

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

AUTOLIV ASP, INC.; NIHON PLAST CO., LTD.; NEATON AUTO
PRODUCTS MANUFACTURING INC.; TAKATA CORPORATION; TK
HOLDINGS, INC.; TOYODA GOSEI CO., LTD.; HYUNDAI MOBIS CO.,
LTD.; MOBIS ALABAMA, LLC; and MOBIS PARTS AMERICA LLC,
Petitioners

v.

AMERICAN VEHICULAR SCIENCES, LLC
Patent Owner

Case IPR2016-01790
U.S. Patent 9,043,093

PATENT OWNER'S NOTICE OF APPEAL
35 U.S.C. § 142 & 37 C.F.R. § 90.2

Pursuant to 37 C.F.R. § 90.2(a), Patent Owner, American Vehicular Sciences, LLC, hereby provides notice of its appeal to the United States Court of Appeals for the Federal Circuit for review of the Final Written Decision of the United States Patent and Trademark Office (“USPTO”) Patent Trial and Appeals Board (“PTAB”) in Inter Partes Review 2016-01790, concerning U.S. Patent 9,043,093 (“the ’093 patent”), entered on March 23, 2018, attached hereto as Appendix A.

ISSUES TO BE ADDRESSED ON APPEAL

- A. Whether the PTAB failed to properly construe the following claim limitation: “a single airbag extending across at least two seating positions of a passenger compartment of a vehicle ... the at least two seating positions comprising a first seating position in a first seat row of seats of the vehicle and a second seating position in a second seat row of seats of the vehicle longitudinally displaced from the first seat row of seats”?
- B. Whether the PTAB erred in concluding that claims 1-44 are unpatentable under 35 U.S.C. § 103(a) as obvious in view of Leising and Lau, as well as additional secondary references?
- C. Whether the PTAB erred in concluding that claims 1-44 are unpatentable

under 35 U.S.C. § 103(a) as obvious in view of Karlow and Lau, as well as additional secondary references?

- D. Whether the PTAB's reliance on attorney argument and unsupported expert testimony is inadequate to support the PTAB's obviousness conclusions?
- E. Whether the PTAB erred in giving insufficient weight to Patent Owner's secondary considerations of non-obviousness?

Simultaneous with submission of this Notice of Appeal to the Director of the United States Patent and Trademark Office, this Notice of Appeal is being filed with the Patent Trial and Appeal Board. In addition, this Notice of Appeal, along with the required docketing fees, is being filed with the United States Court of Appeals for the Federal Circuit.

Dated: May 14, 2018

Respectfully submitted,

/Gregory J. Gonsalves/

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CERTIFICATE OF SERVICE

The undersigned certifies that in addition to being filed electronically through the Patent Trial and Appeal Board's Patent Review Processing System the foregoing PATENT OWNER'S NOTICE OF APPEAL was served on the Director of the United States Patent and Trademark Office, at the following address (in accordance with 37 C.F.R. §§ 90.2(a), 104.2):

Director of the United States Patent and Trademark Office
c/o Office of the General Counsel
United States Patent and Trademark Office
P.O. Box 1450 Alexandria, Virginia 22313-1450

CERTIFICATE OF FILING

The undersigned certifies that on May 14, 2018, a true and correct copy of the foregoing PATENT OWNER'S NOTICE OF APPEAL was filed electronically with the Clerk's Office of the United States Court of Appeals for the Federal Circuit at the following address:

Clerk of Court
United States Court of Appeals for the Federal Circuit
717 Madison Place NW
Washington, DC 20005

CERTIFICATE OF SERVICE

The undersigned hereby certifies that a copy of the foregoing PATENT OWNER'S NOTICE OF APPEAL was served on May 14, 2018, by filing this document through the PTAB's E2E system as well as by delivering a copy via electronic mail to the attorneys of record for the Petitioners as follows:

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Appendix A

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

AUTOLIV ASP, INC.; NIHON PLAST CO., LTD.;
NEATON AUTO PRODUCTS MANUFACTURING INC.;
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TOYODA GOSEI CO., LTD.; HYUNDAI MOBIS CO., LTD.;
MOBIS ALABAMA, LLC; and MOBIS PARTS AMERICA LLC,
Petitioner,

v.

AMERICAN VEHICULAR SCIENCES, LLC,
Patent Owner.

Case IPR2016-01790
Patent 9,043,093 B2

Before TREVOR M. JEFFERSON, JENNIFER MEYER CHAGNON, and
SCOTT C. MOORE, *Administrative Patent Judges*.

CHAGNON, *Administrative Patent Judge*.

FINAL WRITTEN DECISION
Inter Partes Review
35 U.S.C. § 318(a) and 37 C.F.R. § 42.73

I. INTRODUCTION

We have jurisdiction to hear this *inter partes* review under 35 U.S.C. § 6. This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons discussed herein, we determine that Petitioner has shown, by a preponderance of the evidence, that claims 1–44 (“the challenged claims”) of U.S. Patent No. 9,043,093 B2 (Ex. 1001, “the ’093 patent”) are unpatentable.

A. Procedural History

Toyoda Gosei Co., Ltd.; Autoliv ASP, Inc.; Nihon Plast Co., Ltd.; Neaton Auto Products Manufacturing, Inc.; Takata Corporation; TK Holdings, Inc.; Hyundai Mobis Co., Ltd.; Mobis Alabama, LLC; and Mobis Parts America LLC (collectively, “Petitioner”)¹ filed a Petition for *inter partes* review of claims 1–44 of the ’093 patent. Paper 1 (“Pet.”). Petitioner provided a Declaration of Stephen W. Rouhana, Ph.D. (Ex. 1003) in support of its positions. American Vehicular Sciences, LLC (“Patent Owner”) filed a Preliminary Response to the Petition (Paper 14 (“Prelim. Resp.”)), relying on a Declaration of Michael Nranian P.E. (Ex. 2005) in support of its positions.

¹ Petitioner identifies Toyoda Gosei North America Corp.; Autoliv, Inc.; and Mobis America, Inc. as additional real parties-in-interest. Pet. 1.

Pursuant to 35 U.S.C. § 314(a), on March 28, 2017, we instituted *inter partes* review on the following grounds:

whether claims 1, 6, 8, 10, 12, 17–21, 26, 27, 33, 39, 43, and 44 are unpatentable under 35 U.S.C. § 103(a) as obvious in view of Leising² and Lau³;

whether claims 2, 3, 11, 28–32, and 41 would have been obvious under 35 U.S.C. § 103(a) in view of Leising, Lau, and Davis⁴;

whether claims 4 and 13–15 would have been obvious under 35 U.S.C. § 103(a) in view of Leising, Lau, and Daniel⁵;

whether claims 5, 7, 34, and 35 would have been obvious under 35 U.S.C. § 103(a) in view of Leising, Lau, and Kaji⁶;

whether claims 9, 38, 40, 42, and 44 would have been obvious under 35 U.S.C. § 103(a) in view of Leising, Lau, and Steffens⁷;

whether claims 22, 24, and 25 would have been obvious under 35 U.S.C. § 103(a) in view of Leising, Lau, and Suzuki⁸;

whether claim 16 would have been obvious under 35 U.S.C. § 103(a) in view of Leising, Lau, and Paxton⁹;

² U.S. Patent No. 3,897,961, issued Aug. 5, 1975 (Ex. 1005).

³ U.S. Patent No. 5,273,309, issued Dec. 28, 1993 (Ex. 1006).

⁴ U.S. Patent No. 5,269,561, issued Dec. 14, 1993 (Ex. 1007).

⁵ U.S. Patent No. 5,540,459, issued July 30, 1996, filed Oct. 5, 1994 (Ex. 1008).

⁶ U.S. Patent No. 5,222,761, issued June 29, 1993 (Ex. 1009).

⁷ U.S. Patent No. 5,524,924, issued June 11, 1996, filed Nov. 15, 1993 (Ex. 1010).

⁸ U.S. Patent No. 4,021,058, issued May 3, 1977 (Ex. 1011).

⁹ U.S. Patent No. 4,998,751, issued Mar. 12, 1991 (Ex. 1012).

whether claim 23 would have been obvious under 35 U.S.C. § 103(a) in view of Leising, Lau, Suzuki, and Marlow¹⁰;

whether claims 1, 10, 17–21, 26, 27, 33, 36, 37, 39, and 43 would have been obvious under 35 U.S.C. § 103(a) in view of Karlow¹¹ and Lau;

whether claims 2, 3, 11, 28–32, and 41 would have been obvious under 35 U.S.C. § 103(a) in view of Karlow, Lau, and Davis;

whether claims 4, 6, 8, and 12–15 would have been obvious under 35 U.S.C. § 103(a) in view of Karlow, Lau, and Daniel;

whether claims 5, 7, 34, and 35 would have been obvious under 35 U.S.C. § 103(a) in view of Karlow, Lau, and Kaji;

whether claims 9, 38, 40, 42, and 44 would have been obvious under 35 U.S.C. § 103(a) in view of Karlow, Lau, and Steffens;

whether claims 22, 24, and 25 would have been obvious under 35 U.S.C. § 103(a) in view of Karlow, Lau, and Suzuki;

whether claim 16 would have been obvious under 35 U.S.C. § 103(a) in view of Karlow, Lau, and Paxton; and

whether claim 23 would have been obvious under 35 U.S.C. § 103(a) in view of Karlow, Lau, Suzuki, and Marlow;

See Paper 16 (“Inst. Dec.”). Subsequent to institution, Patent Owner filed a Patent Owner Response (Paper 19, “PO Resp.”), along with a second Michael Nranian P.E. (Ex. 2013) to support its positions. Petitioner filed a Reply (Paper 22, “Reply”) to the Patent Owner Response.

¹⁰ U.S. Patent No. 3,966,225, issued June 29, 1976 (Ex. 1013).

¹¹ U.S. Patent No. 5,588,672, issued Dec. 31, 1996, filed Oct. 20, 1995 (Ex. 1014).

An oral hearing was held on December 6, 2017. A transcript of the hearing is included in the record. Paper 30 (“Tr.”).

B. Related Proceedings

The parties indicate that the ’093 patent is the subject of the following district court proceedings: *Am. Vehicular Scis. LLC v. Hyundai Motor Co.*, No. 5:16-cv-11529-JEL-APP (E.D. Mich.); *Am. Vehicular Scis. LLC v. Nissan Motor Co.*, No. 5:16-cv-11530-JEL-APP (E.D. Mich.); *Am. Vehicular Scis., LLC v. Toyota Motor Corp.*, No. 5:16-cv-11531-JEL-APP (E.D. Mich.); and *Am. Vehicular Scis., LLC v. Am. Honda Motor Co.*, No. 5:16-cv-11532-JEL-APP (E.D. Mich.). Paper 13, 1–2; Pet. 1–2.

Claims 1–44 of the ’093 patent also are subject to review in IPR2016-01794. *See Autoliv ASP, Inc. v. Am. Vehicular Scis.*, Case IPR2016-01794 (PTAB Mar. 23, 2017) (Paper 7). Claims 1, 8, 10, 12, 17–19, 26, 27, and 36 of the ’093 patent previously were determined to be unpatentable. *See Unified Patents Inc. v. Am. Vehicular Scis.*, Case IPR2016-00364 (PTAB May 19, 2017) (Paper 35) (“the 364 Final Written Decision,” “364 FWD”) (appeal currently pending, Fed. Cir. Case No. 17-2307).

Patent Owner also identifies pending application No. 14/721,136, which claims priority to the ’093 patent (Paper 13, 2); according to USPTO records, this application has been abandoned.

C. The ’093 Patent

The ’093 patent is titled “Single Side Curtain Airbag for Vehicles,” and was filed as U.S. application No. 11/930,330 on October 31, 2007. Ex. 1001, at [21], [22], [54]. The ’093 patent claims priority, via a chain of

continuation-in-part and divisional applications, to U.S. application No. 08/571,247, filed on December 12, 1995. *Id.* at [60].

