, Examples 16 and 17 had hook densities that were roughly double the densities of Illustrative Examples 1 and 2 and Comparative Example 1.¹⁴

¹⁴ We note these differences appear to run counter to what Patent Owner purports is the ’833 patent’s unexpected discovery, i.e., “[u]nexpectedly, the mechanical fastener according to some embodiments of the present disclosure has increased shear performance, relative to a comparable mechanical fastener having the same dimensions but with a thicker

We note that many other differences exist between Examples 16 and 17 and Illustrative Examples 1 and 2 and Comparative Example 1 that remain unaccounted for (*see* Ex. 1001, Tables 1–4). We also note that Examples 18 and 19 had hook heights of 130 μm and 135 μm , respectively – heights, only slightly higher than Examples 16 (125 μm) and 17 (117 μm) — but, with much weaker shear strength numbers. *See* Ex. 1001, Tables 3, 6.

After having analyzed the entirety of the trial record and assigning appropriate weight to the cited supporting evidence, we determine Petitioner has shown by a preponderance of the evidence that claim 4 is unpatentable over the teachings of Petersen-1.

c. Claim 10

Claim 10 recites “[a] fastening system comprising the mechanical fastener of claim 1 and a loop material for engaging with the mechanical fastener.” Ex. 1001, 27:1–3.

Petitioner asserts that Petersen-1 “discloses that the mechanical fastener is ‘suitable for engagement with a corresponding female fastening material.’” Pet. 51 (citing Ex. 1003, Abstract).

In response, Patent Owner asserts that claim 10 requires that an actual loop material “be present to complete the claimed system, not merely that the male fastener be suitable for use with a loop material.” PO Resp. 49; PO Sur-reply 24–25.

thermoplastic backing and a higher density of fastening elements.”
Ex. 1001, 16:9–14.

Having considered the arguments and evidence presented during trial, we are not persuaded by Patent Owner's argument. As Petitioner notes, "[e]ven Mr. Kline conceded that Petersen-1 discloses loop material." Pet. Reply 23–24 (citing Ex. 1024, 226:6–14). Thus, we credit the deposition testimony of Mr. Kline who acknowledged that the "sanitary napkin" or "panty" depicted in Figure 4A of Petersen-1 is a "loop material," as required by claim 10.

After having analyzed the entirety of the trial record and assigning appropriate weight to the cited supporting evidence, we determine Petitioner has shown by a preponderance of the evidence that claim 10 is unpatentable over the teachings of Petersen-1.

d. Claim 19

Claim 19 recites "[t]he mechanical fastener of claim 1, wherein at least a portion of the post decreases in size from the proximal end to the distal end." Ex. 1001, 28:17–19.

Petitioner asserts that Petersen-1 discloses that "the top portion of the post of the mechanical fastener 14 decreases in size in a direction from the proximal end to the distal end." Pet. 56 (citing Ex. 1003, Fig. 3b). For purposes of Petitioner's obviousness ground over Petersen-1, we do not reach Petitioner's assertion that Petersen-1 discloses that the top portion of its post "decreases in size from the proximal end to the distal end," as recited in claim 19. Instead, we address the limitation of claim 19 below in the context of Petitioner's obviousness ground over Petersen-1, Miller and/or Daio-Seishi (Ground 3).

4. *Conclusion*

For the foregoing reasons, Petitioner has shown by a preponderance of the evidence that claims 1–5, 8–10, 13, 15–18 are unpatentable under 35 U.S.C. § 103(a) as obvious over anticipated by Petersen-1. As discussed above, we do not reach Petitioner’s assertion that claim 19 is obvious over Petersen-1.

E. Obviousness over Petersen-1 and AAPA (Ground 2: Claim 11)

Petitioner asserts that claim 11 is unpatentable as obvious over Petersen-1. Pet. 56–57. Petitioner also relies on the testimony of Dr. Cakmak to support its arguments. *Id.*

1. *Overview of AAPA (Ex. 1003)*

Petitioner asserts that the ’833 patent identifies using three commercially available “nonwoven loop material samples” with fiber basis weights of 14 gsm, 16 gsm, and 25 gsm, respectively. Pet. 56 (citing Ex. 1001, 22:17–47).

2. *Analysis of Claim 11*

Claim 11 recites “[t]he fastening system of claim 10, wherein the loop material has a fiber basis weight in a range from 10 grams per square meter to 30 grams per square meter.” Ex. 1001, 27:4–6.

Petitioner asserts that claim 11 is unpatentable as obvious over Petersen-1 and AAPA.¹⁵ Pet. 56–57. Petitioner asserts that “Table 5 of the

¹⁵ “Statements in a challenged patent’s specification may be used . . . in conjunction with one or more prior art patents or printed publications forming ‘the basis’ of the proceeding under § 311.” USPTO Memorandum, Treatment of Statements of the Applicant in the Challenged Patent in Inter Partes Reviews Under § 311 (August 18, 2020), *available at*

'833 patent discloses fiber basis weights for three nonwoven loop material samples, each 'commercially available' and therefor Admitted Prior Art." *Id.* at 56 (citing Ex. 1001, 22:17–47). Petitioner explains that it would have been obvious to combine these known loft materials, having fiber basis weights within range, with the mechanical fastener disclosed in Petersen-1 because "such a combination amounts to combining prior art elements according to known methods that yield predictable results." *Id.* at 57 (citing *KSR*, 550 U.S. at 421; Ex. 1002 ¶ 111); *see also* Ex. 1003 ¶ 104 (describing that the shape and density of the male fastening elements 14 can be varied based upon loft materials).

Patent Owner does not present any argument for claim 11 other than what we have already considered with respect to claim 1. PO Resp. 47. After considering the evidence and arguments of record, we determine that Petitioner has demonstrated by a preponderance of the evidence that claim 11 would have been obvious in view of Petersen-1 and AAPA.

*F. Obviousness over Petersen-1, Miller and/or Daio-Seishi
(Ground 3: Claims 1–5, 8, 10, 13, and 15–19)*

Petitioner asserts that claims 1–5, 8–10, 13, and 15–19 are unpatentable as obvious over "Petersen, Miller[,] and/or Daio-Seishi." Pet. 58–67 (emphasis omitted). Petitioner also relies on the testimony of Dr. Cakmak to support its arguments. *Id.*

https://www.uspto.gov/sites/default/files/documents/signed_aapa_guidance_memo.pdf.

1. *Overview of Cited References*

a. *Miller (Ex. 1004)*

Miller is directed to “mechanical fasteners such as hook-and-loop fasteners” and particularly “a mushroom-type hook strip such as can releasably close a garment, e.g., a disposable garment such as a diaper or a hospital gown.” Ex. 1004, 1:15–19. More particularly, Miller discloses a hook-and-loop fastener that “because of the density and shape of its hooks, affords the advantage over known prior mushroom-type hook strips of making better engagement in shear with certain types of conventional fabrics and loop materials than known mushroom-type hook strips, while being less expensive to manufacture.” *Id.* at 2:36–42.

b. *Daio-Seishi (Ex. 1006)*

Daio-Seishi is directed to “a male member of a mechanical tape, an absorbent article and a fastening type paper diaper.” Ex. 1006 ¶ 1 (“Technical field”). More particularly, Daio-Seishi discloses that “in the present invention, multiple types of hook parts differing in height or shape are provided, thus allowing the hook parts of different types to function independently or jointly, allowing various fastening characteristics to be achieved as a result.” *Id.* ¶ 8 (“Operation and effect”).

2. *Analysis of Claim 1*

Petitioner asserts claim 1 would have been obvious over Petersen-1, Miller, and/or Daio-Seishi. Pet. 58–60. Petitioner indicates that “[f]or Ground 3, Petersen[-1] is relied upon for each challenged feature, except for” the height range of the upstanding fastening elements. *Id.* at 58.

a) wherein the multiple, upstanding fastening elements have a height of at least 40 micrometers and up to 300 micrometers

Petitioner asserts that each of Miller and Daio-Seishi disclose fastening elements having a height within the claimed range and disclose an overlapping range of fastener height. *Id.* at 58–60.

With respect to Miller, Petitioner asserts that “Miller discloses a specific example of ‘about 0.28 mm’ (280 micrometers).” *Id.* at 58 (citing Ex. 1004, 8:9–18). Petitioner further asserts that “Miller also discloses an overlapping range ‘preferably of from about 0.10 to 1.27 mm [(100 to 1,270 micrometers)] in height, and more preferably from about 0.18 to 0.51 mm [(180 to 510 micrometers)] in height.’” Pet. 59 (citing Ex. 1004, 4:34–36).

With respect to Daio-Seishi, Petitioner asserts that Daio-Seishi

provides specific examples of male fastening elements having heights within the claimed range, and overlapping ranges. *See* Ex.1006 (Daio-Seishi) at ¶¶[0048], [0050]–[0051], and [0074] (disclosing ranges of heights between 100 to 2,000, 250 to 2,000, 250 to 1000, 100 to 500, 150 to 300, 100 to 150, and 100 to 250 micrometers; and disclosing specific examples of upstanding male fastening elements having heights of 285 and 200 micrometers)).

Pet. 59.

Based on the disclosures of Miller and Daio-Seishi, Petitioner concludes that

[i]t would have been obvious to modify the disclosure of Petersen[1] to use the heights of the male fastening members described in Miller or Daio-Seishi, because these references disclose[] providing upstanding elements within the claimed range for applications such as diapers and sanitary napkins, and such a modification would merely result from optimizing a result effective variable (i.e., the height).

Id. (citing Pet. 35–46; Ex. 1003 ¶¶ 19, 69; Ex. 1002 ¶ 112). According to Petitioner, “[a] POSITA would have known that using a male fastening member of a relatively low height reduces the basis weight of a mechanical fastening web” (Pet. 60 (citing Ex. 1002 ¶ 114)) and Petersen-1 identifies “that it was advantageous to have ‘a stretched mechanical fastening web having a low overall thickness and basis weight.’” Pet. 60 (quoting Ex. 1003 ¶ 10). Thus, Petitioner asserts that “[a] POSITA would have recognized the height of the male fastening members as a result-effective variable, and such a combination would simply be a matter of applying a known technique to a known product ready for improvement to yield predictable results.” *Id.* at 60 (citing Pet. 35–46; Ex. 1003 ¶¶ 19, 69; Ex. 1002 ¶ 114). Petitioner also concludes that “[i]t would have been ‘obvious to try’ the disclosed heights of Miller and/or Daio-Seishi with the disclosed method of manufacture of Petersen[-1].” Pet. 60 (citing *KSR*, 550 U.S. at 421).

3. *Patent Owner’s Contentions*

With respect to claim 1, Patent Owner argues that Petitioner’s theory of obviousness under Petersen-1, Miller and/or Daio-Seishi is deficient because (i) it “lacks particularity based on Petitioner’s use of the ‘and/or’ formulation” (PO Resp. 40–42) and (ii) relies on impermissible hindsight. *Id.* at 42–47; PO Sur-reply 16–17.

4. *Discussion*

After considering both parties’ arguments, we are persuaded that Petitioner has established obviousness of claim 1 under a theory of overlapping ranges. Pet. 58–60.

At outset, we are not persuaded by Patent Owner’s argument that Ground 3 “lacks particularity based on Petitioner’s use of the ‘and/or’ formulation, and inconsistencies in their ambiguous use of ‘or,’ ‘and,’ or ‘and/or’ throughout the ground undermine any cogent understanding of the basis for their allegations of obviousness.” PO Resp. 40 (citing Ex. 2008 ¶ 93). As should be apparent from the analysis in this Final Decision, this Panel was able to discern Petitioner’s obviousness arguments notwithstanding Petitioner’s use of the “and/or” formulation. For example, the record indicates that Petitioner is relying on “Miller and/or Daio-Seishi” as disclosing fastening elements having various heights within and overlapping the claimed range, and as such, simply disclosing variations of fastener height ranges. *See* Pet. 23–25, 58–60. Thus, the Petition was sufficiently specific and particular as to its grounds for obviousness both for the Board to consider Petitioner’s positions, which we analyze below, and for Patent Owner to have responded to Petitioner’s positions.

Patent Owner further argues that Petitioner fails to explain why one of ordinary skill in the art would have been motivated to combine Petersen-1, Miller and/or Daio-Seishi to render claim 1 obvious. Instead, Patent Owner contends that Petition relies “on conclusory allegations to perform a hindsight based reconstruction of the claims.” PO Resp. 42 (citing Ex. 2008 ¶¶ 94–95). According to Patent Owner Petitioner provides “a laundry list of various heights disclosed in Miller . . . and Daio-Seishi,” and improperly concludes that “[i]t would have been obvious to modify the disclosure of Petersen[-1] to use *the heights* of the male fastening members described in Miller or Daio-Seishi.” *Id.* at 43–44 (citing Pet. 59) (emphasis added)). Thus, Patent Owner concludes that “Petitioner provides no explanation as to

anything lacking in Petersen-1 that would have motivated a POSITA to turn to any of various *heights* the Petition identifies from Miller and Daio-Seishi.” *Id.* at 43–44.

We are not persuaded by Patent Owner’s argument. A range can be disclosed in multiple prior art references instead of in a single prior art reference depending on the specific facts of the case. *Iron Grip Barbell Co., Inc. v. USA Sports, Inc.*, 392 F.3d 1317, 1322, (Fed. Cir. 2004). In *E.I. du Pont* and *Iron Grip* the court found claims obvious in view of overlapping ranges and disclosures found in multiple prior art references that were all directed to the same general process or structure. *E.I. du Pont*, 904 F.3d at 1010–11; *Iron Grip*, 392 F.3d at 1322. Here, Petersen-1, Miller, and Daio-Seishi are all directed to the production of mechanical fasteners, and as such, we determine that Petitioner’s reliance on ranges from three references is appropriate to show that the hook height range recited by claim 1 of the ’833 patent overlap with the ranges known in the prior art. Ex. 1003 ¶ 66, Ex. 1004, 4:34–36, Ex. 1006 ¶¶ 48, 51–52.

And, as discussed above with respect to Ground 1, the record persuasively establishes that height is a result-effective variable. *See, e.g.*, Ex. 1003 ¶ 66 (“The dimensions of the individual male fastening elements 14 can be varied widely depending on the application and the structure and loftiness of the complementary female fastening material.”); Ex. 1002 ¶¶ 112–113; Ex. 1006 ¶ 48; *See Peterson*, 315 F.3d at 1330 (“The normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of percentage ranges is the optimum combination of percentages.”); *In re Boesch*, 617 F.2d 272, 276 (CCPA 1980) (“[D]iscovery of an optimum value

of a result effective variable in a known process is ordinarily within the skill of the art.”).

Patent Owner further asserts “Miller and Daio-Seishi’s teachings regarding hook height [are] unnecessary and redundant in view of the hook height teachings of Petersen-1.” PO Resp. 44 (citing Ex. 2008 ¶ 95). According to Patent Owner, Petitioner’s reliance on Miller and Daio-Seishi “is nothing more than exercise in hindsight-based reconstruction of the claim.” *Id.* (citing *Kinetic Concepts, Inc. v. Smith & Nephew, Inc.*, 688 F.3d 1342, 1369 (Fed. Cir. 2012)). We disagree.

In *Kinetic*, the issue was whether to combine publications which “both . . . independently accomplish similar functions, namely, draining fluids.” *Kinetic Concepts, Inc.*, 688 F.3d at 1369. One set of publications involved the use of negative pressure to drain wounds. *Id.* at 1362–1363. The other set of publications disclosed a different type of wound drainage system. *Id.* at 1365. The obviousness rejection was predicated on combining the two sets of publications to meet a limitation in the claim of using negative pressure to treat a wound. However, wound treatment was not described in the negative pressure publications. *Id.* at 1361, 1363. Because each publication was complete in teaching a wound drainage method, and there was no teaching that negative pressure could be used to treat wounds, the court found “a person having ordinary skill in the art, who was merely seeking to create a better device to drain fluids from a wound, would have no reason to combine the features of both devices into a single device.” *Id.* at 1369.

We are not persuaded that the facts presented in this Petition are similar to those in *Kinetic*. In the present case, Miller and Daio-Seishi are

not being combined for a new purpose; but rather, they are being relied upon to “demonstrate that it would have been obvious to select heights for the Petersen-1 fastener from the lower end of the overlapping height range” as Miller and Daio-Seishi both “disclose heights in this part of the range for use in the same applications as Petersen-1 – disposable diapers and sanitary napkins.” Pet. Reply 20–21; Pet. 59. “[W]hen a patent ‘simply arranges old elements with each performing the same function it had been known to perform’ and yields no more than one would expect from such an arrangement, the combination is obvious.” *KSR*, 550 U.S. at 417 (quoting *Sakraida v. Ag Pro, Inc.*, 425 U.S. 273, 282 (1976)).

After having analyzed the entirety of the trial record and assigning appropriate weight to the cited supporting evidence, we determine Petitioner has shown by a preponderance of the evidence that independent claim 1 is unpatentable over the teachings of Petersen-1, Miller and/or Daio-Seishi.

5. *Analysis of Claims 2–5, 8–10, 13, and 15–19*

Petitioner also challenges claims 2–5, 8–10, 13, and 15–19 on the same the same ground. Pet. 60–67. Patent Owner separately argues the patentability of claim 19 (PO Resp. 55–58), but does not separately address the patentability of claims 2–5, 8–10, 13, and 15–18. *Id.* at 67.

a. *Claims 2–5, 8–10, 13, and 15–18*

Because we determine that claims 2–5, 8–10, 13, and 15–18 are unpatentable as obvious over Petersen-1 (Ground 1), we do not reach the Petition’s third ground of unpatentability over Petersen-1, Miller and/or Daio-Seishi with respect to claims 2–5, 8–10, 13, and 15–18.

b. Claim 19

Claim 19 recites “[t]he mechanical fastener of claim 1, wherein at least a portion of the post decreases in size from the proximal end to the distal end.” Ex. 1001, 28:17–19.

Petitioner asserts that asserts that “Miller discloses that the ‘stems [of the male fastening members] preferably have fillets at their bases both to enhance strength and stiffness and for easy release from a mold in which they are formed.’” Pet. 65 (citing Ex. 1004, 4:17–20). Petitioner explains that Miller’s fillets “decrease[] in size from the proximal end to the distal end,” as required by claim 19. *Id.* (citing Ex. 1004, Fig. 1). Petitioner further asserts that Daio-Seishi also discloses posts that “decrease[] in size from the proximal end to the distal end,” as required by claim 19. *Id.* at 66 (citing Ex. 1006, Fig. 5). According to Petitioner, “[i]t would have been obvious to include the fillets and general tapered shape of Miller and Daio-Seishi in the manufacturing method of Petersen[-1] to [sic] ‘both to enhance strength and stiffness and for easy release from a mold in which they are formed,’ as disclosed in Miller.” *Id.* (citing Ex. 1004, 4:18–20). Petitioner adds that the “effect of stiffening bottom connected upstanding elements by tapering from bottom to top is common knowledge in the science and engineering of mechanics of solids.” *Id.* (citing Ex. 1002 ¶¶ 122).

In response, Patent Owner asserts that Petitioner’s ground is deficient because Petitioner argues impermissibly that “it would have been obvious to modify the fastener disclosed in Petersen-1 to make it both more and less flexible, both stiffer and less stiff, at the same time.” PO Resp. 56; PO Sur-reply 21–22. Patent Owner first argues that Petitioner’s rationale for modifying Petersen-1’s upstanding fasteners to include the fillets and

general tapered shape of Miller and Daio-Seishi conflicts with “Petersen-1’s teachings that a flexible fastener is preferable, particularly for applications such as use with diapers or sanitary napkins.” *Id.* at 55 (citing Ex 1003 ¶ 9). Patent Owner contends that this rationale is also in conflict with Petitioner’s “reli[ance] on these teachings from Petersen-1 regarding the desirability of having a more flexible fastener in these sorts of applications to argue that it purportedly would have been obvious to reduce the hook heights and basis weight of the fastener.” *Id.* at 55–56 (citing Pet. 41–42; Ex. 1002 ¶¶ 59–61, 98, 112). Patent Owner argues that “Petersen-1 contains no indication whatsoever that there were any issues or problems with the release of the upstanding elements from the disclosed molds,” and as such, one of ordinary skill in the art “would not have been motivated to look to Miller or Daio-Seishi for a solution to this undisclosed and purely speculative issue.” *Id.* 56; PO Sur-reply 22.

After considering both parties’ arguments, we are persuaded by Petitioner’s rationale to modify Petersen-1 to include the fillets and general tapered shape of Miller and Daio-Seishi.

A motivation to combine references may be found “explicitly or implicitly in market forces; design incentives; the ‘interrelated teachings of multiple patents’; ‘any need or problem known in the field of endeavor at the time of invention and addressed by the patent’; and the background knowledge, creativity, and common sense of the person of ordinary skill.” *ZUP, LLC v. Nash Mfg., Inc.*, 896 F.3d 1365, 1371 (Fed. Cir. 2018) (internal quotations and citations omitted); *see also KSR*, 550 U.S. at 419–20.

Based on the record, we agree with Petitioner that even though Petersen-1 discusses the benefits of a flexible fastener, this would not

prevent one of ordinary skill in the art from appreciating “Miller’s separate disclosed advantage of stiffness for manufacturing.” Pet. Reply 25. We also agree with Petitioner that one of ordinary skill in the art “would have found it obvious to choose a shape that compromised between the two and allowed for adequate user comfort *and* efficient manufacturing.” *Id.* In this regard, Petersen-1 identifies that its sanitary napkins are “characterized by a high reliability, an increased mechanical strength resulting in an improved handleability, and—due to the *low or relatively low thickness* of the stretched mechanical fastening web laminate 1—increased wearer—s [sic] comfort.” Ex. 1003 ¶ 105 (emphasis added); *see also id.* ¶ 82 (The thickness of the stretched mechanical fastening web layer 13 “is preferably between 5 and 200 μm and more preferably between 10 and 100 μm .”). Ex. 1003 ¶ 82.

And, while Miller describes that its fillets “enhance strength and stiffness” (Ex. 1004, 4:18–19), Miller also identifies the need to have a backing with “both good flexibility and strength.” *Id.* at 4:62–63. Thus, we find that one of ordinary skill in the art would have recognized the benefits of flexibility for comfort, but also understood the potential manufacturing efficiencies attainable based on Miller’s teachings. A person with ordinary skill in the art is “a person of ordinary creativity, not an automaton,” and “in many cases . . . will be able to fit the teachings of multiple patents together like pieces of a puzzle.” *KSR*, 550 U.S. at 420–21.

Patent Owner’s expert, Mr. Kline, argues that “[i]n my opinion, Petitioner is trying to have it both ways. It argues that a POSITA would be motivated to have a more flexible and less flexible fastener at the same time.” Ex. 2008 ¶ 111. However, neither Patent Owner nor Mr. Kline explain why modifying the shape of Petersen-1’s posts would have been

beyond the level of ordinary skill, or why one with ordinary skill in the art would not have had a reasonable expectation of success in combining the teachings. In fact, Petersen-1 teaches that its male fastening elements 14 can be manufactured using cavities that provide posts of various shapes. Ex. 1003 ¶ 54–55, 66; Pet. Reply 24. This illustrates that one with ordinary skill in the art at the time of the invention would not have found it uniquely challenging or beyond his or her skill to apply the teachings of Miller or Daio-Seishi to other mechanical fasteners, such as those disclosed in Petersen-1.

After having analyzed the entirety of the trial record and assigning appropriate weight to the cited supporting evidence, we determine Petitioner has shown by a preponderance of the evidence that claim 19 is unpatentable over the teachings of Petersen-1, Miller and/or Daio-Seishi.

*G. Obviousness over Petersen-1, Miller and/or Daio-Seishi, and AAPA
(Ground 4: Claim 11)*

Because we determine that claim 11 is unpatentable as obvious over Petersen-1 and AAPA, we do not reach the Petition’s fourth ground of unpatentability over Petersen-1, Miller and/or Daio-Seishi, and AAPA.

*H. Obviousness over Petersen-1 and Miller
(Ground 5: Claims 6 and 7)*

Petitioner asserts that claims 6 and 7 are unpatentable as obvious over Petersen-1 and Miller. Pet. 68–70. Petitioner also relies on the testimony of Dr. Cakmak to support its arguments. *Id.*

Claim 6 recites “[t]he mechanical fastener of claim 1, wherein the cap extends an overhang distance beyond the post, and wherein the overhang distance is in a range from 5 micrometers to 85 micrometers.” Ex. 1001,

26:35–38. Petitioner asserts that Petersen-1 alone or in combination with Miller discloses the limitations of the base claim 1. Pet. 68. Petitioner further asserts that Miller disclose cap overhang distances of 13 μm to 254 μm , and as such, discloses an anticipating range for claim 6. *Id.* (citing Ex. 1004, 4:34–45). Miller discloses that its hooks “have circular disc-like heads that project radially past the stems on each side preferably by an average of about [13 μm to 254 μm], and more preferably by an average of about [25 μm to 127 μm].” Ex. 1004, 4:42–45. Petitioner contends that “the ’833 patent demonstrates no criticality of the ‘overhang distance,’” and as such, it would have been obvious to combine the teachings “of Miller with that of Petersen[-1] because Petersen[-1] discusses using ‘mushroom-type mechanical fastening elements 14,’ and the overhang shape and values discussed in Miller are just specific examples of the ‘[m]ushroom-type mechanical fasteners’ described.” Pet. 68 (citing Ex. 1003 ¶ 64; Ex. 1004, 2:2–3; Ex. 1002 ¶¶ 125–126).

Claim 7 recites “[t]he mechanical fastener of claim 1, wherein the cap extends an overhang distance beyond the post, and wherein a quotient of the overhang distance divided by the height is up to 0.6.” Ex. 1001, 26:39–42.

Petitioner asserts that Petersen-1 alone or in combination with Miller discloses the limitations of the base claim 1. Pet. 69. With reference to the example material discussed in Miller (*see* Ex. 1004, 8:45–54), Petitioner asserts that Miller discloses one example with a quotient within the recited range, i.e., “a male fastening member [with] a height of [280 μm] and an overhang of [80 μm], giving ‘a quotient of the overhang distance divided by the height’ as approximately 0.285.” Pet. 69 (citing Ex. 1002 ¶ 127).

Petitioner argues that

[i]t would have been obvious to combine the disclosures of Miller and Petersen to create a mechanical fastener engageable with “fibers on non-lofty, nonwoven materials, knitted and woven fabrics and on nonwoven fiber layers of laminates that would not typically be considered useful as good loop fastener materials[, such] engagement restrict[ing] relative movement in shear . . . while allowing the hooks 14 to be easily peeled from engagement from those fabrics or laminates,” as evidenced by Miller.

Id. at 70 (citing Ex.1004, 8:20–29; Ex. 1002 ¶¶ 127–128).

Patent Owner does not present any argument for claims 6 and 7 other than what we have already considered with respect to claim 1. PO Resp. 47. After considering the evidence and arguments of record, we determine that Petitioner has demonstrated by a preponderance of the evidence that claim 6 and 7 would have been obvious in view of Petersen-1 and Miller.