The '093 patent relates to an airbag system for a vehicle, in which “the airbag for the front and rear seats are combined, i.e., the airbag deploys along substantially the entire side of the vehicle alongside both the front seat and the rear seat.” *Id.* at 65:29–32. According to the '093 patent, this arrangement “results in significantly greater protection in side impacts when the windows are broken.” *Id.* at 65:32–34. Further, the airbag system of the '093 patent utilizes a single gas-providing system with only one inflator to inflate the airbag. *Id.* at 187:3–6. The airbag also includes a plurality of compartments in flow communication with each other. *See, e.g., id.* at 169:27–33. As described in the '093 patent, the compartments allow the airbag to be formed of the desired shape, while minimizing stress concentrations, as well as the weight of the airbag. *Id.* at 81:14–19.

D. Illustrative Claim

Of the challenged claims, claims 1, 22, 26, 29, 36–39, and 41–43 are independent. Claims 2–21 and 33–35 depend, directly or indirectly, from claim 1; claims 23–25 depend from claim 22; claims 27 and 28 depend from claim 26; claims 30–32 depend from claim 29; claim 40 depends from claim 39; and claim 44 depends from claim 43. Claim 1 of the '093 patent, reproduced below, is illustrative of the challenged claims.

1. An airbag system of a vehicle, the airbag system comprising:

a single airbag extending across at least two seating positions of a passenger compartment of a vehicle, the single airbag arranged to deploy into the passenger compartment along

a lateral side of the vehicle and adjacent each of the at least two seating positions;

a cover interposed between the single airbag and the passenger compartment to cover the single airbag prior to deployment;

a single gas-providing system that has only one inflator that provides gas to inflate the single airbag and which is arranged apart from the single airbag; and

a conduit leading from the single gas-providing system to provide gas to inflate the single airbag, the conduit being arranged to deliver the gas from the single gas-providing system into the single airbag;

the at least two seating positions comprising a first seating position in a first seat row of seats of the vehicle and a second seating position in a second seat row of seats of the vehicle longitudinally displaced from the first seat row of seats, along the lateral side of the vehicle;

wherein the single airbag has a plurality of compartments for receiving the gas, and wherein the plurality of compartments are in flow communication with each other.

Ex. 1001, 186:61–187:18.

II. ANALYSIS

A. *Principles of Law*

To prevail in its challenges to the patentability of the claims, Petitioner must demonstrate by a preponderance of the evidence that the challenged claims are unpatentable. 35 U.S.C. § 316(e); 37 C.F.R. § 42.1(d). “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, 1378–79 (Fed. Cir. 2015) (citing *Tech. Licensing Corp. v. Videotek, Inc.*, 545 F.3d 1316, 1326–27 (Fed. Cir. 2008)) (discussing the burdens of persuasion and production in *inter partes* review).

A claim is unpatentable for obviousness if, to one of ordinary skill in the pertinent art, “the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007) (quoting 35 U.S.C. § 103(a)). The question of obviousness is resolved on the basis of underlying factual determinations including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) objective evidence of nonobviousness. *See Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

A patent claim “is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art.” *KSR*, 550 U.S. at 418. An obviousness determination requires finding “both ‘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.’” *Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1367–68 (Fed. Cir. 2016) (citation omitted); *see KSR*, 550 U.S. at 418 (for an obviousness analysis, “it can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the

elements in the way the claimed new invention does”). A motivation to combine the teachings of two references can 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.” *Plantronics, Inc. v. Aliph, Inc.*, 724 F.3d 1343, 1354 (Fed. Cir. 2013) (citation omitted).

In an *inter partes* review, Petitioner cannot satisfy its burden of proving obviousness by employing “mere conclusory statements,” but “must instead articulate specific reasoning, based on evidence of record” to support an obviousness determination. *In re Magnum Oil Tools Int’l, Ltd.*, 829 F.3d 1364, 1380–81 (Fed. Cir. 2016). The “factual inquiry” into the reasons for “combin[ing] references must be thorough and searching, and the need for specificity pervades.” *In re NuVasive, Inc.*, 842 F.3d 1376, 1381–82 (Fed. Cir. 2016) (internal quotations and citations omitted). A determination of obviousness cannot be reached where the record lacks “explanation as to how or why the references would be combined to produce the claimed invention.” *TriVascular, Inc. v. Samuels*, 812 F.3d 1056, 1066 (Fed. Cir. 2016); *see NuVasive*, 842 F.3d at 1382–85; *Magnum Oil*, 829 F.3d at 1380–81. Thus, to prevail Petitioner must explain how the prior art would have rendered the challenged claim unpatentable.

At this final stage, we determine whether a preponderance of the evidence of the record shows that the challenged claims would have been obvious in view of the asserted prior art. We analyze the asserted grounds of unpatentability in accordance with those principles.

B. Level of Ordinary Skill in the Art

Petitioner asserts that a person of ordinary skill in the art “would have a degree in a related field of science including physics, mechanical or electrical engineering, or equivalent coursework, and at least two years of experience in the area of automotive safety systems with the equivalent of a post-graduate education, such as a master’s degree or equivalent knowledge obtained through work experience, and several years of experience in the design of vehicle occupant protection systems.” Pet. 12; Ex. 1003 ¶ 39. Patent Owner does not address the level of ordinary skill in its Patent Owner Response, but Mr. Nranian testifies that such a person “would have at least a Bachelor’s degree in electrical, electronic, mechanical, or automotive engineering, and at least three years of experience in the integration of airbag, safety, and vehicle occupant protection devices in automotive vehicles, or equivalent knowledge obtained through work experience in the relevant field.” Ex. 2013 ¶ 36. We do not discern a difference between these formulations as applied to the issues in dispute in this proceeding and the parties do not identify any issue in dispute that allegedly turns on such a difference.

For purposes of this Final Written Decision, and based on the parties’ proposed definitions and the complete record now before us, we maintain our previously adopted definition of one of ordinary skill in the art: a person having at least a Bachelor’s degree in physics, or electrical, electronic, mechanical, or automotive engineering, or equivalent coursework, and having several years of experience in the design of vehicle occupant protection systems in automotive vehicles, or equivalent knowledge obtained through work experience in the relevant field. *See* Inst. Dec. 9–10.

The level of ordinary skill in the art in this case further is reflected by the prior art of record. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001); *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995); *In re Oelrich*, 579 F.2d 86, 91 (CCPA 1978).

C. Claim Construction

The '093 patent has expired. *See* PO Resp. 11; Ex. 1001, at [60]; 35 U.S.C. § 154(a)(2). When interpreting claims of an expired patent, our analysis is similar to that of a district court. *In re Rambus, Inc.*, 694 F.3d 42, 46 (Fed. Cir. 2012); *see also Black & Decker, Inc. v. Positec USA, Inc., RW*, 646 Fed. App. 1019, 1024 (Fed. Cir. 2016) (holding that in an *inter partes* review, “[c]laims of an expired patent are given their ordinary and customary meaning in accordance with our opinion in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc)”).¹² Specifically, claim terms are given their ordinary and customary meaning, as would be understood by a person of ordinary skill in the art at the time of the invention, in light of the language of the claims, the specification, and the prosecution history of record. *Phillips*, 415 F.3d at 1313–17. However, there is no presumption of validity, and we do not apply a rule of construction with an aim to preserve the validity of claims.

Petitioner asserts that “[a]ll claim terms should be given their plain and ordinary meaning in light of the specification.” Pet. 11. Patent Owner proposes constructions for three claim terms: (1) “single airbag”; (2) “a single airbag extending across at least two seating positions of a

¹² The parties agree that the *Phillips* standard of claim construction should be applied to the claims in this proceeding. Pet. 11; PO Resp. 11.

passenger compartment of a vehicle . . . the at least two seating positions comprising a first seating position in a first seat row of seats of the vehicle and a second seating position in a second seat row of seats of the vehicle longitudinally displaced from the first seat row of seats”; and (3) “a plurality of compartments.” PO Resp. 12–14.

The parties’ dispute does not require express construction of any claim term. *See, e.g., See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (“[W]e need only construe terms ‘that are in controversy, and only to the extent necessary to resolve the controversy.’”) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)). We address certain aspects of Patent Owner’s proposed constructions in our substantive discussion below.

D. Obviousness in View of, At Least in Part, Leising and Lau

Petitioner asserts that claims 1, 6, 8, 10, 12, 17–21, 26, 27, 33, 39, 43, and 44 are unpatentable under 35 U.S.C. § 103(a) as obvious in view of Leising and Lau. Pet. 23–44. Petitioner further asserts that claims 2, 3, 11, 28–32, and 41 are unpatentable under 35 U.S.C. § 103(a) as obvious in view of Leising, Lau, and Davis; that claims 4 and 13–15 are unpatentable under 35 U.S.C. § 103(a) as obvious in view of Leising, Lau, and Daniel; that claims 5, 7, 34, and 35 are unpatentable under 35 U.S.C. § 103(a) as obvious in view of Leising, Lau, and Kaji; that claims 9, 38, 40, 42, and 44 are unpatentable under 35 U.S.C. § 103(a) as obvious in view of Leising, Lau, and Steffens; that claims 22, 24, and 25 are unpatentable under 35 U.S.C. § 103(a) as obvious in view of Leising, Lau, and Suzuki; that claim 16 is unpatentable under 35 U.S.C. § 103(a) as obvious in view of Leising, Lau,

and Paxton; and that claim 23 is unpatentable under 35 U.S.C. § 103(a) as obvious in view of Leising, Lau, Suzuki, and Marlow. *Id.* at 44–66.

Patent Owner argues that the cited combination of Leising and Lau does not disclose all elements of the independent claims, and that Petitioner has not provided a sufficient reason to combine these references with a reasonable expectation of success. PO Resp. 25–63. Patent Owner also presents evidence of secondary considerations. *Id.* at 63–81.

For the reasons explained below, we determine that Petitioner has demonstrated, by a preponderance of the evidence, that claims 1–35 and 38–44 would have been obvious.

1. Summary of Leising

Leising relates to an “[i]nflatable restraint apparatus for automotive vehicle occupants including an inflatable torso bag structure” and “[i]nflatable side curtains . . . deployed from the roof.” Ex. 1005, at [57]. Figure 2 of Leising is reproduced below.

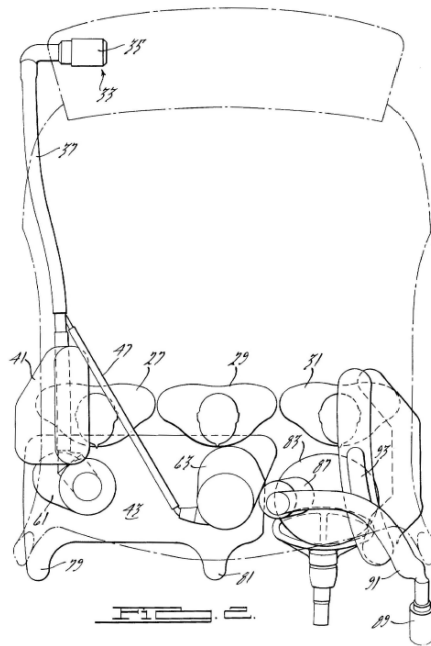


Figure 2, reproduced above, illustrates a plan view of a vehicle including a restraint system. *Id.* at 2:46–50. The inflatable restraint apparatus of Leising includes torso restraining bag 43 and side curtain 41. *Id.* at 1:33–38, 3:32–33. Gas source 33 supplies gas to the inflatable restraints. *Id.* at 3:24–25. Gas reservoir 35 is connected to conduit 37, which extends along the roof to housing area 39, which is located in the roof over the front seat area. *Id.* at 3:27–31. Conduit 37 is connected to side curtain 41 and torso bag 43. *Id.* at 3:32–33.

“The side curtains and inflated torso restraining bag may be interconnected to facilitate positioning or filling of the inflated structures.” *Id.* at [57]; *see id.* at 4:19–23. When deployed, the side curtains extend downwardly between the passenger and the door. *Id.* at 4:40–41, 5:34–35. Prior to deployment, the restraint apparatus is “adapted to be conveniently and aesthetically stowed in the vehicular roof structure.” *Id.* at 5:36–39.

Figure 8 of Leising is reproduced below.