*I. Obviousness over Petersen-1 and Buzzell (Ground 6: Claim 9)
and
over Petersen-1, Miller and/or Daio-Seishi, and Buzzell (Ground 7:
Claim 9)*

Because we determine that claim 9 is unpatentable as obvious over Petersen-1 (Ground 1), we do not reach the Petition’s sixth and seventh grounds of unpatentability over Petersen-1 and Buzzell (Ground 6) and Petersen-1, Miller and/or Daio-Seishi, and Buzzell (Ground 7).

*J. Obviousness over Petersen-1 and Busam
(Ground 8: Claims 11, 12, and 14)*

Petitioner asserts that claims 11, 12, and 14 are unpatentable as obvious over Petersen-1 and Busam. Pet. 71–73. Petitioner also relies on the testimony of Dr. Cakmak to support its arguments. *Id.*

1. Overview of Busam (Ex. 1010)

Busam is directed to “to an improved female fastening portion for a refastenable mechanical fastening device” which is capable of engaging a complementary male fastening portion. Ex. 1010, 1:5–7, 5:35–36. Figure 1 of Busam is reproduced below:

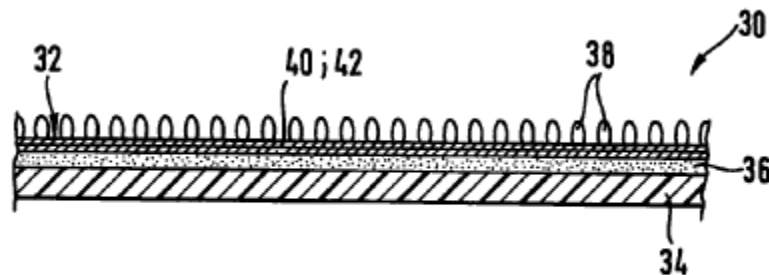


Fig. 1

(“Figure 1 is an enlarged sectional view of the female fastening portion.” Ex. 1010, 4:16–18).

Figure 1 of Busam depicts female fastening portion 30 comprising textile material 32 and loops 38, which is disposed adjacent to a substrate 34. Ex. 1010, 5:39–41. Figure 1 further depicts layer of adhesive 36 that is interposed between textile material 32 and substrate 34. *Id.* at 5:41–43.

Busam discloses

[t]he combined basis weight of the textile material 32 and the layer of adhesive 36 is not greater than 45 grammes per square metre. More specifically, the basis weight of the textile material 32 is not greater than 40 grammes per square metre, preferably not greater than 34 grammes per square metre, more preferably not greater than 28 grammes per square metre.

Id. at 5:43–50. Busam further discloses that

loops 38 of the textile material 32 may be formed with a loop height ranging from about [20 to 20,000 micrometers], a loop denier ranging from 8 to 78 and a basis weight, which is less than 40 grammes per square metre, preferably less than 34 grammes

per square metre and more preferably less than 28 grammes per square metre.

Id. at 6:19–25. Busam identifies that its female loop material is capable of engaging with the male fastening portion with a shear strength that was “reported to be greater than 500 grammes.” *Id.* at 11:56–12:4.

2. *Analysis of Claims 11, 12, and 14*

Patent Owner does not separately address the patentability of claims 11 and 14 (PO Resp. 47), but does separately address the patentability of claim 12. *Id.* at 58–61. We first address the patentability of claims 11 and 14 as a group. We then address the patentability of claim 12.

a. Claims 11 and 14

Petitioner explains how each limitation of claims 11 and 14 is taught or rendered obvious by the disclosures of Petersen-1 and Busam. Pet. 71–73.

Claim 11 recites “[t]he fastening system of claim 10, wherein the loop material has a fiber basis weight in a range from 10 grams per square meter to 30 grams per square meter.” Ex. 1001, 27:4–6. Petitioner asserts that Petersen-1 discloses the subject matter of claims 1 and 10 (*see* Ground 1), and the addition of AAPA discloses the fiber basis weight range recited by claim 11 (Ground 2). Pet. 71. Petitioner further asserts that “Busam also discloses loops 38 having a basis weight of “less than 28 grammes per square metre.” *Id.* (citing Ex. 1010, 6:19–25). Petitioner argues that

[i]t would have been obvious to combine the loop material of Busam with the mechanical fastener disclosed by Petersen[-1] because “[t]he basis weight reduction results in better material utilization, allows the artwork on the substrate underlying the woven fabric to be more clearly highlighted and leads to an improvement in tactile qualities.”

Id. at 72 (citing Ex.1010 at 3:5–11; Ex. 1002 ¶ 130).

Claim 14 recites:

The absorbent article of claim 13, further comprising a front waist region and a rear waist region, wherein at least one of the front waist region or the rear waist region comprises the mechanical fastener, and wherein at least one of the front waist region or the rear waist region comprises a loop material having a fiber basis weight in a range from 10 grams per square meter to 20 grams per square meter.

Ex. 1001, 27:15–21. Petitioner asserts that Petersen-1 discloses the subject matter of claim 13. Pet. 73 (*see* Ground 1). Relying on its expert, Mr. Kline, Petitioner argues that “[i]t would have been obvious to place the mechanical fastener on ‘at least one of the front waist region or the rear waist region’ to fasten the absorbent article.” *Id.* (citing Ex. 1002 ¶ 133).

Patent Owner does not present any argument for claims 11 and 14 other than what we have already considered with respect to claim 1.

PO Resp. 47. After considering the evidence and arguments of record, we determine that Petitioner has demonstrated by a preponderance of the evidence that claims 11 and 14 would have been obvious in view of Petersen-1 and Busam.

b. Claim 12

Claim 12 recites “[t]he fastening system of claim 11, wherein the loop material has a fiber basis weight in a range from 20 grams per square meter to 30 grams per square meter, and wherein the mechanical fastener engages with the loop material with a shear strength of at least 2000 gram-force.”

Ex. 1001, 27:7–11.

Petitioner asserts that Busam “discloses loops 38 having a basis weight of ‘less than 28 grammes per square metre.’” Pet. 71 (citing Ex. 1010, 6:19–25). According to Petitioner,

[i]t would have been obvious to combine the loop material of Busam with the mechanical fastener disclosed by Petersen because “[t]he basis weight reduction results in better material utilization, allows the artwork on the substrate underlying the woven fabric to be more clearly highlighted and leads to an improvement in tactile qualities.”

Id. at 72 (citing Ex. 1010, 3:5–11; Ex. 1002 ¶ 130). Petitioner then concludes that “[b]y combining the mechanical fastener of Petersen[-1] with the loop material disclosed by Busam, the resulting combination would cause ‘a shear strength of at least 2000 gram-force’, as specified by claim 12.” *Id.* (citing Ex. 1002, claim chart between ¶¶ 130–132).

Patent Owner asserts that Petitioner’s ground is insufficient for several reasons. PO Resp. 58–61; PO Sur-reply 23–24. Patent Owner first argues that while Busam does disclose an overlapping range of fiber basis weights,¹⁶

Busam does **not** disclose, and Petitioner[] fail[s] to show, that the sample fasteners for which the shear strength results were reported in Busam, in fact, used a loop material having a fiber basis weight in a range from 20–30 grams per square meter. The fiber basis weight of the loop material of the tested “selection of samples” in Busam could have been above or below this claimed range.

¹⁶ Busam discloses that “the basis weight of the textile [i.e., loop] material 32 is not greater than 40 grammes per square metre, preferably not greater than 34 grams per square metre, more preferably not greater than 28 grammes per square metre.” Ex. 1010, 5:46–50.

PO Resp. 59 (citing Ex. 2008 ¶ 116).¹⁷ Patent Owner further argues that the asserted combination fails to disclose or suggest a mechanical fastener that “engages with the loop material with a shear strength of at least 2000 gram-force” because the shear strength results reported in Busam would not have been understood by one of ordinary skill in the art “to teach that such sample fasteners exhibited shear strengths ‘of at least 2000 gram-force,’ as required by claim 12.” *Id.* at 58–60 (citing Ex. 2008 ¶ 118); *see also id.* at 60 (“Under Petitioner’s implicit, mistaken rationale, any nominally unbounded disclosed range for shear strength (e.g., ‘greater than 10 grams’) would purportedly satisfy the shear strength limitation in claim 12.”).

In response, Petitioner asserts that the disclosed fiber basis weight in Busam “includes both female loop material and adhesive attaching the loop material to a substrate.” Pet. Reply 27 (citing Ex. 1010, 5:46–50). Petitioner asserts that Busam discloses that “the adhesive has ‘a basis weight in the range from 3 to 30 grammes.’” *Id.* (citing Ex. 1010, 5:55–56). According to Petitioner, by subtracting the basis weight of the adhesive from the preferred maximum basis weight of the female loop/adhesive combination (28 grams), Busam, thus, “discloses a loop material (excluding adhesive) having a basis weight of 25 g/m² – squarely in the center of the claimed range.” *Id.* Petitioner further asserts that “[c]laim 12 does not recite

¹⁷ Patent Owner also argues that “Busam does not disclose, and Petitioner[] fail[s] to show, that the male fastening portion of the tested ‘selection of samples’ in Busam had the claimed properties of the male fastener element—i.e., hook heights between 40–300 micrometers and a basis weight between 25–75 grams per square meter.” PO Resp. 59. However, Petitioner does not rely on Busam to address these elements. *See* Pet. 77 (“Petersen[-1] discloses all the features of the base claim 1.”).

any structural features besides loop material basis weight and the mechanical fastener of claim 11” and the record indicates that there are other factors that contribute to achieving the claimed shear strength. *Id.* at 28 (citing Ex. 1024, 227:23–228:6). Consequently, Petitioner concludes that “[e]ither the cited art necessarily discloses the claimed shear strength, because all other claimed structural features are met or it would have been within the level of POSITA to vary known parameters to arrive at the shear strength.” *Id.* (citing Ex. 1024, 136:5–138:1).

Patent Owner counters that Petitioner “improperly shift[s] its position and adopt[s] a brand new obviousness theory in Reply.” PO Sur-reply 23. According to Patent Owner, Petitioner has failed to show that Busam discloses or suggests the shear strength “using fasteners and loop material having the characteristics required by claim 12, and thus failed to show that Busam’s disclosure regarding the measured shear strength had any relevance here.” *Id.* (citing Ex. 1010, 11:56–12:2; Pet. 72 (citing Ex. 1002 at claim chart between ¶¶ 130–132)). Patent Owner further argues that the Board should disregard Petitioner’s arguments that “the cited art necessarily discloses” or that “it would have been [obvious] to vary known parameters” the claimed shear strength because these arguments are based on new theories, which were “introduced for the first time in reply” and “not made ‘in writing and with particularity’ ‘from the onset’ in the Petition.” PO Sur-reply 24 (citing *Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1369 (Fed. Cir. 2016); *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016); *Asetek Danmark A/S v. Coolit Sys., Inc.*, IPR2019-00705, Paper 43 at 20–21 (P.T.A.B. Aug. 21, 2020)).

We find that Patent Owner's arguments and evidence, summarized above, undermine Petitioner's contention that Busam discloses the required shear force strength having the characteristics required by claim 12. We credit Mr. Kline's declaration evidence that "Petitioner does not show that the loop material in the 'selection of samples' for which these shear performance results were reported in Busam had a 'fiber basis weight in a range from 20 grams per square meter to 30 grams per square meter' as required by claim 12." Ex. 2008 ¶ 116. We also credit Mr. Kline's un rebutted testimony that the exhibited shear strengths reported in Busam would not have been understood by one of ordinary skill in the art "to teach that such sample fasteners exhibited shear strengths 'of at least 2000 gram-force,' as required by claim 12." *Id.* ¶ 118.

We find Petitioner has not demonstrated whether the fiber basis weight of the loop material used in Busam's testing falls within the fiber basis weight range, as recited by claim 12. We agree with Mr. Kline that "[t]he fiber basis weight of the loop material of the tested 'selection of samples' in Busam could have been above or below this claimed range." Ex. 2008 ¶ 116. In this regard, Busam simply refers to its broad disclosure regarding fiber basis weights to identify the loop material used during its testing procedure to achieve a resulting shear strength "greater than 500 grammes." Ex. 1010, 12:1, *see also* Ex. 1010, 13:1 ("Loop material[:] As described above.").

Petitioner does not point us to any evidence that Busam's female loop material is capable of engaging with a male fastening portion with a shear strength that was "reported to be greater than 500 grammes" and has "a fiber basis weight in a range from 20 grams per square meter to 30 grams per

square meter,” as claim 12 requires. Petitioner’s attempt to subtract the basis weight of the adhesive from the preferred maximum fiber basis weight of the female loop/adhesive combination does not alter our determination. Pet. Reply 27. With or without adhesive, the record still fails to provide evidence that the shear performance results reported in Busam were achieved with a “loop material [that] has a fiber basis weight in a range from 20 grams per square meter to 30 grams per square meter,” as required by claim 12.

We also agree with Patent Owner that Petitioner’s arguments that “the cited art necessarily discloses” or that “it would have been [obvious] to vary known parameters” the claimed shear strength are based on new theories, which were “introduced for the first time in reply” and “not made ‘in writing and with particularity’ ‘from the onset’ in the Petition.” PO Sur-reply 24 (citations omitted). Petitioner does not explain why the arguments made in its Reply relating to claim 12 could not have been presented in the first instance in the Petition or how the arguments in the Reply are responsive to Patent Owner’s arguments in the Patent Owner Response. *Cf.* Pet. 72 (“By combining the mechanical fastener of Petersen with the loop material disclosed by Busam, the resulting combination would cause ‘a shear strength of at least 2000 gram-force,’ as specified by claim 12.”).