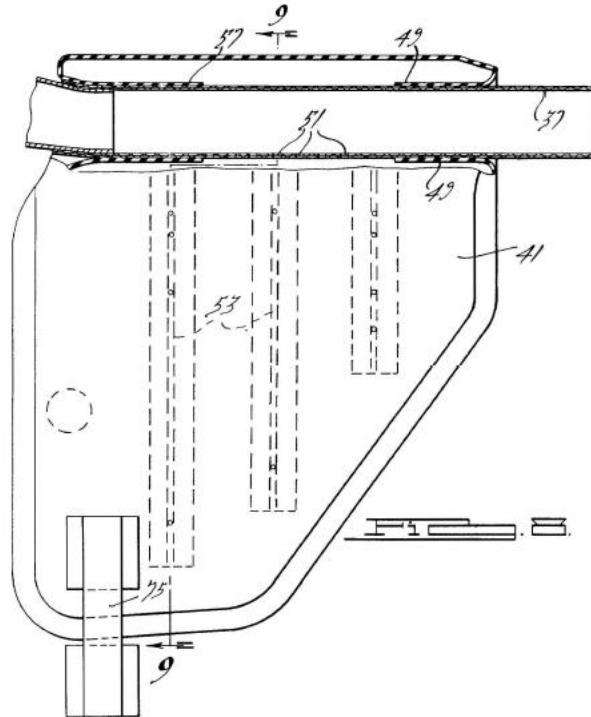


Figure 8, reproduced above, is an enlarged side elevation of a side curtain forming part of the restraint apparatus of Leising. *Id.* at 2:62–63.

A plurality of restraining webs 53 maintain side curtain 41 in a generally flat condition upon inflation. *Id.* at 3:43–46. Each web 53 includes a notch or recess 55 at upper and lower ends thereof. *Id.* at 3:50–51.

2. Summary of Lau

Lau relates to airbag assembly 30, which includes inflator 38, front seat air bag 40 and rear seat air bag 42. Ex. 1006, 2:12–15. Figure 1 of Lau is reproduced below.

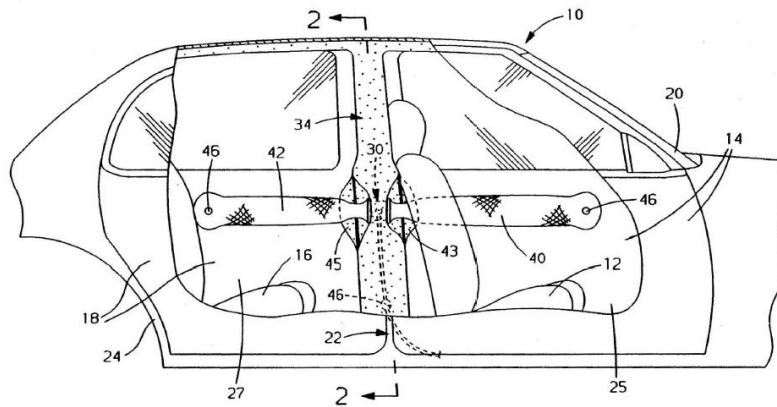


FIG. 1

Figure 1, reproduced above, is a side view of a vehicle showing front and rear seat air bags 40, 42 in the deployed condition. *Id.* at 1:39–42. In the deployed positions, the “air bags extend between the seated occupants and the adjacent vehicle door.” *Id.* at 2:32–34. Prior to deployment, “air bags 40 and 42 are rolled to a stored condition and respectively concealed behind break away doors 43 and 45 . . . which conceals the air bag from view.” *Id.* at 2:15–18.

3. Claim 1: Obviousness in view of Leising and Lau

Whether the Leising/Lau Combination Teaches all Limitations of Claim 1; Whether a Person of Ordinary Skill in the Art Would Have Had Reason to Combine Leising and Lau and Would Have Had a Reasonable Expectation of Success in Doing So

Petitioner's Arguments and Evidence

Claim 1 recites an “airbag system of a vehicle.” As discussed above, Leising and Lau each disclose such an airbag system. *See* Pet. 12–16.

Claim 1 further recites that the airbag system includes “a single airbag extending across at least two seating positions of a passenger compartment of a vehicle, the single airbag arranged to deploy into the passenger compartment along a lateral side of the vehicle and adjacent each of the at least two seating positions.” Further, the claimed “at least two seating positions” include “a first seating position in a first seat row of seats of the vehicle and a second seating position in a second seat row of seats of the vehicle longitudinally displaced from the first seat row of seats, along the lateral side of the vehicle.” In other words, “the airbag for the front and rear seats are combined, i.e., the airbag deploys along substantially the entire side of the vehicle alongside both the front seat and the rear seat.” Ex. 1001, 65:29–32.

Petitioner relies on the combination of Leising and Lau as teaching these claim features. *See* Pet. 23–29, 31. Petitioner asserts that “Leising relates to an inflatable side curtain airbag deployed from the roof of a vehicle.” *Id.* at 12 (citing Ex. 1005, at [57]). In particular, side curtain 41 of Leising is “arranged to deploy from the roof into the passenger compartment along a lateral side of the vehicle.” *Id.* at 23 (citing Ex. 1005, at [57], 3:38–48, 6:66–5:11, 5:36–39, Figs. 1–3). According to Petitioner, while

“Leising’s airbag does not explicitly extend across two longitudinally displaced seating positions along a lateral side of the vehicle,” Leising does include “explicit disclosure of integrating multiple airbag portions that extend across multiple occupants to form a single airbag.” *Id.* at 24, 26 (citing Ex. 1005, 4:19–23; Ex. 1003 ¶ 100). Leising teaches a second row of seats (i.e., the back seats) that are longitudinally displaced from the first row of seats (i.e., the front seats). *Id.* at 31 (citing Ex. 1005, 3:19–21, Figs. 2, 3).

Petitioner argues that “it would have been obvious to extend side curtain 41 [of] Leising to protect rear seat occupants” and that “[a] side airbag curtain extending from the front seat to the rear seat was known as early as 1965.” *Id.* at 24 (citing Ex. 1003 ¶ 87; Ex. 1017). Thus, according to Petitioner, “[e]xtending a single airbag across the passenger compartment . . . would have been a viable alternative design which [a person of ordinary skill in the art] would have found obvious to try,” and “such a design would have simply combined prior art elements according to known methods to yield predictable results.” *Id.* at 25 (citing Ex. 1003 ¶ 105).

Petitioner additionally points to the regulatory environment, which by 1995 included new side impact regulations, as evidence that “it would have been obvious to extend Leising’s side curtain 41 to the rear seat for back seat occupant safety” and that the “extension could be made by elongating and enlarging Leising’s side curtain 41, its housing, and roof storage area along the entire length of the roof.” *Id.* at 26; Ex. 1003 ¶ 100.

Petitioner further relies on Lau, for its express teaching of an airbag assembly that provides side airbag protection for both front and rear occupants. Pet. 27 (citing Ex. 1003 ¶ 103); *see* Ex. 1006, Fig. 1. According

to Petitioner, Leising and Lau are “[i]n the same field (i.e., airbags in vehicles)” and “address the same problem (i.e., how to effectively provide side airbag protection during an accident).” Pet. 27; Ex. 1003 ¶ 106.

Petitioner, thus, asserts that “[i]t would have been obvious to [a person of skill in the art] to extend Leising’s side curtain 41 to protect occupants in the rear seat based on Lau.” Pet. 27; Ex. 1003 ¶ 106.

The airbag system of claim 1 further includes “a cover interposed between the single airbag and the passenger compartment to cover the single airbag prior to deployment.” Petitioner notes that “Leising discloses side curtain 41 is stowed in the vehicular roof structure but does not expressly disclose a ‘cover.’” Pet. 29. Petitioner asserts, however, that it would have been obvious to use break away doors as taught in Lau (*see* Ex. 1006, 2:14–17, Fig. 1), to store the airbag of Leising in an aesthetic manner. Pet. 29; Ex. 1003 ¶ 111. According to Petitioner, “the break away doors would be placed in the roof area and would provide the expected result of allowing the side curtain of Leising to deploy when needed, while keeping the side curtain concealed from view before use.” Pet. 29; Ex. 1003 ¶ 111.

Claim 1 further recites “a single gas-providing system that has only one inflator that provides gas to inflate the single airbag and which is arranged apart from the single airbag.” Petitioner points to Leising’s “single gas source 33, having one inflator 35 . . . for supplying gas to side curtain 41,” as teaching this claim feature. Pet. 29–30 (citing Ex. 1005, 3:23–25, Figs. 2, 3); Ex. 1003 ¶ 112. According to Petitioner, “it was known to use a single energy source for two airbags and would have been desirable to achieve low-cost, small, and efficient cars.” Pet. 25 (citing Ex. 1003 ¶ 105; Ex. 1005, 3:23–31). Thus, according to Petitioner, “[e]xtending a

single airbag across the passenger compartment with a single inflator would have been a viable alternative design which [a person of ordinary skill in the art] would have found obvious to try,” and “such a design would have simply combined prior art elements according to known methods to yield predictable results.” *Id.* (citing Ex. 1003 ¶ 105). Petitioner further notes that Lau discloses inflator 38 to generate inflation gas for both front occupant bag 40 and rear occupant bag 42. *Id.* at 30 (citing Ex. 1006, 2:28–34). According to Petitioner, a person of ordinary skill in the art “would realize a separate airbag with its own inflator is not needed for the rear seat because Leising and Lau both disclose using a single inflator for multiple airbag portions.” *Id.*; Ex. 1003 ¶ 114.

Regarding the claimed “conduit leading from the single gas-providing system to provide gas to inflate the single airbag, the conduit being arranged to deliver the gas from the single gas-providing system into the single airbag,” Petitioner points to tube 37 of Leising that extends from single gas reservoir 35 to side curtain 41, and delivers gas thereto, as disclosing this claim feature. Pet. 30 (citing Ex. 1005, 3:28–33, Figs. 2, 3).

Finally, claim 1 recites that “the single airbag has a plurality of compartments for receiving the gas, and wherein the plurality of compartments are in flow communication with each other.” Petitioner points to disclosure in Leising of the use of “restraining webs 53 to form a plurality of compartments, in a vertical direction,” as teaching this claim feature. *Id.* at 31–32 (citing Ex. 1005, 2:62–63, 3:1–2, 3:43–49, Figs. 8, 10, 11); Ex. 1003 ¶ 118. Petitioner further asserts that “restraining webs 53 do not extend the entire length of side curtain 41,” and, thus, “the compartments

in side curtain 41 are in flow communication.” Pet. 32–33 (citing Ex. 1005, 3:37–42, Figs. 8, 10, 11; Ex. 1003 ¶ 119).

Patent Owner’s Arguments and Evidence and Our Analysis

In its Patent Owner Response, Patent Owner argues that several limitations of the independent claims are missing from Petitioner’s proposed combination. *See* PO Resp. 25–28, 61–63. Specifically, Patent Owner asserts that the cited combination does not teach or suggest “a single airbag extending across . . . a lateral side of the vehicle” across two passenger compartments; or “a plurality of compartments [with] flow communication.” *Id.* Patent Owner also argues that Petitioner fails to show that it would have been obvious to modify Leising in view of Lau with any reasonable expectation of success. *Id.* at 28–61. We address each of Patent Owner’s arguments in turn.

*“single airbag extending across . . . a lateral side of the vehicle”
across two passenger compartments*

Patent Owner argues that the “combination of Leising and Lau would not have taught or suggested ‘a single airbag extending across a lateral side of the vehicle’ across two passenger compartments, as required by each of the challenged independent claims.” PO Resp. 25. In this regard, Patent Owner argues that Petitioner “admitted that ‘Leising’s airbag does not explicitly extend across two longitudinally displaced seating positions along a lateral side of the vehicle’” (*id.* (quoting Pet. 24)) and that “Lau teaches two separate air bags” (*id.* (citing Ex. 1006, 2:12–14)). Patent Owner continues, arguing that “Lau makes no mention of a single air bag extending laterally across front and rear seating positions, let alone teach or explain how [a person of ordinary skill in the art] would achieve such an air bag,”

and that “the two air bags of Lau collectively do not extend across the area between the two rows of seats (i.e., the B-pillar).” *Id.* at 26 (citing Ex. 2005 ¶¶ 44, 45, 172–173).

Patent Owner’s arguments in this regard focus on the references individually, whereas Petitioner’s asserted ground is based upon the teachings of the combination. *See In re Keller*, 642 F.2d 413, 426 (CCPA 1981) (holding that nonobviousness cannot be established by attacking references individually where the ground of unpatentability is based upon the teachings of a combination of references). Contrary to Patent Owner’s arguments, Petitioner does not rely on Lau for a teaching of a single airbag extending across two rows of seats. Instead, as discussed above, Petitioner’s proposed combination relies on disclosure in Lau of airbag protection of both front and back seat passengers (rather than on Lau’s use of two airbags to do so), as evidence that one of skill in the art would also have considered safety protection for rear seat occupants, and would have found it obvious to extend the side airbag of Leising in order also to protect passengers in the back seat. *See, e.g.*, Pet. 27 (citing Ex. 1003 ¶¶ 103, 107); *see also* Reply 8 (“Petitioners do not rely on the specific configuration in Lau”); Tr. 27:13–19 (confirming the extent of Petitioner’s reliance on Lau). Further, Petitioner, relying on testimony from Dr. Rouhana, describes how such an extension of Leising’s airbag could be accomplished (i.e., “by elongating and enlarging Leising’s side curtain 41, its housing, and roof storage area along the entire length of the roof”). *See id.* at 26–27 (citing Ex. 1003 ¶¶ 100–103).

Based on the evidence presented, we find that it would have been within the level of ordinary skill to extend the side airbag of Leising, and that a person of ordinary skill in the art would have done so in order to

protect also passengers in the back seat. Thus, we find that the combination of Leising and Lau teaches or suggests “single airbag extending across . . . a lateral side of the vehicle” across two passenger compartments, as claimed.¹³

“plurality of compartments [with] flow communication”

Patent Owner argues that the portions of Leising upon which Petitioner relies to show a plurality of compartments, “do not, in fact, show more than one compartment.” PO Resp. 61 (citing Ex. 1005, Figs. 8, 11). Rather, according to Patent Owner, “Leising explicitly states that the purpose of the restraining webs is to maintain the side curtain in a flat condition upon inflation.” *Id.* at 61–62 (citing Ex. 1005, 3:43–46). Patent Owner continues, arguing that

Petitioners’ assertion that “Figure 11 . . . is a sectional view showing the compartments of the side curtain 41,” is also wrong. Figure 11 is not a sectional view of the side curtain 41 as alleged by Petitioners; it is instead a section view of only a fragment of the side curtain 41: “FIG. 11 is a fragmentary section taken through the mid portion of the curtain shown in FIG. 10”

¹³ Patent Owner proposes that the recited “single airbag extending across at least two seating positions of a passenger compartment of a vehicle . . .” requires “one airbag extending across a first seating position of a first row of seats and a second seating position of a second row of seats *as well as the area between the first and second seating positions*” (i.e., the B-pillar). PO Resp. 13 (emphasis added); *see also id.* at 25–28 (arguing the references do not disclose B-pillar protection). Petitioner disagrees, arguing “the claims . . . do not require B-pillar protection.” *See* Reply 12. We need not resolve this claim construction issue, however, because we are persuaded that Petitioner’s proposed combination, i.e., extending the side airbag of Leising to also protect occupants in the back seat of the vehicle, meets even Patent Owner’s narrower proposed construction. *See Nidec*, 868 F.3d at 1017; *see also* Ex. 1003 ¶ 101 (Dr. Rouhana testifying that the airbag of Leising, as modified in Petitioner’s proposed combination, would “provide[] padding for the B-pillar.”); Pet. 26–27; Reply 12–13.

(Exhibit 1002, col. 3, ll. 1–2). That is, FIG 11 shows only the center portion of the side curtain containing the restraining webs. Accordingly, FIG. 11 does not show a plurality of compartments in flow communication (Ex. 2013, ¶ 209).

Id. at 62–63.

We do not find Patent Owner’s arguments persuasive. Patent Owner’s arguments are based on its proposed construction—namely, that “a plurality of compartments” should be construed as “two or more separate chambers.” *Id.* at 13–14. Patent Owner’s proposal is based on a dictionary definition of “compartment” as “a separate room, section, or chamber.” *Id.* (citing Ex. 2002, 283). Patent Owner argues that because the sections of Leising’s airbag are not completely separate, that they cannot form a plurality of compartments. *See id.* at 62–63 (“FIG 11 shows only the center portion of the side curtain contain[s] the restraining webs. Accordingly, FIG 11 does not show a plurality of compartments . . .”). The claims, however, require also that the “plurality of compartments are in flow communication with each other.” Patent Owner’s proposed construction does not explain how “compartments” can be completely separated from each other, yet also be in “flow communication” as required by the claims. *See also* Tr. 26:14–16 (Petitioner’s counsel arguing: “The claims require flow communication between the chambers. That would be inconsistent with having a completely closed off type chamber.”). During the oral hearing, Patent Owner argued that the “opening [between compartments] has to be a relatively small volume or area.” Tr. 13:16–17; *see id.* at 11:3–14:20 (full discussion at oral hearing on Patent Owner’s proposed construction of “compartments”). When asked at the oral hearing, Patent Owner indicated there was guidance in the Specification of the ’093 patent, as well as in

Mr. Nranian’s declaration, as to what size openings would be small enough allow something to qualify as a compartment, however did not point to any specific portions of the record. *See* Tr. 14:5–20. Upon review of the ’093 patent Specification, the Patent Owner Response, and the evidence cited therein, we do not discern any such specific guidance delineating at what point an opening between two compartments would become too large to remain within the scope of the claims. We, thus, are not persuaded that “compartments” is limited to completely separate chambers, or that the ’093 patent Specification supports limiting the size of any opening between compartments to any specific size.

Figure 11 of Leising shows restraining webs 53 dividing side curtain 41 into several sections, or compartments. During the oral hearing, Patent Owner argued that Leising does not disclose compartments because “the opening — well what is alleged to be the opening is just too large.” Tr. 13:13–16. As noted above, however, Patent Owner’s assertion that the claims include any specific requirement regarding the relative size of the opening between compartments is not supported by record evidence. Further, regardless of the stated function of restraining webs 53, as can be seen in Figures 8–10 of Leising, restraining webs 53 include an “elongated notch or recess 55 at the upper and lower ends thereof,” through which air will flow upon filling of side curtain 41, thus allowing flow communication between the compartments.¹⁴ Ex. 1005, 3:50–53.

¹⁴ We note, also, that the ’093 patent itself describes that the compartments thereof allow the airbag to be formed of the desired shape, which is similar to the stated function of restraining webs 53 of Leising. *See, e.g.*, Ex. 1001, 81:14–19, Fig. 84.

Patent Owner also presents arguments directed to the airbags of Lau (*see* PO Resp. 63); however, Petitioner does not rely on Lau for teaching this disputed limitation. *See* Reply 23.

Based on the evidence presented, we find that Leising teaches or suggests a “plurality of compartments [with] flow communication with each other,” as claimed.

Reasons to Combine and Reasonable Expectation of Success

Patent Owner argues that Petitioner “fail[s] to provide any evidence whatsoever that combining the various portions of the references would achieve the particular structure of a single airbag extending laterally across two passenger rows including the area between the two rows (e.g., B-pillar) . . . with a reasonable expectation of success.” PO Resp. 29. Further, according to Patent Owner, a person of ordinary skill in the art would not have combined the teachings of Leising and Lau because such a person “would have understood that such a combination would not have protected the passengers of a vehicle and rather, would have caused serious injury and death.” *Id.* (quoting Ex. 2005 ¶ 200). Patent Owner presents several specific arguments in this regard (*see id.* at 29–61), and we address each of these in turn.

Patent Owner argues that a person of ordinary skill “would have understood that the airbag system resulting from the combination of Lau and Leising cannot provide airbag protection for occupant contact with the B-pillar.” *Id.* at 29. Patent Owner’s arguments in this regard are premised on the fact that in Lau “there is an open space between the two air bags,” and thus the B-pillar is uncovered. *See id.* at 30 (citing Ex. 2005 ¶ 306). Patent Owner also asserts that a person of ordinary skill “would not have had a

reasonable expectation of success of combining Lau’s two air bags into one bag as claimed.” *Id.* at 49. According to Patent Owner, the inflator and other components between Lau’s airbags means “the existence of a single airbag is an impossibility.” *Id.*

Patent Owner’s arguments, however, ignore the proposed combination actually presented by Petitioner, and supported by testimony from Dr. Rouhana—namely, that one of skill in the art would have found it obvious to extend the side airbag of Leising in order also to protect passengers in the back seat, based on Lau’s teaching of airbag protection of both front and back seat passengers (*see, e.g.*, Pet. 26–27 (citing Ex. 1003 ¶¶ 100–103, 107)). Petitioner does not rely on a bodily incorporation into Leising of the two-airbag disclosure of Lau that Patent Owner asserts is deficient. As discussed above, we are persuaded that the combination of Leising and Lau teaches or suggests this claim feature.

Patent Owner further argues that “modifying Leising’s air bag with Lau would have rendered the air bag inoperable because Lau’s B-pillar mounted air bag would have been blocked from deploying.” PO Resp. 34. Patent Owner also asserts that a person of ordinary skill in the art “would have been dissuaded from modifying Leising’s air bag with Lau” for several reasons: (1) “because Lau’s B-pillar mounted air bag deployment doors would not have worked properly” (*id.* at 38); (2) “because Lau’s B-pillar mounted air bag would not have protected OOP [(out of position)] occupants” (*id.* at 39); and (3) “because Lau’s B-pillar mounted air bag would have interfered with the seat belt system” (*id.* at 45). Again, Patent Owner’s arguments are each premised on a combination in which the airbag of Lau is bodily incorporated into Leising. *See id.* at 34–49. In Petitioner’s

proposed combination, the airbag is not mounted as shown in Figure 1 of Lau, but is instead “roof-mounted and [would] deploy downward into the passenger compartment as taught by Leising.” Pet. 26 (citing Ex. 1003 ¶ 100). Although Patent Owner cites to testimony from Mr. Nranian in support of these arguments (*see, e.g.*, Ex. 2005 ¶¶ 96, 203, 207–209, 220), the cited testimony is not persuasive because the testimony and Patent Owner’s arguments are directed to deficiencies or possible injuries caused by an air bag mounted as in Lau, and are not directed to Petitioner’s proposed combination.

Mr. Nranian also testifies that a person of ordinary skill in the art “would have readily understood that implementing the embodiments as described in [Leising] will cause severe OOP issues.” Ex. 2013 ¶ 518.¹⁵ Mr. Nranian points, for example, to Figure 5 of Leising, asserting this figure “shows a deployment of the restraint apparatus for an out-of-position occupant, which to a POSA is readily recognized as dangerous and utterly ridiculous.” *Id.* Figure 5 of Leising, however, is related to how torso bag 43 operates with respect to out-of-position occupants. *See* Ex. 1005, 2:54–56, 5:13–27. It does not depict Leising’s side curtain 41, upon which Petitioner relies. Thus, Patent Owner’s arguments regarding Figure 5 have minimal, if any, relevancy to the issues in this proceeding. Mr. Nranian further testifies that:

The ‘093 [patent’s] inflatable curtain airbag . . . has novel and non-obvious design, with compartments for added rigidity, special fabric, manufacturing and sewing/stitching for lightweight, increased strength and durability which was not

¹⁵ Patent Owner cites to Ex. 2013 ¶ 517 (PO Resp. 40). We understand this to be a typographical error.

known in the prior art (and absolutely not disclosed or even mentioned in Lau or Leising) so that the '093 inflatable curtain can be implemented with one inflator, and extend and deploy across at least two rows of seats (including the B-Pillar as shown in '093 Figure 86) to protect occupants from contact with the A-Pillar, B-Pillar, and even the C-Pillar, from impacts at all angles that can throw the occupants in different directions.

Ex. 2013 ¶ 525; PO Resp. 41. None of these features discussed by Mr. Nranian, however, is recited in the claims. According, this testimony also is not relevant to the obviousness of the challenged claims.