Such arguments and evidence are the type of material that should have been included in the Petition in the first instance to present a *prima facie* case of unpatentability, and, therefore, are improperly introduced for the first time in the Petitioner’s Reply. *See* Patent Trial and Appeal Board Consolidated Trial Practice Guide 73–75 (Nov. 2019), available at <https://www.uspto.gov/TrialPracticeGuideConsolidated> (discussing the

appropriate scope for a reply); *id.* at 73 (“Petitioner may not submit new evidence or argument in reply that it could have presented earlier, e.g. to make out a *prima facie* case of unpatentability.”). It was Petitioner’s burden to demonstrate sufficiently in the Petition that the cited prior art renders the challenged claims unpatentable, including showing that the Petition’s contentions are supported by evidence. *See* 35 U.S.C. § 314(a); *see also* *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d at 1363 (“In an IPR, the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable.”) (citing 35 U.S.C. § 312(a)(3)); *Intelligent Bio-Systems, Inc. v. Illumina Cambridge Ltd.*, 821 F.3d at 1369 (requiring “the initial petition identify ‘with particularity’ the ‘evidence that supports the grounds for the challenge to each claim.’”). Thus, under the particular facts and circumstances in this case, we decline to consider Petitioner’s arguments and evidence relating to claim 12 presented belatedly in the Reply.

Based on the complete record, we are not persuaded that Petitioner has established, by a preponderance of the evidence, that the combination of Petersen-1 and Busam teaches or suggests the subject matter of claim 12.

*K. Obviousness over Petersen-1, Miller and/or Daio-Seishi, and Busam
(Ground 9: Claims 11, 12, and 14)*

Petitioner asserts that claims 11, 12, and 14 are unpatentable as obvious over Petersen-1, Miller and/or Daio-Seishi, and Busam. Pet. 73–74. Petitioner also relies on the testimony of Dr. Cakmak to support its arguments. *Id.*

1. Analysis of Claims 11, 12, and 14

Petitioner asserts that “[i]f Petersen alone is found to not disclose the features of the base claim 1 or the intermediate claim 10, Miller and/or Daio-Seishi disclose these features.” Pet. 73 (citing Ground 3). Petitioner further asserts that “Busam discloses the additional features of claims 11, 12, and 14.” *Id.* at 74 (citing Ground 8).

Patent Owner does not separately address the patentability of claims 11 and 14 (PO Resp. 47), but does separately address the patentability of claim 12. *Id.* at 61–62. We first address the patentability of claims 11 and 14 as a group. We then address the patentability of claim 12.

a. Claims 11 and 14

Patent Owner does not present any argument for claims 11 and 14 other than what we have already considered with respect to claim 1. PO Resp. 47. After considering the evidence and arguments of record, and for the reasons discussed above with respect to Ground 8, we determine that Petitioner has demonstrated by a preponderance of the evidence that claims 11 and 14 would have been obvious in view of Petersen-1, Miller and/or Daio-Seishi, and Busam.

b. Claim 12

In addition to Petitioner’s arguments that “Busam discloses the additional features of claims 11, 12, and 14” (Pet. 74 (citing Ground 8)), Petitioner asserts that “Daio-Seishi also discloses fastening systems having a shear force of 3.5 to 5.0 kg (non-woven) and 4.5 to 8.0 kg (woven), demonstrating that mechanical fasteners for disposable diapers hav[ing] shear strengths near the challenged claim[’s] range.” *Id.* at 74 (citing Ex. 1006 ¶¶ 61–62; *ClearValue Inc.*, 668 F.3d at 1345).

In response, Patent Owner asserts that Busam fails to satisfy the limitations of claim 12 for the same reasons discussed with respect to Ground 8. PO Resp. 61; *see also id.* at 58–61; PO Sur-reply 23–24. In addition, Patent Owner argues that

the shear performance disclosure of the unmodified fastener systems in Daio-Seishi that Petitioner identifies (Ex. 1006 at [0061]-[0062]) suffers from similar deficiencies discussed above regarding the Busam reference. Namely, Petitioner[] fail to show that the disclosed shear performance results in Daio-Seishi were achieved with fastener systems having the properties required by claim 12.

PO Resp. 62. .

In reply, Petitioner relies on the same arguments and evidence presented in support of Ground 8. Pet. Reply 26–28.

As discussed above with respect to Ground 8, we find that Patent Owner’s arguments and evidence undermine Petitioner’s contention that Busam discloses the reported shear strength having the characteristics required by claim 12. The additional teaching of Daio-Seishi does not alter our conclusion. Petitioner asserts that Daio-Seishi discloses fastening systems having resulting shear strength ranges between 3,500 to 5000 grams and 4,500 to 8,000 grams, respectively. Pet. 74 (citing Ex. 1006 ¶¶ 61–62). However, similar to the deficiency identified by Patent Owner with respect to Busam, Petitioner does not point us to any evidence supporting a teaching in Daio-Seishi that the female loop material capable of engaging with a male fastening portion with a shear strength between ranges of 3,500 to 5000 grams and 4,500 to 8,000 grams, respectively, was a female loop material having “a fiber basis weight in a range from 20 grams per square meter to 30 grams per square meter,” as claim 12 requires.

Based on the complete record, we are not persuaded that Petitioner has established, by a preponderance of the evidence, that the combination of Petersen-1, Miller and/or Daio-Seishi, and Busam teaches or suggests the subject matter of claim 12.

*L. Obviousness over Petersen-1, Ausen, and Wood
(Ground 10: Claim 15) and
over Petersen-1, Miller and/or Daio-Seishi, Ausen, and Wood
(Ground 11: Claim 15)*

Because we determine that claim 15 is unpatentable as obvious over Petersen-1 (Ground 1), we do not reach the Petition's tenth and eleventh grounds of unpatentability over Petersen-1, Ausen, and Wood (Ground 10) and Petersen-1, Miller and/or Daio-Seishi, Ausen, and Wood (Ground 11).

M. Obviousness over Petersen-1 and Ausen (Ground 12: Claim 20)

Petitioner asserts that claim 20 is unpatentable as obvious over Petersen-1 and Ausen. Pet. 77–78. Petitioner also relies on the testimony of Dr. Cakmak to support its arguments. *Id.*

1. Overview of Ausen (Ex. 1008)

Ausen is directed to “molded hook fasteners for use with hook and loop fasteners.” Ex. 1008 ¶ 2. Ausen describes that its “low density hook element” may be used with pull-up diapers. *Id.* ¶37. Ausen discloses that “improved engagement has been unexpectedly discovered where the hooks have relatively low arm droop, and the ratio of the arm droop to the thickness of the nonwoven portion of a nonwoven laminate is less than 1.5, preferably less than 1.3 and most dramatically when less than 1.0.” *Id.* ¶ 53.

a. Analysis of Claim 20

Claim 20 recites “[t]he mechanical fastener of claim 1, wherein at least a portion of the cap is turned down toward the thermoplastic backing.” Ex. 1001, 28:20–22.

Petitioner asserts that Ausen discloses “head portion 17 has hook engaging parts or arms 36, 37 projecting past the stem portion 15 on one or both sides 38.” Pet. 77 (citing Ex. 1008 ¶ 25). Petitioner provides a copy of Figure 5A of Ausen below:

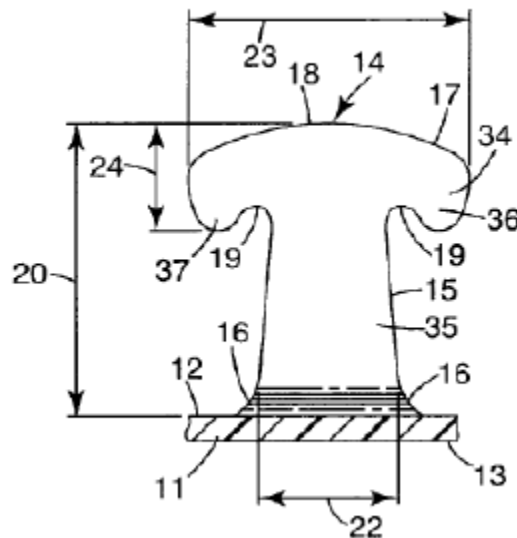


Figure 5A depicts an enlarged end view of a hook member with a mushroom-shaped cap having a portion turned back toward the backing on which the member is attached. Ex. 1008 ¶ 12.

Petitioner, relying on its expert, Dr. Cakmak asserts that “[i]t would have been obvious to modify the upstanding members of Petersen[-1] so the distal ends of the caps thereof turn downward toward the thermoplastic backing to provide a stronger bond between the upstanding members and a

corresponding loop material.” Pet. 78 (citing Ex. 1008 ¶ 53; Ex. 1002 ¶ 137).

Patent Owner argues that Ausen “offers no such support for making this proposed modification”; but instead, “teaches away from making such a modification to the shape of the cap.” PO Resp. 63 (citing Ex. 2008 ¶ 125); PO Sur-reply 18–19. According to Patent Owner, Ausen “teaches that little, if any, arm droop was preferred and resulted in better engagement performance” (PO Resp. 64 (citing Ex. 1008 ¶ 53)), and as such, one of ordinary skill in the art would not have been motivated to “modify the upstanding members of Petersen-1 such that the distal ends of the caps turn downward toward the thermoplastic backing—that is, to modify the caps to add arm droop.” *Id.* at 64–65 (citing Ex. 2008 ¶ 127).

In response, Petitioner argues that “Ausen’s disclosure of advantageous *low* arm droop does not rise to the level of teaching away.” Pet. Reply 30. According to Petitioner, “[n]ot only does Ausen explicitly illustrate the ‘turn down’ cap (arm droop), *but ‘low arm droop’ is still arm droop* and claim 20 does not specify any degree of cap turn down.” Pet. Reply 29.

Patent Owner responds that regardless of whether Ausen teaches that lower arm droop “is preferable to higher arm droop rises to the level of a teaching away, it certainly does not teach towards or encourage *adding or increasing* arm droop where none existed previously. PO Sur-reply 18 (citing Ex. 2008 ¶¶ 127–128).

After considering the parties’ arguments and evidence, we are persuaded by Petitioner’s showing and determine that Ausen does not teach away from modifying the shape of a cap so that “at least a portion of the cap

is turned down toward the thermoplastic backing,” as required by claim 20. A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant. *In re Gurley*, 27 F.3d 551, 553 (Fed. Cir. 1994). The mere fact that Ausen suggests the benefit of hooks with “relatively low arm droop” is not sufficient to teach away from modifying a hook to provide some arm droop where none existed previously.

We also find that Patent Owner’s argument that Ausen “teaches that little, if any, arm droop was preferred and resulted in better engagement performance” mischaracterizes the teachings of Ausen. PO Resp. 64 (citing Ex. 1008 ¶ 53). Ausen does not teach or suggest that it would be beneficial to have no droop; but instead, merely recognizes a correlation between arm droop and the thickness of a nonwoven material with respect to engagement. Ex. 1008 ¶ 53. As such, we agree with Petitioner that one of ordinary skill in the art would have understood Ausen to teach that “relatively low arm droop may provide improved engagement.” Pet. Reply 29 (citing Ex. 1008 ¶ 53).

We find that one of ordinary skill in the art would have been motivated to modify the upstanding members of Petersen-1 so that at least a portion of the cap would be turned down toward the thermoplastic backing, as claim 20 requires. Pet. 78. We credit Dr. Cakmak’s testimony that doing so would “provide a stronger bond between the upstanding members and a corresponding loop material.” Ex. 1002 ¶ 137. This rationale is supported by Dr. Cakmak’s previous explanation that

[f]astening between upstanding elements (i.e. the hooks of a hook and loop fastening system) and a corresponding loop material is influenced by the geometries of the upstanding elements and the corresponding loop material. The geometry of the upstanding elements may be defined, for example, by the density (number per unit area) of the upstanding elements, the shape and dimensions of a shaft portion of the upstanding elements (e.g., height, width/and or diameter), *as well as the dimensions and the shape of the tip thereof*. The geometries of the loop material may be defined by the diameter and density of fibers (e.g. nonwoven fibers), and the depth of the fibrous structure.

Ex. 1002 ¶ 29 (emphasis added); *see also id.* ¶ 30 (“For a person skilled in the art of polymers and design thereof, it is relatively straightforward to find out the optimum density and shape of the upstanding elements given the parameters of a corresponding loop material.”). The record also corroborates Dr. Cakmak’s statement. *See, e.g.,* Ex. 1003 ¶ 65 (“The enlarged section of the male fastening elements may have any shape such as hooks, T’s, J’s, mushroom-type heads (including concavely curved heads and disc-shaped heads) or any other shape allowing for engagement with complementary female fastening materials.”).

After having analyzed the entirety of the trial record and assigning appropriate weight to the cited supporting evidence, we determine Petitioner has shown by a preponderance of the evidence that claim 20 is unpatentable over the teachings of Petersen-1 and Ausen.

*N. Obviousness over Petersen-1, Miller and/or Daio-Seishi,
and Ausen (Ground 13: Claim 20)*

Because we determine that claim 20 is unpatentable as obvious over Petersen-1 and Ausen (Ground 12), we do not reach the Petition’s thirteenth

ground of unpatentability over Petersen-1, Miller and/or Daio-Seishi, and Ausen.

III. CONCLUSION

After having analyzed the entirety of the trial record and assigning appropriate weight to the cited supporting evidence, we determine Petitioner has shown by a preponderance of the evidence that claims 1–11 and 13–20 are unpatentable over the cited prior art. We are not, however, persuaded by a preponderance of the evidence that claim 12 is unpatentable over the cited prior art.

IV. REVISED MOTION TO AMEND

A. Introduction

Under 35 U.S.C. § 316(d)(1) and 37 C.F.R. § 42.121(a), Patent Owner moves to replace claims 1–9 of the '833 patent with proposed substitute claims 28–30. RMTA 2. The motion is contingent on our determination that claims 1–9 are unpatentable. *Id.* Because we determine that claims 1–9 have been shown to be unpatentable for the reasons explained above (*see* Section II), we address Patent Owner's Revised Motion to Amend.