Further, Petitioner provides testimonial evidence that the modified airbag could be designed by one of ordinary skill in the art to avoid interference with the seat belt system. *See* Pet. 26, 28 (citing Ex. 1003 ¶¶ 100–101, 108); *see also* Reply 16–17. The lack of any discussion regarding how to handle potential seat belt interference in the '093 patent itself also supports Petitioner's assertion that it is within the level of ordinary skill in the art. *See* Reply 18. Regarding Patent Owner's out of position occupant arguments, we note that both experts agree that "airbag design is about minimizing risk, not eliminating risk." *Id.* at 21 (citing Ex. 2026, 16:22–17:8; Ex. 1020, 41:25–42:6). Further, as noted by Petitioner (*Id.* at 19), the '093 patent teaches protecting out of position occupants by suppressing airbag deployment (using out of position sensors) (*see* Ex. 1001, 14:56–64), rather than by any particular design features of the airbag itself.

Patent Owner also asserts that "Leising's air bag system would have been rendered unsuitable for its intended purpose and inoperative if it were modified to extend across two rows and the B-pillar." PO Resp. 51. According to Patent Owner, a person of ordinary skill in the art would not have made the proposed combination because the resulting airbag would be

dangerous. *See id.* at 51–58 (citing Ex. 2005 ¶¶ 225, 228–231; Ex. 2026, 52:13–53:17, 54:18–55:1). We do not find this argument persuasive, because, as discussed above, “airbag design is about minimizing risk, not eliminating risk.” Reply 21 (citing Ex. 2026, 16:22–17:8; Ex. 1020, 41:25–42:6). Patent Owner’s additional arguments regarding the inoperability of the combination address various deficiencies of the references individually, and do not address Petitioner’s proposed combination. For example, Patent Owner argues that, because Leising only describes protection from the A-pillar and side roof rails, the proposed modification would not provide B-pillar protection for front row occupants, or any protection for second row occupants. PO Resp. 55–56 (citing Ex. 1005, 5:57–61; Ex. 2005 ¶ 229). However, as discussed above, we are persuaded that once the airbag of Leising is extended to the rear seat (as suggested by the teachings of Lau) in accordance with Petitioner’s proposed combination, it will provide protection from the B-pillar as well as for a rear seat passenger. *See* Pet. 26–27; Ex. 1003 ¶¶ 100–103, 106, 107.

Finally, Patent Owner asserts that Petitioner did not present “evidence as to why [a person of ordinary skill in the art] would have been able to achieve the structure of the ‘093 patent from the very different structure taught by Leising by modifying it with Lau.” PO Resp. 58. As discussed above, however, Petitioner provides explanation supported by Dr. Rouhana’s testimony in support of its assertions that one of ordinary skill in the art would have been motivated to modify Leising based on the teachings of Lau, to arrive at the claimed invention. We find Petitioner’s explanation and supporting testimony persuasive.

Based on the complete record now before us, we are persuaded that Petitioner has articulated reasoning with rational underpinning why a person of ordinary skill in the art would have combined Leising and Lau in the proposed manner.

Objective Indicia of Nonobviousness

We turn next to Patent Owner's evidence and arguments relating to objective considerations of non-obviousness. Factual inquiries for an obviousness determination include secondary considerations based on objective evidence of non-obviousness. *Graham*, 383 U.S. at 17–18. Notwithstanding what the teachings of the prior art would have suggested to one with ordinary skill in the art at the time of the invention, the totality of the evidence submitted, including objective evidence of nonobviousness, may lead to a conclusion that the claimed invention would not have been obvious to one with ordinary skill in the art. *In re Piasecki*, 745 F.2d 1468, 1471–1472 (Fed. Cir. 1984).

We note that it is not sufficient that a product or its use merely be within the scope of a claim in order for objective evidence of nonobviousness tied to that product to be given substantial weight. There must also be a causal relationship, termed a “nexus,” between the evidence and the claimed invention. *Merck & Co. v. Teva Pharm. USA, Inc.*, 395 F.3d 1364, 1376 (Fed. Cir. 2005). A nexus to establish that the evidence relied upon traces its basis to a novel element in the claim and not to something in the prior art. *Institut Pasteur & Universite Pierre Et Marie Curie v. Focarino*, 738 F.3d 1337, 1347 (Fed. Cir. 2013). Objective evidence of nonobviousness must also be reasonably commensurate in scope with the claim. *In re Kao*, 639 F.3d 1057, 1068 (Fed. Cir. 2011). Objective

evidence that results from something that is not “both *claimed* and *novel* in the claim” lacks a nexus to the merits of the invention. *Id.* (emphases added). This does not mean that the offered evidence must reach every embodiment within the scope of the claim, so long as an “adequate basis to support the conclusion that other embodiments falling within the claim will behave in the same manner.” *Id.*

All types of objective evidence of nonobviousness must be shown to have nexus. *GPAC Inc.*, 57 F.3d at 1580 (nexus generally); *Rambus Inc. v. Rea*, 731 F.3d 1248, 1256 (Fed. Cir. 2013) (long-felt need); *Wm. Wrigley Jr. Co. v. Cadbury Adams USA LLC*, 683 F.3d 1356, 1364 (Fed. Cir. 2012) (copying); *Kao*, 639 F.3d at 1069 (unexpected results); *Muniauction, Inc. v. Thomson Corp.*, 532 F.3d 1318, 1328 (Fed. Cir. 2008) (praise); *In re Huang*, 100 F.3d 135, 140 (Fed. Cir. 1996) (commercial success). The stronger the showing of nexus, the greater the weight accorded the objective evidence of nonobviousness. *See Ashland Oil, Inc. v. Delta Resins & Refractories, Inc.*, 776 F.2d 281, 306 (Fed. Cir. 1985). “Where the allegedly obvious patent claim is a combination of prior art elements, . . . the patent owner can show that it is the claimed combination as a whole that serves as a nexus for the objective evidence” *WBIP, LLC v. Kohler Co.*, 829 F.3d 1317, 1330 (Fed. Cir. 2016) (citing *Rambus Inc. v. Rea*, 731 F.3d at 1258). “[T]here is a presumption of nexus for objective considerations when the patentee shows that the asserted objective evidence is tied to a specific product and that product “is the invention disclosed and claimed in the patent.” *WBIP*, 829 F.3d at 1329.

Patent Owner’s Arguments and Evidence

Patent Owner offers evidence of long-felt need, commercial success, and unexpected results.¹⁶ PO Resp. 63–81. We first address nexus of the objective evidence to the challenged claims. We then address the particular evidence presented by Patent Owner.

Nexus

Patent Owner does not address nexus directly. *See generally* PO Resp. Patent Owner’s evidence of objective considerations generally refers “curtain airbags” and “rollover curtains.” *See id.* at 63–81. In discussing the objective evidence, Patent Owner characterizes the invention of the ’093 patent as a “curtain airbag,” or in other words “a side air bag extending across two rows of a vehicle and [deploying] downward.”¹⁷ *See, e.g., id.* at 64, 69, 74, 78, 79, 80.

Petitioner argues that “each of the claims of the ’093 patent includes *several other limitations*, including a ‘single-gas providing system’ that is arranged/located ‘apart from the single airbag’ and a plurality of compartments ‘in flow communication.’” Reply 23; *see also* Tr. 25:24–26 (Petitioner’s counsel arguing: “The claim is more than just a cite for an air bag that has an inflator, it’s got a conduit, it’s got chambers and flow communication.”). According to Petitioner, “Patent Owner has not provided

¹⁶ Patent Owner also mentions other secondary considerations—professional approval by those of skill in the art, utility produced by the invention, and purported copying—but does not present any evidence directed to these considerations. *See* PO Resp. 63–81.

¹⁷ Patent Owner also discusses lack of seat belt interference. The claims, however, do not include this features, thus, it is not relevant to the discussion of nexus.

any objective evidence of nonobviousness that is *coextensive with the claimed invention*, including” these limitations of the claims. Reply 24; *see also* Tr. 8:3–10 (Petitioner’s counsel arguing: “It is our position that there’s been no evidence that those commercial embodiments would include these features, for example, a gas providing system that has one inflator and the inflator being arranged apart from the air bag. There’s no discussion of that whatsoever in the briefing in the evidence.”).

At oral hearing, Patent Owner argued that “the collection of [] limitations that are recited in the claim is a curtain air bag.” *See* Tr. 24:7–13 (“JUDGE CHAGNON: So it’s, just to clarify, it’s your position, and correct me if I’m wrong, but is it your position that what is claimed -- the terminology ‘curtain air bag’ is shorthand for the entire claim?

DR. GONSALVES: Correct. It’s clear from looking at the limitations deploying downward and the air bag extending along the entire side of the vehicle, both the front and the rear seat, the collection of those limitations that are recited in the claim is a curtain air bag.”). Petitioner disagreed. *See id.* at 26:1–9 (“JUDGE CHAGNON: . . . do you disagree with Patent Owner’s contention that the terminology ‘side curtain air bag’ can be used as shorthand to mean everything in claim 1, for example? MR. BIRD: Yes, I disagree. I think that side curtain air bag could be just the air bag itself. It’s not the inflator, it’s not the conduit, it’s not the other features of the claims and there’s just no evidence of that and that’s because the full claim, the evidence he’s provided is not commensurate with the claim that Patent Owner has received from the Patent Office.”). Patent Owner was given the opportunity to point to evidence that the airbags discussed in the objective evidence include these other features, but provided only a general answer,

and did not provide any specific citations to the record. *See id.* at 24:24–25:8 (“JUDGE MOORE: Just referring to claim 1. Is there any evidence in the record that these allegedly commercially successful air bags you were just discussing included a single gas providing system with only one inflator that’s arranged apart from the side air bag and a conduit leading from the gas providing system to the single air bag, as recited in claim 1. Is there any evidence in the record showing that these successful air bags met those limitations in claim 1? DR. GONSALVES: I would have to look through the documents that Mr. Nranian identified in his declaration to tell you that for sure, but I believe the description of those air bags that were later found to be an improvement over the pre-existing air bags did have that feature.”). Further, we do not discern any of Patent Owner’s arguments or cited evidence regarding the objective evidence that includes any discussion, for example, of the claimed single inflator or conduit.

Based on the evidence before us, we are not persuaded that Patent Owner has shown a nexus between the objective evidence of non-obviousness and the challenged claims. For completeness, however, we address substantively Patent Owner’s objective evidence of non-obviousness.

Long-Felt Need

Patent Owner asserts that “[p]rior to the invention of the ‘093 patent, there was a long-felt, but unmet need for a side air bag extending across two rows of a vehicle and downward so as to offer better protection to [out of position] occupants without interfering with seatbelts.” PO Resp. 64. Patent Owner points to a report of the U.S. Department of Transportation National

Highway Traffic and Safety Administration (“NHTSA report”)¹⁸, which, according to Mr. Nranian, show “that rollover curtains (such as those described and claimed in the ‘093 Patent) have superior advantages over head/thorax airbags that deploy from the seat (combination airbags), and thorax bags that deploy either from the seat or door.” *Id.* at 64–65 (quoting Ex. 2013 ¶ 373). We note that although the NHTSA report describes “curtain air bags” as being “built into the roof-rail area above the side window and deploy downward to cover the window area,” the NHTSA report also explicitly states that “[t]he analyses of this report are *limited to air bags for front-seat occupants.*” Ex. 2018, 1 (emphasis added). Thus, contrary to Patent Owner’s assertions, this evidence does not support a long-felt need for a side air bag extending across two rows of a vehicle, as required by the claims. Thus, we are not persuaded this evidence is commensurate with the scope of the claims.

Patent Owner also points to a Department of Transportation article¹⁹ as evidence that “airbags . . . like the claimed invention of the ‘093 patent . . . prevent occupant ejection.” PO Resp. 71 (citing Ex. 2021, 3). We note, however, that this article identifies specifically “rollover air bags” rather than “curtain airbags” more generally as providing this benefit (i.e., reducing the risk of ejection), and expressly cautions, “[y]ou will need

¹⁸ NHTSA DOT HS 811 882, *Updated Estimates of Fatality Reduction by Curtain and Side Air Bags in Side Impacts and Preliminary Analyses of Rollover Curtains* (Jan. 2014). Ex. 2018. Citations to Ex. 2018 are to the original pagination of the report. We note that Patent Owner also cites generally to Exhibits 2014–2017, but does not point to any particular portions of these exhibits, or discuss the relevance thereof.

¹⁹ DOT HS 809 546, *Buying a Safer Car in 2004 – Valuable Information on: Crash Test, Rollover Ratings and Safety Features* (2004). Ex. 2021.

to talk with your dealer to see if your vehicle’s side-impact head curtain air bags can also function as rollover air bags.” Ex. 2021, 3. Thus, we also are not persuaded this evidence is commensurate with the scope of the claims.

Patent Owner offers additional evidence that curtain airbags can prevent injury in rollover situations, particularly as compared to other types of side airbags (e.g., combination head and torso bags). *See* PO Resp. 71–75 (citing Ex. 2018, 2, 5; Ex. 2022, 2; Ex. 2024, Abstract; Ex. 2025). None of the evidence, however, supports an assertion of long-felt need at the time of the invention of the ’093 patent claims, but merely discusses the benefits of curtain airbags generally. Further, this evidence is from a time-period much later than the claimed 1995 priority date of the ’093 patent. *See, e.g.*, Ex. 2018 (NHTSA report dated Jan. 2014); Ex. 2022 (article dated Feb. 24, 2012); Ex. 2024 (article presented at conference in 2012, relating to technology introduced in 2002); Ex. 2025 (web article accessed May 6, 2017). We are not persuaded this evidence supports a finding of long-felt need.

For the reasons discussed, we determine that Patent Owner’s evidence of long-felt need is entitled to little or no weight.

Commercial Success

Patent Owner points to data provided in the NHTSA report as evidence that the “type of air bag claimed by the ’093 patent has enjoyed considerable commercial success as indicated by the substantial increase in the market share of that type of air bag.” PO Resp. 75 (citing Ex. 2018, 5–

8²⁰ (particularly Table 1 and Fig. 10)). We note, as indicated in the NHTSA report, that “the statistics are for vehicles involved in fatal crashes and *do not necessarily correspond to market shares.*” Ex. 2018, 5 (emphasis added). In any event, we find the relative growth to be somewhat relevant. However, Patent Owner does not present evidence that the increase in use of curtain airbags is due to the invention of the ’093 patent, rather than, for example, a general interest in increasing the safety of vehicles by adding airbags generally. Further, the major growth in the use of curtain and curtain+torso bags was after about 2005, ten years after the claimed 1995 priority date of the ’093 patent. *See* Ex. 2018, 8, Table 1.

For the reasons discussed, we determine that Patent Owner’s evidence of long-felt need is entitled to some, but little weight.

Unexpected Results

Patent Owner asserts that “the type of airbag claimed in the ’093 patent has achieved the unexpected result of limiting severe injury and death from occupant ejection because of the claimed features (e.g., deploying downward (curtain), covering two rows, stiffness from multiple compartments).” PO Resp. 78–79 (citing Ex. 2034²¹, 1). Nothing in this article supports an argument that the reduction in injury or death due to use of side curtain airbags was unexpected in any way. Instead, the article

²⁰ Patent Owner cites to pages 5–15 of Exhibit 2018, however, the discussion is limited to that at pages 5–8 of the exhibit. Again, Patent Owner also cites generally to Exhibits 2014–2017, but does not point to any particular portions of these exhibits, or discuss the relevance thereof.

²¹ Insurance Institute for Highway Safety Status Report, *New Ejection Rule May Spur Changes in Side Airbags* (Apr. 26, 2011). Patent Owner cites to Ex. 2028, but the corresponding quotation is from Ex. 2034. We understand this to be a typographical error.

merely indicates that side curtain airbags are effective in reducing such injuries and death. *See* Ex. 2034.

Patent Owner also discusses, as an example, an article about side impact tests for small pickups, in which the only small truck tested in 2008 in side impacts with “good results” was the one with a “curtain airbag deploying downward and extending across two rows, like the claimed airbag of the 093 patent.” PO Resp. 80–81 (citing Ex. 2036²², 1). The article indicates, however, that the other trucks tested *did not have side airbags at all* because, in 2008 at the time of the testing, side airbags were considered an optional feature in the other models. *See* Ex. 2036, 1–2. Thus, we are not persuaded that the superior results of the vehicle including side airbags necessarily are attributed to the claimed invention, but may instead be attributed to the fact that there were side airbags at all.

We are not persuaded that Patent Owner’s evidence supports a finding of unexpected results. For the reasons discussed, we determine that Patent Owner’s evidence of long-felt need is entitled to little or no weight.

Conclusion as to Obviousness of Claim 1

As discussed, we determine that Patent Owner has not established a nexus between the objective evidence and the claimed invention. However, even were we to consider Patent Owner’s objective evidence, weighing it alongside the strength of the other *Graham* factors in the present record, we still would conclude that, on balance, the evidence of obviousness outweighs the relatively weak evidence of nonobviousness.

²² Insurance Institute for Highway Safety News, *First Institute Side Tests of Small Pickups* (July 24, 2008) (Ex. 2036).

Based on the evidence of record, we are persuaded that Petitioner has shown that the combination of Leising and Lau teaches or suggests all of the limitations of claim 1, and has articulated reasoning with rational underpinning why a person of ordinary skill in the art would have combined these references in the proposed manner. Having considered all the evidence of record, including Patent Owner's secondary considerations arguments, we determine that Petitioner has shown, by a preponderance of the evidence, that the combination of Leising and Lau renders claim 1 obvious.

4. Claims 6, 8, 10, 12, 17–21, 26, 27, 33, 39, 43, and 44:
Obviousness in view of Leising and Lau

Regarding independent claims 26, 39, and 43, Petitioner relies on similar arguments and evidence as presented with respect to claim 1. *See* Pet. 38–39, 41–43; Ex. 1003 ¶¶ 130–131, 136–139. Regarding dependent claims 6, 8, 10, 12, 17–21, 27, 33, and 44, Petitioner provides arguments and evidence as to how each claim limitation is taught or suggested by the cited combination of Leising and Lau, and relies upon Dr. Rouhana's testimony. *See* Pet. 33–49, 39–40, 44 (citing Ex. 1005, 3:23–33, 3:37–42, 3:62–64, 5:36–41, Figs. 2, 3; Ex. 1006, 1:58–2:12; Ex. 1003 ¶¶ 100–102, 107, 126, 128, 129, 138); Ex. 1003 ¶¶ 121–129, 132–135.

Apart from Patent Owner's arguments, discussed above with respect to claim 1, Patent Owner does not present separate arguments directed to any

of claims 6, 8, 10, 12, 17–21, 26, 27, 33, 39, 43, and 44.²³ We agree with Petitioner and find that the combination of Leising and Lau teaches or suggests all the limitations of claims 6, 8, 10, 12, 17–21, 26, 27, 33, 39, 43, and 44, and has articulated sufficient reasoning why it would have been obvious to combine these references in the proposed manner. Having considered all the evidence of record, including Patent Owner’s secondary considerations arguments, we determine that Petitioner has demonstrated, by a preponderance of the evidence, that the combination of Leising and Lau renders obvious claims 6, 8, 10, 12, 17–21, 26, 27, 33, 39, 43, and 44.

5. Claims 2, 3, 11, 28–32, and 41: Obviousness in view of Leising, Lau, and Davis

Claim 2 depends from claim 1, and further recites a “nozzle or flow restrictor” that “affect[s] the flow rate of the gas into the single airbag as a function of temperature.” Claim 3 depends from claim 2, and further recites that “nozzle or the flow restrictor has an opening that changes in size as a function of temperature.”

Claim 11 depends from claim 1, and further recites that “the conduit is configured to vary as a function of pressure for providing variable amounts of gas to the single airbag as a function of pressure, wherein a first amount of gas is provided to the single airbag at a first pressure and a second amount of gas is provided to the single airbag at a second pressure different than the

²³ Our Scheduling Order cautioned Patent Owner “that any arguments for patentability not raised in the [Patent Owner’s Response] will be deemed waived.” See Paper 17, 5–6; see also *NuVasive, Inc.*, 842 at 1380–81 (determining Patent Owner waived arguments made only in its Preliminary Response but not raised in the Patent Owner Response after institution).

first pressure.” Claim 28 depends from claim 26 and recites a similar feature.

Independent claim 41 recites features similar to claim 1, and further recites that “the conduit is configured to vary as a function of temperature for providing variable amounts of gas to the single airbag as a function of temperature, wherein a first amount of gas is provided to the single airbag at a first temperature and a second amount of gas is provided to the single airbag at a second temperature different than the first temperature.”

Independent claim 29 is a method claim, similar to claim 26, and recites a similar additional limitation as claim 41.

Petitioner refers back to its discussion regarding claim 1 for the corresponding limitations of independent claims 29 and 41, and further relies on Davis as teaching the additional claim limitations of these claims and of claims 2, 3, 11, and 28, as noted above. Pet. 44–51. Davis teaches, in relevant part, an airbag inflator including several sets of orifices, of varying sizes, through which an airbag inflating gas is directed to an airbag.

Ex. 1007, 6:20–48. Prior to activation of the inflator, all of the orifices are blocked by a layer of rupturable foil. *Id.* at 6:48–53. Once the inflator is activated, a first set of orifices is unblocked/opened. *Id.* at 6:53–60. When the temperature and pressure increase to certain levels, a second set of orifices is opened, and when the temperature and pressure increase further, a third set of orifices is opened. *Id.* at 6:60–7:1.

According to Petitioner, “[b]y varying the flow rate out of the inflator as a function of temperature and pressure, Davis solves the problem of an undesirably high inflation rate and bag pressure.” Pet. 45; Ex. 1003 ¶ 140. Petitioner notes that the ’093 patent recognizes that “it is a known property

or characteristic of propellants . . . that their burn rate is dependent on the surrounding pressure.” Pet. 51 (quoting Ex. 1001, 59:36–39). Dr. Rouhana testifies that burn rate affects inflation rate. Ex. 1003 ¶ 148; *see* Pet. 51. According to Petitioner, one of ordinary skill in the art would have been motivated to use the teachings of Davis (i.e., varying the conduit of an airbag inflator to provide variable amounts of gas as a function of pressure and temperature) in the airbag system of Leising and Lau to control the inflation rate thereof to “solve[] the problem of an undesirably high inflation rate and inflation pressure,” which can lead to inflation-induced injuries. Pet. 51 (citing Ex. 1003 ¶ 148).

Further, regarding claims 30–32, which depend from claim 29, Petitioner provides arguments and evidence as to how each claim limitation is taught or suggested by the cited combination of Leising, Lau, and Davis, and relies upon Dr. Rouhana’s testimony. *See id.* at 48–49 (citing Ex. 1007, 6:51–7:5; Ex. 1003 ¶¶ 144–145).

Patent Owner does not address this asserted ground substantively, beyond the arguments discussed above with respect to claim 1. We agree with Petitioner, and find that Davis teaches or suggests providing variable amounts of gas as a function of pressure and as a function of temperature, as recited in claims 2, 3, 11, 28, 29, and 41, and that a person of ordinary skill in the art would have used this teaching of Davis in the airbag system of Leising and Lau, in order to control inflation rate and reduce injury. As discussed in detail with respect to claim 1, we find that the combination of Leising and Lau teaches or suggests all the remaining limitations of claims 29 and 41. We also agree with Petitioner and find that the combination of Leising, Lau, and Davis teaches or suggests all the

limitations of dependent claims 30–32. Having considered all the evidence of record, including Patent Owner’s secondary considerations arguments, we determine that Petitioner has demonstrated, by a preponderance of the evidence, that the combination of Leising, Lau, and Davis renders obvious claims 2, 3, 11, 28–32, and 41.

6. Claims 4 and 13–15: Obviousness in view of Leising, Lau, and Daniel

Claim 4 depends from claim 1, and further recites that “said cover is part of a ceiling of the vehicle that defines the passenger compartment and is flexible to conform to a mounting location at which the single airbag system is mounted.” Petitioner relies on Daniel as disclosing this additional claim limitation. Pet. 51–52. Daniel discloses, in relevant part, a roof rail mounted airbag assembly, including “trim cover 66 . . . formed of a flexible, resilient material.” Ex. 1008, at [54], 2:47–50. According to Petitioner, a person of ordinary skill in the art would have included the flexible cover of Daniel within a ceiling of the vehicle (from which an airbag may be deployed, as disclosed in Leising (*see* Pet. 51)), in the airbag system of Leising and Lau, for the well-known advantages of protecting an airbag using a cover, such as “protecting the airbag during installation and providing a path for airbag deployment.” *Id.* at 53–54 (citing Ex. 1003 ¶ 154).