1. Pilot Program Participation

A pilot program for motion to amend practice and procedures became available to all proceedings instituted on or after March 15, 2019. *See* Notice Regarding a New Pilot Program Concerning Motion to Amend Practice and Procedures in Trial Proceedings in Under the America Invents Act Before the Patent Trial and Appeal Board, 81 Fed. Reg. 9497 (March 15, 2019). Pursuant to the Pilot Program, a patent owner may request, in its motion to amend, that the Board issue preliminary guidance after the

petitioner files its opposition. *See id.* at 9499, 9500. Preliminary guidance on a motion to amend is not binding on the Board. *See id.* at 9500. After receiving preliminary guidance from the Board, a patent owner may elect to file a revised motion to amend, file a reply to petitioner's opposition and/or the preliminary guidance, or take no action. *See id.*

In the proceeding before us, Patent Owner requested preliminary guidance from the Board in its Motion to Amend. *See* MTA 1–2. After Petitioner filed its Opposition to the Motion to Amend, the Board issued Preliminary Guidance. *See* Paper 21. Patent Owner then elected to file a Revised Motion to Amend, which we address herein. For the reasons provided below, we determine that Petitioner has proven that the proposed substitute claims would have been obvious, and for that reason, we deny Patent Owner's Contingent Motion to Amend.

B. Proposed Substitute Claims

Patent Owner submits the following proposed substitute claims 28–30 (with added material underlined, strike-outs to indicate text removed from original claim 1, and bracketed material to identify limitations):

28. [28.pre]¹⁸ A mechanical fastener comprising:

[28[a]] a thermoplastic backing;

[28[b]] multiple, upstanding fastening elements that have a post with a proximal end attached to the thermoplastic backing and a distal end comprising a cap larger in area than a cross-sectional area of the post,

¹⁸ We use Patent Owner's designations to refer to the claim elements of the proposed substitute claims. RMTA, Claim Appendix (Listing of Proposed Substitute Claims).

[28[c]] wherein the multiple, upstanding fastening elements have

a height of at least 40 micrometers and up to ~~300~~
203 micrometers, and

wherein a basis weight of the mechanical fastener is in a range from 25 grams per square meter to 75 grams per square meter; and

[28[d]] wherein the cap extends an overhang distance beyond the post in a range from 10 micrometers to 72 micrometers; and

[28[e]] wherein a bending index, which is a quotient of the overhang distance divided by the height, is between 0.05 and 0.48; and

[28[f]] wherein the upstanding fastening elements are present on the thermoplastic backing in a density range from 271 per square centimeter to 542 per square centimeter; and

[28[g]] wherein the thermoplastic backing has a thickness in a range from 20 micrometers to 80 micrometers.

29. The mechanical fastener of claim ~~1~~ 28, wherein the cap extends beyond the post on at least two opposing sides of the post.

30. The mechanical fastener of claim 29, wherein the relative cap area, which is a quotient of the aggregate cap area divided by the area of the mechanical fastener, is a range from 10% to 24%.

RMATA, Claim Appendix (indentation added/modified for clarity).

C. Procedural 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, 4 (PTAB Feb. 25, 2019) (precedential) (“*Lectrosonics*”).

First, we consider whether the Revised Motion to Amend proposes a reasonable number of substitute claims. 35 U.S.C. § 316(d)(1)(B). We apply “a rebuttable presumption that a reasonable number of substitute claims per challenged claim is one (1) substitute claim.” *Lectrosonics*, Paper 15 at 4–5 (citing 37 C.F.R. § 42.121(a)(3)).

Patent Owner proposes three substitute claims (28–30) for nine original claims. RMTA 2. More particularly, Patent Owner proposes to substitute claims 28–30 “contingent on the Board finding original challenged claims 1–9 unpatentable on the grounds set forth in the Petition.” *Id.* at 3. Petitioner does not challenge Patent Owner’s assertion. *See generally* RMTA Opp. Thus, Patent Owner has proposed a reasonable number of substitute claims.

Second, we consider whether the proposed substitute claims respond to a ground of unpatentability involved in this trial. *Lectrosonics*, Paper 15 at 5–6. Patent Owner asserts that proposed “[s]ubstitute independent claim 28 and dependent claims 29 and 30 add novel and nonobvious limitations that further distinguish the prior art and arguments advanced by Petitioner in the Petition and is therefore responsive.” RMTA 11. Patent Owner’s amendment responds to Petitioner’s ground of unpatentability for at least independent claim 1, which previously did not require the combination of limitations presented in proposed substitute claim 28, and claims 29 and 30 which depend therefrom. Petitioner does not argue otherwise. *See generally* RMTA Opp. Thus, Patent Owner’s Motion to Amend responds to at least one ground of unpatentability.

Third, we consider the breadth of the substitute claims because “[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; 35 U.S.C. § 316(d)(3); 37 C.F.R.

§ 42.121(a)(2)(ii). Patent Owner asserts that the proposed substitute claims narrow the scope of the original claims. RMTA 2–3. For example, Patent Owner asserts that proposed

[s]ubstitute independent claim 28 includes all of the claim limitation[s] of original independent claim 1, while adding further requirements that the claimed mechanical fastener (i) have a cap overhang distance within a specified range; (ii) have a specified bending index, which is a quotient of the overhang distance divided by the height, within a specified range; (iii) have a density of upstanding fastening elements within a specified range; and (iv) have a thermoplastic backing thickness within a specified range.

Id. at 3. Patent Owner further asserts that proposed substitute independent claim 28 provides a narrower range for the height of its “multiple, upstanding elements” and dependent claims 29 and 30 further narrow the claims. *Id.* Petitioner does not argue otherwise. *See generally* RMTA Opp. Thus, we determine that the language added by the proposed substitute claims narrows, and does not enlarge, the scope of the claims.

Patent Owner further asserts that proposed substitute claims 28–30 are fully supported by the original disclosure in U.S. Provisional Application 61/535,639, filed on September 16, 2011 (“’639 provisional”), and each of “the line of priority documents listed on the face of the ’833 patent.” RMTA 4 (citing Exs. 2011, 2012, 2013). Patent Owner provides citations to the ’639 provisional and the original disclosure of the ’833 patent to demonstrate written description support for each limitation in the proposed substitute claims. *Id.* at 4–11 (citing Exs. 2011, 2012, 2013).

Petitioner argues that the proposed substitute claims lack written description support. RMTA Opp. 23–25. Petitioner asserts that the ’833 patent “does not support the specific combination of features proposed to be claimed.” *Id.* at 23. According to Petitioner,

[p]roposed substitute claim 28 arbitrarily cobbles together ranges for basis weights, heights, cap overhang, bending indices, density, and backing thickness. While ranges for certain parameters similar to these can be found in various original dependent claims, nowhere does the specification disclose the new combination of ranges recited in claim 28. Indeed, the patent fails to describe the narrower proposed ranges of height, cap overhang distance, and bending index.

Id. at 24. Petitioner argues that in addition to a lack of support for the new and narrower ranges, there is nothing in the ’833 patent that places any significance on the newly selected endpoints of these ranges. *Id.* at 25. More particularly, Petitioner asserts that “[t]here is no disclosure that the new endpoints are preferred endpoints nor any guidance suggesting the importance or criticality of the values as endpoints for ranges from the myriad of data disclosed.” *Id.* (citing *Grunenthal GmbH v. Antecip Bioventures II LLC*, PGR2017-00008, Paper 43, 15–20 (PTAB June 22, 2018) (“*Grunenthal*”). Thus, Petitioner argues there is no support in the original disclosure of the ’833 patent that would have reasonably conveyed to one of ordinary skill in the art that “the inventors possessed a mechanical fastener having the combination of claim 28 or placed any significance on this combination.” *Id.* at 24. We disagree.

The test for determining compliance with the written description requirement is not simply the presence or absence of literal support in the specification for the claim language, but rather, whether the disclosure of the

application as originally filed reasonably conveys to a person of ordinary skill in the art that the inventor had possession of the claimed subject matter at the time of filing. *Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010) (en banc); *Vas-Cath, Inc. v. Mahurkar*, 935 F.2d 1555, 1563 (Fed. Cir. 1991); *In re Kaslow*, 707 F.2d 1366, 1375 (Fed. Cir. 1983). It is well settled that the written description requirement of § 112 requires the disclosure to convey that Patent Owner had possession of the entire range. *In re Lukach*, 442 F.2d 967, 969 (CCPA 1971) (holding that a single disclosure of a value within a range does not provide support for the entire range). In *General Hospital Corp. v. Sienna Biopharmaceuticals, Inc.*, 888 F.3d 1368, 1372 (Fed. Cir. 2018), our reviewing court explained:

The disclosure of a broad range of values does not by itself provide written description support for a particular value within that range. Instead, where a specification discloses a broad range of values and a value within that range is claimed, the disclosure must allow one skilled in the art to immediately discern the limitation at issue in the claims.

Id.

Proposed substitute claim 28 recites “multiple, upstanding fastening elements [that] have a height of at least 40 micrometers and up to 203 micrometers.” RMTA Claim Appendix.

For support, Patent Owner directs our attention to page 4, line 28 through page 5, line 6 of the ’639 provisional. RMTA 5¹⁹; *see also id.* at 5–6 (citing Ex. 2011, 2:20–22; 33:3–10 (claim 1), 4:28–5:6, 26:1–2, 30:1–2,

¹⁹ Patent Owner relies on the original page numbers identified in the ’639 provisional’s Specification as opposed to the page numbers in the bottom right corner identifying Exhibit 2013. The ’639 provisional’s Specification begins at page 38 of Exhibit 2013.

Tables 3, 6). The '639 provisional discloses that the multiple, upstanding fastening elements have a maximum height “of up to 300 μm , [and] in some embodiments up to 285 μm , 275 μm , or 250 μm ” and a minimum height “of at least 40 μm , in some embodiments, at least 50 μm , 100 μm , or 140 μm .” Ex. 2011, 4:28–5:3; Ex. 2013, 4:28–5:3; Ex. 1001, 3:59–66; *see also* Ex. 1001, 3:59–3:66.²⁰ The '639 provisional also discloses ranges “from 150 μm to 300 μm , 40 μm to 285 μm , 100 μm to 275 μm , 140 μm to 250 μm , 50 μm to 300 μm , 50 μm to 285 μm , 50 μm to 275 μm , 100 μm to 250 μm , 100 μm to 285 μm , 100 μm to 300 μm , 140 μm to 275 μm , or 155 μm to 250 μm .” Ex. 2011, 5:4–7; Ex. 2013, 5:4–7; *see also* Ex. 1001, 3:59–4:6.

Although there is no express disclosure in the '639 provisional or the original disclosure of the '833 patent for a height range “of at least 40 micrometers and up to 203 micrometers,” as recited by proposed substitute claim 28, the cited portions of the '639 provisional and the original disclosure of the '833 patent do recite numerous heights that include among them the upper and lower endpoint recited in proposed substitute claim 28. The '639 provisional and the original disclosure of the '833 patent also include a test fastener with a capped height of 203 μm . Ex. 2011 Table 3 (Example 11), Ex. 2013, Table 3 (Example 11); *see also* Ex. 1001, Table 3 (Example 11). In light of this disclosure, we find that Patent Owner has established that, at the time the '833 patent's application was filed, the inventor possessed upstanding fastening elements having a range of heights “of at least 40 micrometers and up to 203 micrometers.” *Cf. Wertheim*, 541

²⁰ On the current record, there is no dispute regarding the '833 patent's claim of priority to the '639 provisional application (Ex. 2013).

F.2d 257, 265 (CCPA 1976) (holding claim reciting solids content range of 35–60% supported by specification’s disclosure of range of 25–60% and specific embodiments of 36% and 50%).

Proposed substitute claim 28 further recites that “the cap extends an overhang distance beyond the post in a range from 10 micrometers to 72 micrometers.” RMTA Claim Appendix.

For support, Patent Owner directs our attention to the ’639 provisional at page 6, lines 7–10, page 26, line 3 through page 27, line 10, and page 30, lines 1–2, as well as, Tables 4 and 6. RMTA 6–7 (citing Exs. 2011, 2013). The ’639 provisional also discloses that the cap overhang distance “extends up to 90 μm beyond the post,” and in some embodiments, extends “up to 85[μm], 84 μm , 82 μm , or 80 μm .” Ex. 2011, 6:10–13; Ex. 2013, 6:11–14; *see also* Ex. 1001, 4:59–62. The ’639 provisional and the original disclosure of the ’833 patent also disclose a minimum amount of overhang may “is at least 5 μm or 10 μm .” Ex. 2011, 6:15; Ex. 2013, 6:16; *see also* Ex. 1001, 4:62–66. The ’639 provisional and the original disclosure of the ’833 patent also disclose overhang from “from 5 μm to 84 μm , 5 μm to 80 μm or 5 μm to 75 μm ,” as well as, “from 5 μm to 65 μm .” Ex. 2011, 6:13–17; Ex. 2013, 6:14–20; *see also* Ex. 1001, 4:66–5:4.

Again, although there is no express disclosure in the ’639 provisional or ’833 patent’s original disclosure for a cap overhang distance “from 10 micrometers to 72 micrometers,” as recited by proposed substitute claim 28, the cited portions of the ’639 provisional and the ’833 patent’s original disclosure do recite numerous cap overhang distances that encompasses the upper and lower endpoint recited in proposed substitute claim 28. The ’639 provisional and the ’833 patent disclosure also include a test fastener with a

cap overhang distance of 72 μm . Ex. 2011, Table 3 (Example 7); Ex. 2013, Table 3 (Example 7); Ex. 1001, Table 3 (Example 7). In light of this disclosure in the original disclosure, we find that Patent Owner has established that, at the time the '833 patent's application was filed, the inventor possessed upstanding fastening elements with a range of cap overhang distances "from 10 micrometers to 72 micrometers." *Cf. Wertheim*, 541 F.2d at 265.