Claims 13–15 depend from claim 1 and further recite, respectively, that “the one inflator is within a headliner of the vehicle,” that “the one inflator and the single airbag are connected to each other and are within a ceiling of the vehicle,” and that “the one inflator and the single airbag are in an airbag module, and wherein the airbag module is within a ceiling of the

vehicle.” Petitioner relies on Leising and Daniel as disclosing these additional claim limitations. *Id.* at 52–53. In this regard, Leising discloses that gas reservoir 35 is connected by tube 37 extending along the roof to housing area 39 located in the roof. Ex. 1005, 3:28–32, Fig. 2. Daniel discloses an airbag assembly in the roof rail which includes an inflator housing 46, which includes a propellant boss 54 housing stored gas or a gas generant. Ex. 1008, 2:37–39; *see* Pet. 53. Thus, according to Petitioner, the combination of Leising, Lau, and Daniel discloses the features of claims 13–15. *See* Pet. 52–54; Ex. 1003 ¶¶ 150–154.

Patent Owner does not address this asserted ground substantively, beyond the arguments discussed above with respect to claim 1. We agree with Petitioner, and find that Daniel teaches or suggests a cover, as recited in claim 4, and that a person of ordinary skill in the art would have included the flexible cover of Daniel in the airbag system of Leising and Lau, in view of the well-known advantages of a cover, including protecting the airbag and providing a deployment path. We also find that both Leising and Daniel teaches or suggests housing the inflator of an airbag system in the ceiling of a vehicle, as recited in claims 13–15. Having considered all the evidence of record, including Patent Owner’s secondary considerations arguments, we determine that Petitioner has demonstrated, by a preponderance of the evidence, that the combination of Leising, Lau, and Daniel renders obvious claims 4 and 13–15.

7. Claims 5, 7, 34, and 35: Obviousness in view of Leising, Lau, and Kaji

Claims 5 and 7 depend from claim 1, and further recite “wherein the single airbag comprises at least two material layers with an outermost one of

said at least two layers being made from film” and “wherein the single airbag comprises at least one layer of film,” respectively. Claim 34 depends from claim 33, and further recites that “the single airbag comprises at least one layer of film.” Claim 35 depends from claim 34, and further recites that “said at least one layer of film comprises an outermost layer of the single airbag.” Petitioner relies on Kaji as disclosing these additional claim limitations. Pet. 54–55.

Kaji discloses, in relevant part, forming an airbag of a “cloth laminated by a plastic film.” Ex. 1009, 2:47–53. Petitioner, relying on testimony from Dr. Rouhana, asserts that a person of ordinary skill in the art “would have understood that a thin cloth laminated by a plastic film [as in Kaji] would achieve a lightweight airbag.” Pet. 55 (citing Ex. 1003 ¶ 159). Thus, according to Petitioner, using a cloth laminated by a plastic film, as disclosed in Kaji, in the airbag system of Leising and Lau is merely a “combination . . . of familiar elements according to known methods to yield predictable results.” *Id.* (citing Ex. 1003 ¶ 159).

Patent Owner does not address this asserted ground substantively, beyond the arguments discussed above with respect to claim 1. We agree with Petitioner, and find that Kaji teaches or suggests an airbag with a film layer, as recited in claims 5, 7, 34, and 35, and that a person of ordinary skill in the art would have used the airbag material of Kaji in the airbag system of Leising and Lau, in order to achieve a lightweight airbag, which also would have been a combination of a known elements (i.e., cloth laminated by a plastic film) to yield predictable results (i.e., a lightweight airbag). *See KSR*, 550 U.S. at 416 (“The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable

results.”). Having considered all the evidence of record, including Patent Owner’s secondary considerations arguments, we determine that Petitioner has demonstrated, by a preponderance of the evidence, that the combination of Leising, Lau, and Kaji renders obvious claims 5, 7, 34, and 35.

8. Claims 9, 38, 40, 42, and 44: Obviousness in view of Leising, Lau, and Steffens

Claim 9 depends from claim 1, and further recites that “the single gas-providing system is a hybrid gas inflation system.” Petitioner relies on Steffens as disclosing this additional claim limitation. Pet. 55. Steffens discloses, in relevant part, a side airbag with an inflator, and teaches that hybrid inflators may contain a combination of stored gas and a gas generating material. Ex. 1010, 4:15–27, Figs. 6, 7. According to Petitioner, a hybrid gas inflator, as described in Steffens, “is one of the three most common types of inflators used with airbags,” and it, thus, “would have been obvious to use a hybrid inflator as in Steffens with [the airbag system of] Leising and Lau.” Pet. 59–60 (citing Ex. 1003 ¶ 164).

Independent claims 38 and 42 recite limitations similar to claim 1, and each further recites that “the gas from the single gas-providing system passes through one of the plurality of compartments to another one of the plurality of compartments for inflating the single airbag.” Claims 40 and 44 depend from claims 39 and 43, respectively, and recite the same additional limitation. Petitioner refers back to its discussion regarding claim 1 for the corresponding limitations of independent claims 38 and 42, and further relies on Steffens as disclosing the additional claim limitation. *Id.* at 56–59.

Steffens discloses, in relevant part, that “air bag portion 210 defines a chamber 212 which communicates through a plurality of passages 220 with

the chamber 61b of the air bag portion 51b. Inflation fluid flows from the chamber 61b through the passages 220 into the chamber 212 when the air bag portion 51b is inflated.” Ex. 1010, 7:4–10. According to Petitioner, “[p]assing air through one chamber into another was a known way to fill airbag chambers.” Pet. 60 (citing Ex. 1003 ¶ 165). Thus, Petitioner asserts that “[a]s Leising and Steffens both disclose airbags with gas passing through one chamber into another, there would be no reason to delete that aspect of the airbag when extending it to the rear seat as taught by Lau.” *Id.* (citing Ex. 1003 ¶ 165).

Patent Owner does not address this asserted ground substantively, beyond the arguments discussed above with respect to claim 1. We agree with Petitioner, and find that Steffens teaches a hybrid gas inflation system, as recited in claim 9, and that a person of ordinary skill in the art would have used the hybrid gas inflator of Steffens in the airbag system of Leising and Lau, because it would have been a simple substitution of one known element for another (e.g., to use one of the three common types of inflators). We also agree with Petitioner and find that Steffens teaches or suggests gas passing through one chamber to another, as recited in claims 38, 40, 42, and 44, and that a person of ordinary skill in the art would have retained this “known way to fill airbag chambers” in the airbag system of Leising and Lau. As discussed in detail with respect to claim 1, we find that the combination of Leising and Lau teaches or suggests all the remaining limitations of claims 38 and 42. Having considered all the evidence of record, including Patent Owner’s secondary considerations arguments, we determine that Petitioner has demonstrated, by a preponderance of the

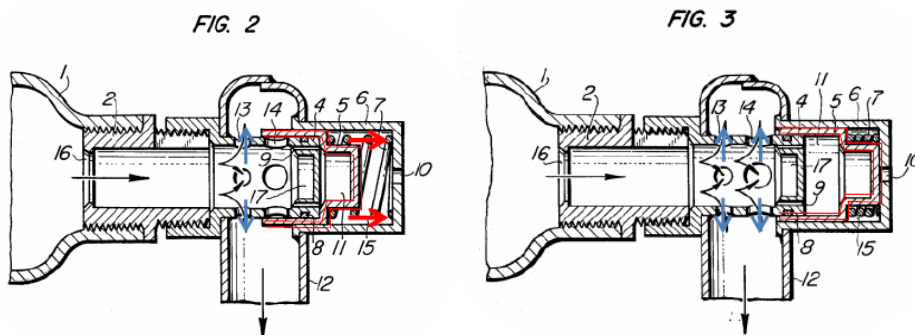
evidence, that the combination of Leising, Lau, and Steffens renders obvious claims 9, 38, 40, 42, and 44.

9. Claims 22, 24, and 25: Obviousness in view of Leising, Lau, and Suzuki

Independent claim 22 recites features similar to claim 1, and further recites “a nozzle or flow restrictor between the single gas-providing system and an interior of the single airbag, said nozzle or flow restrictor affecting the flow rate of the gas into the single airbag as a function of pressure.”

Petitioner refers back to its discussion regarding claim 1 for the corresponding limitations of independent claim 22, and further relies on Suzuki as teaching the additional claim limitation noted above. Pet. 60–63.

Suzuki teaches, in relevant part, a nozzle for use in an airbag system. Ex. 1011, at [57]. High pressure gas is discharged from a container into an inflatable safety bag through a nozzle and conduit. *Id.* at 2:41–44. As the gas flows through the nozzle, the pressure of the gas forces the nozzle to open further. *See id.* at 3:34–61. Petitioner’s annotated versions of Figures 2 and 3 of Suzuki (Pet. 62) are reproduced below.



Figures 2 and 3 are partial cross-sectional views of a nozzle portion of the airbag system of Suzuki, as annotated by Petitioner. Ex. 1011, at [57], 2:15–19. As highlighted by Petitioner’s annotations, increased pressure from the

high pressure gas (indicated by a black arrow in the figures) forces spool 5 to retract (shown in red), thereby opening nozzle holes 14 and increasing gas flow through nozzle 4 (shown by blue arrows in the figures). *See id.* at 3:34–61.

Petitioner notes that the '093 patent recognizes that “it is a known property or characteristic of propellants . . . that their burn rate is dependent on the surrounding pressure.” Pet. 64 (quoting Ex. 1001, 59:36–39). Dr. Rouhana testifies that “[w]hen the burn rate increases, the inflation rate and peak pressure flowing into an airbag also increase,” which can be associated with increased risk of injury for occupants. Ex. 1003 ¶ 170; *see* Pet. 64. Thus, according to Petitioner, a person of ordinary skill in the art “would accommodate for this known property of propellants by including a pressure dependent flow rate by introducing a flow restrictor as taught in Suzuki” in the airbag system of Leising and Lau. Pet. 64 (citing Ex. 1003 ¶ 170).

Further, regarding claims 24 and 25, which depend from claim 22, Petitioner provides arguments and evidence as to how each claim limitation is taught or suggested by the cited combination of Leising, Lau, and Suzuki, and relies upon Dr. Rouhana’s testimony. *See id.* at 63–64 (citing Ex. 1011, 3:47–51); Ex. 1003 ¶¶ 168–169.

Patent Owner does not address this asserted ground substantively, beyond the arguments discussed above with respect to claim 1. We agree with Petitioner, and find that Suzuki teaches or suggests a flow restrictor, as recited in claim 22, and that a person of ordinary skill in the art would have used the flow restrictor of Suzuki in the airbag system of Leising and Lau, in order to control the inflation rate to reduce the risk of injuries. As discussed

in detail with respect to claim 1, we find that the combination of Leising and Lau teaches or suggests all the remaining limitations of claim 22. We also agree with Petitioner and find that the combination of Leising, Lau, and Suzuki teaches or suggests all the limitations of dependent claims 24 and 25. Having considered all the evidence of record, including Patent Owner's secondary considerations arguments, we determine that Petitioner has demonstrated, by a preponderance of the evidence, that the combination of Leising, Lau, and Suzuki renders obvious claims 22, 24, and 25.

10. Claim 16: Obviousness in view of Leising, Lau, and Paxton

Claim 16 depends from claim 1, and further recites that “the one inflator is configured to provide a first propellant formulation and a second propellant formulation, wherein the first propellant formulation is a faster burning propellant than the second propellant formulation.” Petitioner relies on Paxton as disclosing this additional claim limitation. Pet. 64–65.