Proposed substitute claim 28 also recites "a bending index, which is a quotient of the overhang distance divided by the height, is between 0.05 and 0.48." RMTA Claim Appendix.

For support, Patent Owner directs our attention to page 6, lines 18–26, page 26, line 3 through page 27, line 10, page 30, lines 1–2, as well as Tables 4 and 6, of the '639 provisional. RMTA 7 (citing Exs. 2011, 2013). The '639 provisional and '833 patent's original disclosure also disclose that in some embodiments, "the upstanding fastening elements have a bending index of up to 0.6, 0.50, or 0.45. For example, the upstanding fastening elements may have a bending index of 0.02 to 0.6 or 0.05 to 0.5. For a bending index below 0.02, the post may bend when the mechanical fastener is exposed to a shear force, decreasing the strength of engagement. For a bending index greater than 0.6, the cap may bend when the mechanical fastener is exposed to a shear force, decreasing the strength of engagement." Ex. 2011, 6:20–28; Ex. 2013, 6:25–31; Ex. 1001, 5:8–20.

Similar to the height and cap overhang distance parameters, there is no express disclosure in the '639 provisional or '833 patent's disclosure for a bending index range "between 0.05 and 0.48," as recited by proposed substitute claim 28, the cited portions of the '639 provisional and the '833

patent disclosure do recite numerous values for a bending index that include among them the upper and lower endpoint recited in proposed substitute claim 28. Ex. 2011, 6:22–28; Ex. 2013, 6:25–31; Ex. 1001, 5:8–20. In light of this disclosure, we find that Patent Owner has established that, at the time the '833 patent's application was filed, the inventor possessed upstanding fastening elements with a bending index range “between 0.05 and 0.48.” *Cf. Wertheim*, 541 F.2d at 265.

The remaining claimed ranges of proposed substitute claim 28 are directed to additional mechanical fastener parameters related to the “basis weight of the mechanical fastener,” “thickness of the backing,” and “relative cap area.” RMTA Claim Appendix. Based on the support identified by Patent Owner, we find that Patent Owner has established that, at the time the '833 patent's application was filed, the inventor possessed the claimed ranges required by these additional fastener parameters. RMTA 5–10 (citing Exs. 2011, 2013).

We are not persuaded by Petitioner's argument that the '833 patent does not support the “specific combination” set forth in proposed substitute claim 28. RMTA Opp. 23–24. Instead, we credit Mr. Kline's unrebutted declaration evidence that “a person of ordinary skill in the art would have identified the claimed fastener parameters and derived the claimed ranges for these parameters and recognized the claimed invention through a straightforward analysis of the fastener test data reported in the '833 patent specification.” Ex. 2014 ¶ 25. Relying on its expert, Mr. Kline, Patent Owner concludes that one skilled in the art would have been able to “derive and recognize the claimed ranges for the claimed combination of parameters that distinguished these two groups and resulted in improved fastener

performance.” RMTA Reply 12 (citing Ex. 2014 ¶¶ 21, 23, 25–28); *see also In re Alton*, 76 F.3d 1168, 1175 (Fed. Cir. 1996) (So long as a person “of ordinary skill in the art would have understood the inventor to have been in possession of the claimed invention at the time of filing, even if every nuance of the claims is not explicitly described in the specification, then the adequate written description requirement is met.”).

We also are not persuaded by Petitioner’s contention that the present case is similar to the Board’s decision in *Grunenthal*. The panel in *Grunenthal* found the factual situation in that case to be similar to facts presented *Purdue Pharma L.P. v. Faulding Inc.*, 230 F.3d 1320, 1326–27 (Fed. Cir. 2000). In *Purdue Pharma*, the patent owner sought to establish written description support for a claimed ratio in data derived from the three examples. The court found that “[a]lthough the examples provide the data from which one can piece together the C_{max}/C_{24} limitation, neither the text accompanying the examples, nor the data, nor anything else in the specification in any way emphasizes the C_{max}/C_{24} .” *Id.* at 1326. The court found the examples did not support the claimed ratio because the patentees had simply “pick[ed] a characteristic possessed by two of their formulations, a characteristic that [was] not discussed even in passing in the disclosure, and then [made] it the basis of claims that cover not just those two formulations, but any formulation that has that characteristic.” *Id.* at 1327

Here, in contrast, possession of the claimed ranges is evidenced by viewing numerous ranges and example test data and the ’639 provisional and the ’833 patent’s original disclosure do much more than discuss those ranges in passing, making it clear that each of the ranges is contemplated as part of the mechanical fasteners of the disclosed invention. That is, the ’639

provisional and the '833 patent disclosure clearly demonstrate that that the various fastener parameters with and ranges work in conjunction to affect resulting shear strength. *See* Ex. 2013, Tables 1–7; Ex. 1001, Tables 1–7. According to Mr. Kline,

the hook and loop fastener industry is an empirically driven field that looks to data and test results to move forward, make design decisions, and produce improvements. In this empirically driven field, in order to develop improved fasteners, a person of ordinary skill in the art would have first looked to the data set produced by the inventors of the '833 patent and organized the tested example fasteners in descending order of average measured shear performance.

Ex. 2014 ¶ 25. From this viewpoint, we credit Mr. Kline's opinion that the "experimental data provided in the '833 patent specification thus communicated the characteristics of the fasteners that were discovered to have improved performance and would have allowed persons of ordinary skill in the art to recognize the claimed invention." *Id.* ¶ 27.

In sum, for the reasons discussed, we find that Patent Owner has established that, at the time the '833 patent's application was filed, the inventor possessed all of the subject matter recited in proposed new claims 28–30.

Finally, the Revised Motion to Amend includes the required claim listing. RMTA, Claim Appendix; 37 C.F.R. § 42.121(b); *Lectrosonics*, Paper 15 at 8.

Based on the above, we find that Patent Owner's Revised Motion to Amend meets the requirements of 35 U.S.C. § 316(d) and 37 C.F.R. § 42.121. Therefore, we analyze whether Petitioner has met its burden of persuasion on the alleged unpatentability of the proposed substitute claims.

See Lectrosonics, Paper 15 at 4 (stating that “the burden of persuasion ordinarily will lie with the petitioner to show that any proposed substitute claims are unpatentable by a preponderance of the evidence”); *see also Aqua Prods., Inc. v. Matal*, 872 F.3d 1290, 1328 (Fed. Cir. 2017) (en banc) (holding the Board must assess the patentability of proposed substitute claims “without placing the burden of persuasion on the patent owner”); Rules of Practice to Allocate the Burden of Persuasion on Motions to Amend in Trial Proceedings Before the Patent Trial and Appeal Board, 85 Fed. Reg. 82,923 (Dec. 21, 2020). In the analysis below, we assess whether the proposed substitute claims “are unpatentable by a preponderance of the evidence based on the entirety of the record” before us. *Lectrosonics*, Paper 15 at 4.

D. Claim Construction

Neither party provides its own proposed construction for any terms proposed in the substitute claims. *See generally* RMTA; RMTA Opp. We determine that no claim terms require construction to address the issues presented by Patent Owner’s Revised Motion to Amend. *See Nidec Motor Corp.*, 868 F.3d at 1017.

E. Whether the Proposed Substitute Claims Fail to Comply with the Written Description Requirement under 35 U.S.C. § 112(a).

As discussed above under section IV.C. “New Matter,” with respect to the procedural requirements associated with a motion to amend, the portions of the ’639 provisional and ’833 patent’s original disclosure cited by Patent Owner are adequate to satisfy the written description requirement.

F. Whether the Proposed Substitute Claims Would Have Been Obvious

Petitioner argues that the proposed substitute claims are unpatentable as obvious based on the same or similar combinations of references set forth in the Petition for the corresponding original claims. RMTA Opp. 1–23. The chart below summarizes the challenges to the proposed substitute claims.

Proposed Substitute Claims Challenged	35 U.S.C. §	Reference(s)
28–30	103(a)	Petersen-1, as evidenced by and further in view of Petersen-2 and/or Miller
28–30	103(a)	Petersen-2, Petersen-1
28–30	103(a)	Daio-Seishi, in further view of Petersen-1 and at least one of Petersen-2 and Miller
28–30	103(a)	Miller, Petersen-1

Having considered the record as a whole, we discern in the proposed amendments little or no patentable distinction as compared to the claims they are intended to replace. Therefore, because we have determined already that Petitioner has demonstrated by a preponderance of the evidence that claims 1–11 and 13–20 of the ’833 patent are unpatentable, we rely on much of our analysis from above with respect to Patent Owner’s arguments in support of the proposed substitute claims.

1. Obviousness Based on Petersen-1, as evidenced by and further in view of Petersen-2 and/or Miller

Petitioner asserts that proposed substitute claims 28–30 are unpatentable as obvious under 35 U.S.C. § 103 over the combined teachings of Petersen-1, as evidenced by and further in view of Petersen-2 and/or Miller. RMTA Opp. 6–11, 19–23.

a. Proposed Substitute Claim 28

With respect to the preamble (28[pre]) and limitations 28[a], 28[b], and 28[c], Petitioner asserts that “Petersen-1 discloses the mechanical fastener structure, backing, and height” and basis weight ranges. RMTA Opp. 6–7 (citing Ex. 1002 ¶¶ 83, 93–94; Ex. 1003 ¶¶ 60, 66, 93–94, 158, 161, 163, 335; Pet. 35–40, 43–46; Pet. Reply 10). Petitioner asserts that “[i]t would have been obvious to select heights and basis weights on the lower end of Petersen-1’s range to improve comfort, to reduce material usage and costs, and for generally improved fastening efficiency.” *Id.* at 7 (citing Ex. 1002 ¶¶ 31–34, 37, 59, 93–94; Ex. 1003 ¶ 10; Pet. 7; Pet. Reply 3–7).

With respect to limitations 28[d] and 28[e], Petitioner asserts that each of Petersen-1, Miller, and Petersen-2 discloses the cap overhang range and bending index range, as required by limitation 28[d] and [e], respectively. RMTA Opp. 7–10.

Turning first to limitation 28[d], Petitioner asserts that Petersen-1 discloses an overlapping cap overhang distance range of 2.5 μm to 500 μm . RMTA Opp. 7 (citing Ex. 1002 ¶ 66; Pet. 54–55). Petitioner asserts that Miller also discloses an overlapping overhang distance range of about 13 μm to 254 μm , and more preferably about 25 μm to 127 μm . *Id.* (citing Ex. 1004 4:34–45; Pet. 68). Petitioner still further asserts that “Petersen-2

discloses an identical range as Miller, further demonstrating that the proposed overhang distance range was well known in the design of mechanical fasteners.” *Id.* (citing Ex. 1014 ¶ 46). In light of these disclosed cap overhang ranges, Petitioner concludes that “[i]t would have been obvious to select an overhang distance range within the proposed range of claim 28, because ““where 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.”” *Id.* at 7–8.

Turning next to limitation 28[e], Petitioner acknowledges that Petersen-1 does not expressly disclose numerical values for a bending index²¹ range, but argues that Petersen-1 “discloses anticipating values of the claimed overhang distance, which when ‘divided by the height,’ which Petersen-1 also discloses, would fall within the proposed bending index range.” RMTA Opp. 8. With this understanding, Petitioner asserts that Petersen-1, Miller, and Petersen-2 each discloses overlapping overhang distance ranges, and as such, “Petersen-1 alone, and Petersen-1 in view of at least one of Miller and Petersen-2 disclose an anticipating bending index range.” *Id.* at 9–10. Petitioner also directs our attention to an example in Miller “for an additional teaching that it was known to use bending index values like those in proposed claim 28.” *Id.* at 9–10 (citing Ex. 1004, 8:45–55 (With reference Miller’s example, Petitioner points out that “a height of 0.28 μm and an overhang distance of 0.08 μm , giv[es] a bending index of 0.285.”)).

²¹ Limitation 28[e] identifies that the “bending index” is the “quotient of the overhang distance divided by the height.” RMTA Claim Appendix.

With respect to limitations 28[f] and 28[g], Petitioner asserts that Petersen-1 discloses the density and backing thickness ranges, as required by limitation 28[f] and [g], respectively. RMTA Opp. 11.

Turning first to limitation 28[f], Petitioner asserts that Petersen-1 discloses overlapping density ranges of “1 and 2,500 cm², more preferably between 2 and 2,000 cm² and especially preferably between 5 and 1,800 cm².” RMTA Opp. 11 (citing Ex. 1003 ¶¶ 10, 84, 86, 159–161); Pet. 63–64. According to Petitioner, “Petersen-1 further teaches that lower densities were advantageous to increase fastening efficiency (a teaching 3M does not dispute), and 3M does not present any evidence regarding criticality of density.” *Id.* (citing Ex. 1002 ¶¶ 28–37, 46–62, 97–99; Ex. 1003 ¶¶ 10, 86; Pet. 50–51; Pet. Reply 8–9; Ex. 1024, 74:6–9). Petitioner also contends that Miller and Petersen-2 provide evidence that suggests the use of density ranges towards the lower end of Petersen-1. *Id.* (citing Ex. 1004, 8:45–54, 4:34–39, 4:62–65, Abstract; Ex. 1014 ¶ 15).

Turning next to limitation 28[g], Petitioner asserts that Petersen-1 also discloses an example with an anticipating backing thickness of about 59 µm. RMTA Opp. 11 (citing Ex. 1002 ¶¶ 103–104; Ex. 1003 ¶¶ 159–161; Pet. 48–49).

b. Analysis

Patent Owner asserts that proposed substitute claims 28–30 “add novel and nonobvious limitations that further distinguish the prior art and arguments advanced by Petitioner in the Petition.” RMTA 11–13; *See generally* RMTA Reply. More particularly, Patent Owner argues that

Petitioner’s mere identification from one or more prior art references of separate, discrete disclosures of generic ranges of possible values for individual fastener parameters (e.g., hook

height, basis weight, cap overhang, hook density, and backing thickness) is insufficient to establish a *prima facie* showing of obviousness (*see* [RMTA] Opp., 5–23) because it fails to consider the claimed invention as a complete whole.

Id. at 2. According to Patent Owner, Petitioner’s new grounds of unpatentability are based impermissibly on hindsight and improperly break the proposed substitute claims “into their component limitations, and then simply matches these component pieces to separate, discrete disclosures in one or more of the identified prior art references.” *Id.* at 3(citing RMTA Opp., 5–23; Ex. 2014 ¶¶ 9–10).

Having considered the arguments and evidence presented during trial, we are persuaded that Petitioner has sufficiently shown that the proposed substitute claims would have been obvious over the cited prior art. We are not persuaded by Patent Owner’s arguments to the contrary.

The fact that Petitioner proposes the combination of multiple result-effective variables from the different examples within Petersen-1 or the combination of different prior art references does not necessarily render their combination nonobvious or beyond the capability of a person having ordinary skill in the art. Here, Patent Owner argues that the mechanics and behavior of hook and loop fasteners can be quite complex and unpredictable and Petitioner fails to “present any evidence showing why a person of ordinary skill in the art would have had a reasonable expectation of success to formulate a claimed fastener having” the features recited by proposed substitute claim 28. RMTA Reply 3, 7.

However, many of the prior art references themselves suggest that optimization of fastener parameters would have been necessary based upon a particular application, female loft material, and/or material composition of

fastener elements. For example, Petersen-1 suggests that the dimensions of its male fastening elements can be “*varied widely*” based on a particular application and complementary female fastening material. Ex. 1003 ¶ 66 (emphasis added). Daio-Seishi teaches that hook height is “set at one’s discretion according to the female member and the fastening properties,” and similarly teaches that hook density may also be “set at one’s discretion” because “if they are too sparse or too dense, the effect of differences in shape and height on fastening characteristics will be weakened.” Ex. 1006 ¶ 48. *See also* Ex. 2001, 4:60–64 (“One skilled in the art will recognize that the shape, density and polymer composition of the hooks and loops may be selected to obtain the desired level of securement between the fastening components and the mating fastening components.”); Ex. 2003, 4:5–12 (discussing the use of “male material having such hooks of a specific configuration at a specific density in combination with a female material” to achieve a particular objective); Ex. 2005, Abstract (“The value of the specific energy of detachment of such mechanically latched systems can be related to the geometry and material properties of the individual fixing elements.”); Ex. 1008 ¶ 51 (“[O]ptimum backing thickness will vary depending upon the resin from which the hook fastener portion is made.”).

Patent Owner’s argument that “the mechanics and behavior of hook and loop fasteners can be quite complex and unpredictable” (RM TA Reply 3 (citing Ex. 2005; Ex. 2008 ¶ 31)) suggests that an ordinarily skilled artisan may not be able to predict absolutely how varying each of the claimed fastener parameters would affect fastener performance without experimentation. However, “obviousness cannot be avoided simply by a showing of some degree of unpredictability in the art so long as there was a

reasonable probability of success.” *See Allergan*, 726 F.3d at 1292 (citing *Pfizer, Inc. v. Apotex, Inc.*, 480 F.3d 1348, 1364 (Fed. Cir. 2007)). Here, we find that the evidence of record shows that it would have been well within the skill set of an ordinary artisan to optimize and vary mechanical fastener parameters based upon a particular application, female loft material, and/or material composition of fastener elements. *See, e.g.*, Ex. 1006 ¶ 48 (discussing that hook height and hook density may be “set at one’s discretion”).

Patent Owner further argues that Petitioner’s new grounds of unpatentability are based impermissibly on hindsight and none of the supporting rationales proffered by Petitioner cures this fundamental deficiency. RMTA Reply 3–4. To support its position, Patent Owner argues first that Petitioner misleadingly asserts that “[i]t would have been obvious to select heights and basis weights on the lower end of Petersen-1’s range to improve comfort, to reduce material usage and costs, and for generally improved fastening efficiency.” *Id.* at 4 (citing RMTA Opp. 7). Patent Owner next argues that Petitioner provides no evidence to show that any of its proffered rationales “would have actually motivated a skilled artisan to accept the as-then-understood tradeoff between hook height and fastener shear performance.” *Id.* at 4–5. Instead, Patent Owner argues that Petitioner simply concludes that it would have been obvious to determine the optimum or workable ranges of the various parameters required by proposed substitute claim 28 “by routine experimentation.” *Id.* at 5–6 (citing RMTA Opp. 7–10).

Having considered the arguments and evidence presented during trial, we find Petitioner’s showing to be sufficient and are not persuaded by Patent

Owner's arguments to the contrary. Instead, we determine that one with ordinary skill in the art at the time of the '833 patent's invention would have recognized that individual fastener parameters, e.g., hook height, basis weight, cap overhang, bending index, hook density, and backing thickness, recited by proposed substitute claim 28, are result-effective variables. It is well established that "discovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art." *Boesch*, 617 F.2d at 276; *Antonie*, 559 F.2d at 620.

Patent Owner argues that one of ordinary skill in the art would not have been motivated to optimize the overlapping ranges disclosed in the prior art to arrive at the newly claimed ranges because "[t]he large volume of potential experimental fasteners [that would need] to be tested moves the substitute claims outside of the 'typical' case of overlapping ranges disclosed in the prior art." RMTA Reply 7 (citing *Genetics Institute, LLC v. Novartis Vaccines & Diagnostics, Inc.*, 655 F.3d 1291 (Fed. Cir. 2011)). We disagree.

Unlike the proposed substitute claims, the claims at issue in *Genetics Institute* did not address a numerical range, but a range of different structures of truncated proteins for human Factor VIII. *Genetics Institute*, 655 F.3d at 1295. The court noted "the nontrivial differences in the proteins at issue," and found that the prior art disclosed about 68,000 truncated variants, making the disclosed range extremely broad. *Id.* at 1306. The court also found that there was no motivation to make the larger truncated proteins covered by the claims at issue as the reference was directed to making smaller truncated proteins. *Id.* In contrast to *Genetics Institute*, proposed substitute claim 28 recites numerical ranges for six mechanical fastener

parameters. And, as discussed above, the record demonstrates persuasively that it was known at the time of the invention that each of these known parameters were result-effective variables that could be optimized or “varied widely” based upon a particular application, female loft material, and/or material composition of fastener elements. *See, e.g.*, Ex. 1002 ¶¶ 26–37; Ex. 1003 ¶ 66; Ex. 1006; 48; Ex. 2001, 4:60–64.

We also disagree with Patent Owner that Petitioner misleadingly asserts that “[i]t would have been obvious to select heights and basis weights on the lower end of Petersen-1’s range to improve comfort, to reduce material usage and costs, and for generally improved fastening efficiency.” RMTA Reply 4 (citing RMTA Opp. 7). According to Patent Owner, “the ‘fastening efficiency’ rationale and teachings identified by Petitioner relate only to hook density and would have provided no motivation whatsoever to reduce the hook height of a fastener to within the claimed range.” *Id.* at 4. However, as Petitioner points out, Patent Owner mischaracterizes Petitioner’s “rationale for reducing hook density to improve ‘fastening efficiency’ and reduce basis weight, as being a rationale to solely reduce hook height.” RMTA Sur-reply 5, n. 4 (emphasis omitted); *compare* Pet. 45 (“Even if 3M could demonstrate criticality for the claimed basis weight range, again, Petersen[-1] had disclosed that stretching inherently reduces the basis weight of the web laminate (and the thickness and density of the upstanding fastening elements), without undermining fastening efficiency.”).

Equally unpersuasive is Patent Owner’s argument that none of Petitioner’s proffered rationales “would have actually motivated a skilled artisan to accept the as-then-understood tradeoff between hook height and

fastener shear performance.” RMTA Reply 4–5. For the reasons discussed in Section II.D.2.b. above, we agree with Petitioner that Patent Owner’s trade-off argument “is premised on the false assumption about the conventional wisdom, not evidence that its characterization of the conventional wisdom is correct.” RMTA Sur-reply 4 (emphasis omitted). Furthermore, we find Petitioner’s additional rationales for why one of ordinary skill in the art at the time of the invention would be motivated to optimize the claimed ranges through routine experimentation to be supported by the record. Pet. 15–16 (citing Ex. 1002 ¶¶ 59–62), Pet. 40–43 (citing Ex. 1002 ¶¶ 28–37, 46–62, 97–99).

Patent Owner argues next that Petitioner “does not even attempt to argue that there was a rationale that would have motivated a person of ordinary skill in the art to select values within the claimed ranges for certain other claimed parameters, such as cap overhang distance and bending index.” RMTA Reply 5; *see also id.* at 8 (“There is no recognition in this art, however, that this ratio or bending index had any effect on the properties (such as the shear engagement performance) of a fastener.”).

We are not persuaded by Patent Owner’s assertion that Petitioner has failed to establish that the prior art discloses a “bending index” within the recited range or that the “bending index” was not understood to be a result-effective variable because the prior art fails to demonstrate that it would have had any effect on the shear engagement performance of a mechanical fastener. RMTA Reply 8. When determining whether a variable is result-effective in an obviousness analysis, our reviewing court has stated:

“[I]n cases in which the disclosure in the prior art was insufficient to find a variable result-effective, there was

essentially no disclosure of the relationship between the variable and the result in the prior art.” 692 F.3d at 1297. Likewise, if the prior art does recognize that the variable affects the relevant property or result, then the variable is result-effective. *Id.* (“A recognition in the prior art that a property is affected by the variable is sufficient to find the variable result-effective.”). And “the prior art need not provide the exact method of optimization for the variable to be result-effective.” *Id.*

E.I. DuPont, 904 F.3d at 1009.

As discussed above, the evidence of record persuasively demonstrates that the height, density, and basis weight of upstanding fastening elements are result-effective variables that affect the resulting shear strength of mechanical fasteners. *See* Section II.D.2.b. We also find the record provides persuasive evidence to establish that cap overhang distance and bending index are result-effective variables. For example, Petersen-1 identifies that “[t]he dimensions of the individual male fastening elements 14 can be varied widely depending” on the intended application” while discussing a range of parameters corresponding to height, cap overhang distance, and thus, bending index. Ex. 1003 ¶ 66; *see also* Ex. 2001, 4:60–64 (“One skilled in the art will recognize that the shape, density and polymer composition of the hooks and loops may be selected to obtain the desired level of securement between the fastening components and the mating fastening components.”); Ex. 2003, 4:5–12 (discussing the use of “male material having such hooks of a specific configuration at a specific density in combination with a female material” to achieve a particular objective); Ex. 2005, Abstract (“The value of the specific energy of detachment of such mechanically latched systems can be related to the geometry and material properties of the individual fixing elements.”).

In response, other than opining that “certain parameters (e.g., cap shape) did not *appear* to have any measured material effect that differentiated the performance” (Ex. 2014 ¶ 21 (emphasis added)), neither Patent Owner nor Mr. Kline provides any additional evidence suggesting that a relationship between cap overhang distance and shear strength and bending index and resulting shear strength would not exist. Mr. Kline’s statement that cap shape “did not appear to have any measured material effect” is weakened, however, by testimony he provided in his first deposition acknowledging that “the shape of the cap,” “among other things,” may contribute to increased shear strength. Ex. 1024, 227:23–228:6 (“Q[.] So is it fair to say that basis weight and hook heights are the only features that contribute to the 2,000 gram force arrived at [in] claim 12?” “A[.] There are other details disclosed in the disclosure which show that they’re able to reach that.” “Q[.] Such as maybe the shape of the cap?” “A[.] Among other things.”).

The ’833 patent discloses that the bending index is a ratio that “relates to how much the cap or the post will bend when the upstanding fastening element is exposed to a shear force.” Ex. 1001, 5:8–10. When asked to define the term “rigidity,” Mr. Kline testified during cross-examination that “[r]igidity is a measure of bending resistance.” Ex. 1046, 121:10–13. We also note that the Sasaki reference, introduced by Patent Owner as “contemporaneous art” (PO Resp. 22–23), teaches that there was a known correlation between height²² and rigidity “in order to obtain a sufficient

²² “[B]ending index” is the quotient of the overhang distance divided by the height.” RMTA Claim Appendix.

engaging force.” Ex. 2003, 3:53–56.²³ Thus, we find the record establishes that cap overhang distance and bending index are also result-effective variables and the general conditions of the claim are disclosed in at least Petersen-1.

Accordingly, we find that Petitioner establishes, by a preponderance of the evidence, that the multiple mechanical fastener variables, i.e., height, basis weight, cap overhang distance, bending index, density, and backing thickness, as recited by proposed substitute claim 28, are result-effective variables with overlapping ranges known in the prior art. There is, therefore, a rebuttable presumption that the claims are obvious unless Patent Owner can come forward with evidence that the claimed ranges would not have been obvious in light of the prior art asserted by Petitioner. *See E.I. DuPont*, 904 F.3d at 1008 (quoting *Galderma*, 737 F.3d at 738).

Patent Owner responds that “even if there were a presumption of obviousness with respect to the proposed substitute claims . . . , the experimental data reported in the ’833 patent demonstrates the unexpected results discovered by the inventors, and thus the criticality and nonobviousness of these proposed substitute claims.” RMTA Reply 9. According to Patent Owner, the proposed substitute claims are nonobvious based on the evidence and arguments detailed in its Patent Owner’s Response and Sur-Reply. *Id.* (citing PO Resp. 16–24; PO Sur-reply 2–8); *see also id.* (“[T]he ’833 patent teaches that the conventional wisdom in the art at the time of invention was that increasing shear performance of a

²³ Our reliance on Sasaki supports our understanding, but is not necessary to our decision.

fastener was positively correlated to increasing hook height.”). Patent Owner also argues that the proposed substitute claims are nonobvious because “they have been further narrowed to encompass those fasteners that generally demonstrated the most unexpectedly superior shear engagement performance.” *Id.* at 9–10.

Having considered the arguments and evidence presented during trial, we are not persuaded by Patent Owner’s arguments. As discussed above in Section II.D.2., we are not persuaded that the record supports Patent Owner’s assertions regarding the “conventional wisdom,” i.e., “increased hook height was positively correlated with increased engagement performance across the spectrum of potential loop materials.” PO Sur-reply 15. Instead, we find the record supports Petitioner’s assertion that one of ordinary skill in the art at the time of the invention would have appreciated that “[s]hear and peel strength are dependent largely on the geometries of the upstanding elements (*i.e.*, the hook portion) and a corresponding loop material.” Pet. 5 (citing Ex. 1002 ¶28). And, with the benefit of a complete record, we agree with Petitioner that, at the time of the invention, “the prior art taught how hook density (to avoid an impenetrable canopy) and hook height (to assure sufficient penetration into the loop material without bottoming out) could be selected to ensure the desired level of engagement.” RMTA Opp. 4 (citing Pet. Reply 16–19; Pet. 6–7).

We also are not persuaded by Patent Owner’s argument that the proposed substitute claims are nonobvious because “they have been further narrowed to encompass those fasteners that generally demonstrated the most unexpectedly superior shear engagement performance.” RMTA Reply 9–10. According to Patent Owner’s expert, Mr. Kline, the scope of proposed claim

28 was determined by organizing the experimental data provided in the '833 patent "in descending order based on their average measured shear strength across the three sample loop materials." Ex. 2014 ¶ 20. With respect to the narrower height range recited now in limitation 28[c], Mr. Kline states that "the highest twelve performing fasteners had surprisingly low hook heights of 203 micrometers or shorter." *Id.* ¶ 21.

And, with respect to the additional limitations of proposed substitute claim 28, i.e., cap overhang, bending index, hook density, backing thickness, Mr. Kline testifies that

to further delineate the properties and characteristics of those fasteners with these relatively shorter hooks and having the highest shear performance from those fasteners having lower shear performance, additional characteristics and ranges of parameters were identified and defined using the test data. All of the eleven highest performing fasteners had values of basis weight, cap overhang, bending index, hook density, and backing thickness, in addition to their relatively short hook heights, falling within the ranges recited in substitute claim 28.

Id.

Although we agree with Patent Owner that proposed substitute claim 28 is narrower in scope than original claim 1, this change in scope does not alter our determination that criticality and unexpected results have not been shown. For example, as discussed above in Section II.D.2.a., the experimental data that Patent Owner relies upon in the '833 patent to support its assertion of criticality only provides data for a height range of 117 μm to 247 μm . *See* Ex. 1001, Table 3. As such, we find that no experimental data exists to support Patent Owner's assertion for a significant portion of the claimed range from 40 μm to 116 μm . *See In re Peterson*, 315 F.3d at 1331 (affirming obviousness where the applicant claimed an alloy with 1–3%

rhodium, yet presented unexpected results only for 2% rhodium, and evidence suggested that 3% rhodium possessed inferior properties); *In re Grasselli*, 713 F.2d at 743 (concluding that unexpected results “limited to sodium only” were not commensurate in scope with claims to a catalyst having “an alkali metal”). Thus, for this reason, and the reasons discussed above in Section II.D.2., we find there is no credible evidence of criticality or that the alleged unexpected results could be obtained over the entire scope of fastening elements heights encompassed by the range recited in proposed substitute claim 28.

We also find the addition to proposed substitute claim 28 of ranges for cap overhang, bending index, density, and backing thickness fails to align the alleged unexpected results with the scope of the claim. As we discussed above in Section II.D.2.a., the data relied upon by Patent Owner in the ’833 patent fail to account for numerous parameters that impact fastening performance and resulting shear strength. In this regard, we agree with Petitioner that Patent Owner’s evidence of alleged unexpected results is not

commensurate with the full scope of the proposed claims because: (a) the claims fail to recite numerous parameters for the male fastening portion that contribute to fastening performance (*see, e.g.*, Ex.1024, 115:9–120:13 and 227:23–228:6 (Mr. Kline testifying that unclaimed variables such as cap shape, cap size, and stem diameter all affect fastening performance)) and (b) the claims do not specify any specific female loop material that also contributes to fastening performance (*see, e.g.*, Ex.1024, 46:15–22 (Mr. Kline testifying that “surface-to-surface” contact with loop materials “dictates the fastening performance”); Ex.1002, ¶[0029] (Dr. Cakmak testifying that “[f]astening . . . is influenced by the geometries of the upstanding elements and the corresponding loop material.)).

RMTA Opp. 2 (emphasis omitted). In fact, the '833 patent itself provides additional evidence that other differences may affect the resulting shear strength. More particularly, the '833 patent discloses that “shear performance is unexpectedly improved upon stretching the thermoplastic backing and decreasing its thickness even though the density of the upstanding elements is reduced by half.” Ex. 1001, 16:17–21. For these reasons, and the reasons discussed above in Section II.D.2., we find there is no credible evidence that the alleged unexpected results are attributable to the claimed combination.

After having analyzed the entirety of the trial record and assigning appropriate weight to the cited supporting evidence, we determine Petitioner has shown by a preponderance of the evidence that proposed substitute claim 28 is unpatentable over at least the teachings of Petersen-1, as evidenced by and further in view of Petersen-2 and/or Miller.

c. Proposed Substitute Claim 29

Claim 29 is a proposed substitute for original claim 3. Proposed substitute claim 29 recites “[t]he mechanical fastener of claim [28], wherein the cap extends beyond the post on at least two opposing sides of the post.” RMTA, Claim Appendix.

Petitioner asserts that proposed substitute claim 29

is obvious based on the same grounds set forth above, at least because each of the prior art references cited disclose[s] a cap extending “beyond the post on at least two opposing sides of the post.” See e.g., Ex.1003 (Petersen-1), Fig. 3b; Ex.1014 (Petersen-2), Fig. 5a; Ex.1006 (Daio-Seishi), Fig. 5; and Ex.1004 (Miller), Fig. 1; see Petition, 47 and 60-61. A POSITA would not need to further modify any of the references to arrive at the features recited in claim 29.

RMTA Opp. 19.

Patent Owner does not present any arguments for proposed substitute claim 29 other than what we have already considered with respect to proposed substitute claim 28. *See generally* RMTA Reply. After considering the evidence and arguments of record, we determine that Petitioner has demonstrated by a preponderance of the evidence that proposed substitute claim 29 would have been obvious in view Petersen-1, as evidenced by and further in view of Petersen-2 and/or Miller.

d. Proposed Substitute Claim 30

Proposed substitute claim 30 is a new claim that recites “[t]he mechanical fastener of claim 29, wherein the relative cap area, which is a quotient of the aggregate cap area divided by the area of the mechanical fastener, is a range from 10% to 24%.” RMTA, Claim Appendix (emphasis omitted).

According to Petitioner, the ’833 patent does not disclose “how to calculate ‘relative cap area’, and instead discloses a method of calculating ‘relative cap density’ using the same formula recited in proposed claim 30.” RMTA Opp. 20 (citing Ex. 1001, 11:22–23, 28–29, 21:30–34). Petitioner notes that “[r]elative cap area’ and ‘relative cap density’ are used interchangeably throughout the ’833 [p]atent disclosure and mean the same thing.” *Id.*

With this understanding, Petitioner asserts that “Petersen-2 discloses measurement ranges of its caps and stems, which can be used to compute a range of cap areas.” *Id.* at 21 (citing Ex.1014 ¶ 26). Petitioner explains that “[a]dding the preferred extension of Petersen-2’s caps to the stem diameter gives a range of 0.152 to 0.406 mm (0.127 mm + 0.025 mm, on the low end;

and 0.279 mm + 0.127 mm, on the high end),” and then “[u]sing the formula for area of a circle, $A=\pi r^2$, one can obtain an approximate areal range of the caps in Petersen-2 as 0.018 to 0.129 mm².” *Id.* Petitioner further asserts that “[s]electing a value in the middle of this range, e.g., 0.0735 mm², (0.000735 cm²) and multiplying by a density on the lower end of the ranges disclosed in the respective references, e.g. 300 N/cm² gives an approximate relative cap area of 22.05%, which is squarely within the range of claim 30.” *Id.* at 22. Based on this analysis, Petitioner concludes that

[i]t would have been obvious to select a relative cap area within the range of proposed claim 30 because the general conditions of the parameter (area and density) were disclosed in the prior art, 3M has not presented any evidence of criticality, and all of the cited prior art references are in the same field/endeavor. *See In re Aller*, 220 F.2d 454, 456 ; *see In re Hoeschele*, 406 F.2d 1403 [(CCPA 1969)].

Id.

Patent Owner does not present any arguments for proposed substitute claim 30 other than what we have already considered with respect to proposed substitute claim 28. *See generally* RMTA Reply. After considering the evidence and arguments of record, we determine that Petitioner has demonstrated by a preponderance of the evidence that proposed substitute claim 30 would have been obvious in view of Petersen-1, as evidenced by and further in view of Petersen-2 and/or Miller.

2. Remaining Grounds of Unpatentability Proposed by Petitioner

Petitioner additionally asserts that proposed substitute claims 28–30 are unpatentable as obvious under 35 U.S.C. § 103 over Petersen-2 and Petersen-1; Daio-Seishi, in further view of Petersen-1 and at least one of

Petersen-2 and Miller; and Miller and Petersen-1. Because Petitioner has already shown that all of the proposed substitute claims are unpatentable, we do not reach these additional asserted grounds.

V. CONCLUSION²⁴

A summary of our conclusions appears in the charts below:

²⁴ Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner's attention to the April 2019 Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding. *See* 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. *See* 37 C.F.R. § 42.8(a)(3), (b)(2).

Claims	35 U.S.C. §	Reference(s)/Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1–5, 8– 10, 13, 15–19	103(a)	Petersen-1	1–5, 8–10, 13, 15–18 ²⁵	
11	103(a)	Petersen-1, AAPA	11	
1–5, 8, 10, 13, 15–19	103(a)	Petersen-1, Miller, Daio-Seishi	1, 19 ²⁶	
11	103(a)	Petersen-1, Miller, Daio-Seishi, AAPA ²⁷		
6,7	103(a)	Petersen-1, Miller	6, 7	
9	103(a)	Petersen-1, Buzzell ²⁸		
9	103(a)	Petersen-1, Miller, Daio-Seishi, Buzzell ²⁹		
11, 12, 14	103(a)	Petersen-1, Busam	11, 14	12
11, 12, 14	103(a)	Petersen-1, Miller, Daio-Seishi, Busam	11, 14	12
15	103(a)	Petersen-1, Ausen, Wood ³⁰		
15	103(a)	Petersen-1, Miller, Daio-Seishi, Ausen, Wood ³¹		
20	103(a)	Petersen-1, Ausen	20	
20	103(a)	Petersen-1, Miller, Daio-Seishi, Ausen ³²		

²⁵ As noted above, we do not reach Petitioner’s challenge of claim 19 as unpatentable under § 103(a) over Petersen-1.

²⁶ As noted above, we do not reach Petitioner’s challenge of claims 2–5, 8–10, 13, and 15–18 as unpatentable under § 103(a) over Petersen-1, Miller, and Daio-Seishi.

²⁷ As noted above, we do not reach Petitioner’s challenge of claim 11 as unpatentable under § 103(a) over Petersen-1, Miller, Daio-Seishi, and AAPA.

²⁸ As noted above, we do not reach Petitioner’s challenge of claim 9 as unpatentable under § 103(a) over Petersen-1 and Buzzell.

²⁹ As noted above, we do not reach Petitioner’s challenge of claim 9 as unpatentable under § 103(a) over Petersen-1, Miller, Daio-Seishi, and Buzzell.

³⁰ As noted above, we do not reach Petitioner’s challenge of claim 15 as unpatentable under § 103(a) over Petersen-1, Ausen, and Wood.

³¹ As noted above, we do not reach Petitioner’s challenge of claim 15 as unpatentable under § 103(a) over Petersen-1, Miller, Daio-Seishi, Ausen, and Wood.

³² As noted above, we do not reach Petitioner’s challenge of claim 20 as unpatentable under § 103(a) over Petersen-1, Miller, Daio-Seishi, and Ausen.

Claims	35 U.S.C. §	Reference(s)/Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
Overall Outcome			1–11, 13–20	12

Motion to Amend Outcome	Claims
Original Claims Cancelled by Amendment	
Substitute Claims Proposed in the Amendment	28–30
Substitute Claims: Revised Motion to Amend Granted	
Substitute Claims: Revised Motion to Amend Denied	28–30
Substitute Claims: Not Reached	

VI. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that, claims 1–11 and 13–20 of U.S. Patent No. 10,165,833 are held unpatentable;

FURTHER ORDERED that, claim 12 of U.S. Patent No. 10,165,833 is not held unpatentable;

FURTHER ORDERED that Patent Owner's Revised Contingent Motion to Amend is denied; and

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

IPR2020-00699
Patent 10,165,833 B2

For PETITIONER:
William Mandir
Raja Saliba
John Bird
Sughrue Mion, PLLC
wmandir@sughrue.com
rsaliba@sughrue.com
jbird@sughrue.com

For PATENT OWNER:
Heidi Keefe
Joseph E. Van Tassel
COOLEY LLP
hkeefe@cooley.com
jvantassel@cooley.com