Paxton teaches, in relevant part, a “two-stage automotive gas bag inflator using igniter material to delay a second stage ignition.” Ex. 1012, at [54], [57]. As described in Paxton, a “pressure vs. time curve [of inflator performance] may be controlled using different size gas generant pellets 96 and wafers 120 to control the pressure rise rate,” and this control may be used to “slow or speed the rate of gas generation.” *Id.* at 13:21–25, Fig. 10. Dr. Rouhana testifies that “[d]ual propellant inflators are a way to control the airbag inflation rate, which is desirable to reduce the risk of injuries to vehicle occupants.” Ex. 1003 ¶ 173; *see* Pet. 65. Thus, according to Petitioner, the use of the dual propellant inflator of Paxton in the airbag system of Leising and Lau “would do no more than yield predictable results.” Pet. 65 (citing Ex. 1003 ¶ 173).

Patent Owner does not address this asserted ground substantively, beyond the arguments discussed above with respect to claim 1. We agree with Petitioner, and find that Paxton teaches or suggests the respective propellant formulations, as recited in claim 16, and that a person of ordinary skill in the art would have used this dual propellant inflator of Paxton in the airbag system of Leising and Lau, in order to control inflation rate and reduce risk of injury. Having considered all the evidence of record, including Patent Owner's secondary considerations arguments, we determine that Petitioner has demonstrated, by a preponderance of the evidence, that the combination of Leising, Lau, and Paxton renders obvious claim 16.

11. Claim 23: Obviousness in view of Leising, Lau, Suzuki, and Marlow

Claim 23 depends from claim 22, and further recites that “the single airbag is configured to be inflated by the single gas-providing system and air from a cabin of the vehicle.” Petitioner relies on Marlow as disclosing this additional claim limitation. Pet. 65–66.

Marlow teaches, in relevant, part, that “[t]he hot gas from the propellant charge can be the sole source of inflating the confinement, *can be used with ambient air*, or, in accordance with the preferred embodiment, used to augment a stored fluid.” Ex. 1013, 1:33–37 (emphasis added). Petitioner, relying on testimony from Dr. Rouhana, asserts that using “inflation by the single gas-providing system and air from the vehicle cabin,” as taught by Marlow, in the airbag system of Leising and Lau “would result in a combination of familiar elements according to known methods does no more than yield predictable results.” Pet. 65–66 (citing

Ex. 1003 ¶ 174). Petitioner further asserts that a person of ordinary skill in the art would understand that, because it is self-contained, Marlow's inflator could be housed in the ceiling of the passenger compartment (as is Leising's inflator) rather than in the engine compartment (as taught in Marlow).

Id. at 66 (citing Ex. 1003 ¶ 174).

Patent Owner does not address this asserted ground substantively, beyond the arguments discussed above with respect to claim 1. We agree with Petitioner, and find that Marlow teaches or suggests an inflator that uses ambient air (e.g., air from a cabin of the vehicle), as recited in claim 23, and that a person of ordinary skill in the art would have used the inflator of Marlow with the airbag system of Leising and Lau, because it would have involved merely the use of familiar elements according to known methods. *See KSR*, 550 U.S. at 416 (“The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results.”). Having considered all the evidence of record, including Patent Owner's secondary considerations arguments, we determine that Petitioner has demonstrated, by a preponderance of the evidence, that the combination of Leising, Lau, and Marlow renders obvious claim 23.

E. Obviousness in View of, At Least in Part, Karlow and Lau

Petitioner asserts that claims 1, 10, 17–21, 26, 27, 33, 36, 37, 39, and 43 are unpatentable under 35 U.S.C. § 103(a) as obvious in view of Karlow and Lau. Pet. 66–86. Petitioner further asserts that claims 2, 3, 11, 28–32, and 41 are unpatentable under 35 U.S.C. § 103(a) as obvious in view of Karlow, Lau, and Davis; that claims 4, 6, 8, and 12–15 are unpatentable

under 35 U.S.C. § 103(a) as obvious in view of Karlow, Lau, and Daniel; that claims 5, 7, 34, and 35 are unpatentable under 35 U.S.C. § 103(a) as obvious in view of Karlow, Lau, and Kaji; that claims 9, 38, 40, 42, and 44 are unpatentable under 35 U.S.C. § 103(a) as obvious in view of Karlow, Lau, and Steffens; that claims 22, 24, and 25 are unpatentable under 35 U.S.C. § 103(a) as obvious in view of Karlow, Lau, and Suzuki; that claim 16 is unpatentable under 35 U.S.C. § 103(a) as obvious in view of Karlow, Lau, and Paxton; and that claim 23 is unpatentable under 35 U.S.C. § 103(a) as obvious in view of Karlow, Lau, Suzuki, and Marlow. *Id.* at 86–89.

Patent Owner argues that the cited combination of Karlow and Lau does not disclose all elements of the independent claims. PO Resp. 20–25.

For the reasons explained below, we determine that Petitioner has demonstrated, by a preponderance of the evidence, that claim 1–44 would have been obvious.

1. Summary of Karlow

Karlow relates to a “side impact head restraint with inflatable deployment” for head protection during a side impact collision. Ex. 1014, 2:15–19. Figure 5 of Karlow is reproduced below.

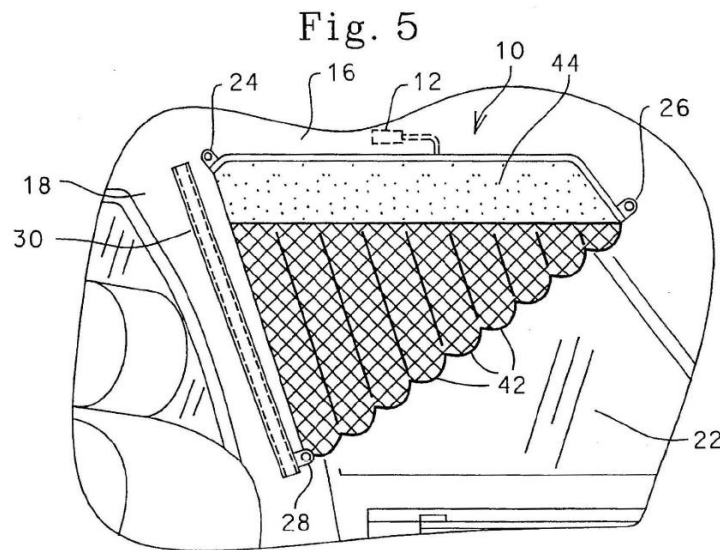


Figure 5, reproduced above, illustrates one embodiment of the deployable restraint system of Karlow. *Id.* at 3:26–29. Upon receipt of a crash signal, gas generator 12 generates gas to inflate the inflatable member, which in the embodiment of Figure 5 includes inflatable fingers 42 and cloth manifold 44. *Id.* at 3:42–44, 4:53–55. When undeployed, the inflatable member is secured behind a trim close-out panel, and a trim tear seam can also be provided to hide the device and enhance the aesthetic quality. *Id.* at 3:50–54. When inflated, slider 31 moves downwardly along track 30, opening the restraint system. *Id.* at 4:9–13.

2. Claim 1: Obviousness in view of Karlow and Lau

Whether the Karlow/Lau Combination Teaches all Limitations of Claim 1; Whether a Person of Ordinary Skill in the Art Would Have Had Reason to Combine Karlow and Lau and Would Have Had a Reasonable Expectation of Success in Doing So

Petitioner's Arguments and Evidence

Claim 1 recites an “airbag system of a vehicle.” As discussed above, Karlow and Lau each disclose such an airbag system. *See* Pet. 15–16, 21–22.

Claim 1 further recites that the airbag system includes “a single airbag extending across at least two seating positions of a passenger compartment of a vehicle, the single airbag arranged to deploy into the passenger compartment along a lateral side of the vehicle and adjacent each of the at least two seating positions.” Further, the claimed “at least two seating positions” include “a first seating position in a first seat row of seats of the vehicle and a second seating position in a second seat row of seats of the vehicle longitudinally displaced from the first seat row of seats, along the lateral side of the vehicle.”

Petitioner relies on the combination of Karlow and Lau as teaching these claim features. *See* Pet. 66–70, 72. Petitioner asserts that “Karlow discloses a single airbag 10 [that] deploys into the passenger compartment along a lateral side of the vehicle.” *Id.* at 66–67 (citing Ex. 1014, 1:8–9, 3:49–59, 4:39–62, Figs. 1, 2, 3a, 4, 5); *see also id.* at 81 (citing the same evidence, and asserting that the airbag of Karlow “deploys *downward* into the passenger compartment). Petitioner, referring back to its previous discussion of the regulatory environment and the understanding of a person of ordinary skill in the art set forth in its arguments about the Leising and

Lau combination, asserts that “it would have been obvious to [a person of ordinary skill in the art] to extend Karlow’s airbag to protect occupants.” *Id.* at 67.

Petitioner further asserts that it would have been obvious, based on Lau’s express teaching of an airbag assembly that provides protection for both front and rear occupants, to extend Karlow’s airbag to the rear seat. *Id.*; Ex. 1003 ¶ 177. According to Petitioner, “Karlow and Lau are in the same field (use of airbags in vehicles) and both address the same problem (how to effectively provide side airbag protection during an accident).” Pet. 67; Ex. 1003 ¶ 177. Further, a person of ordinary skill “would be motivated to apply the single airbag to cover both seat rows because of engineering, cost, design constraints, and the desires of management,” as well as for “rear seat occupant safety.” Pet. 67 (citing Ex. 1003 ¶ 178), 72 (citing Ex. 1003 ¶ 189).

Petitioner argues that the “extension of Karlow’s curtain could be made by elongating airbag system 10 and placing track 30 behind the rear seat window.” *Id.* at 68 (citing Ex. 1003 ¶ 179). Dr. Rouhana testifies that “[t]he shape of the [extended] airbag could be trapezoidal, rectangular, or custom shaped to cover from the A-pillar to the C-pillar and extend below the window sill.” Ex. 1003 ¶ 179; Pet. 68. Petitioner also presents testimony that one of ordinary skill in the art would be able to configure the modified airbag to avoid interference with the seatbelt. Ex. 1003 ¶¶ 180–182; Pet. 68–69.

The airbag system of claim 1 further includes “a cover interposed between the single airbag and the passenger compartment to cover the single airbag prior to deployment.” Petitioner asserts that Karlow teaches that

“[b]efore deployment, Karlow’s inflatable member 14 and restraint curtain 20 are ‘folded and secured behind the trim close-out panel.’” *Id.* at 70 (citing Ex. 1014, 3:43–45). Petitioner argues that the trim close-out panel of Karlow with the tear seam provides a cover, as claimed. *Id.*; Ex. 1003 ¶ 185.

Claim 1 further recites “a single gas-providing system that has only one inflator that provides gas to inflate the single airbag and which is arranged apart from the single airbag.” Petitioner points to the gas-providing system with one inflator 12 of Karlow, as teaching this claim feature. Pet. 70–71 (citing Ex. 1014, 3:41–43, 5:20–24, 8:14–23, Figs. 1, 2, 3a, 4, 5). Petitioner further notes that Lau also uses only inflator 38, and, thus, after modifying Karlow to extend to the rear seat area, one of skill in the art would have continued to use the single gas-providing system and inflator. *Id.* at 71 (citing Ex. 1006, 1:31–32, 2:12–13, Figs. 1, 3, 4; Ex. 1003 ¶ 186).

Regarding the claimed “conduit leading from the single gas-providing system to provide gas to inflate the single airbag, the conduit being arranged to deliver the gas from the single gas-providing system into the single airbag,” Petitioner points to the conduit (shown in hidden lines in Figure 5) from inflator 12 to the airbag of Karlow that delivers gas thereto, as disclosing this claim feature. *Id.* (citing Ex. 1014, Fig. 5); Ex. 1003 ¶ 187.

Finally, claim 1 recites that “the single airbag has a plurality of compartments for receiving the gas, and wherein the plurality of compartments are in flow communication with each other.” Petitioner points to inflatable fingers 42 and manifold 44 of Figure 5 of Karlow, as teaching this claim feature. Pet. 73 (citing Ex. 1014, 4:53–61, Fig. 5;

Ex. 1003 ¶ 191). Petitioner further asserts that the inflatable fingers are in flow communication with each other. *Id.*; Ex. 1003 ¶ 192.

Patent Owner’s Arguments and Evidence and Our Analysis

In its Patent Owner Response, Patent Owner argues that certain limitations of the independent claims are missing from Petitioner’s proposed combination. *See* PO Resp. 20–25. Specifically, Patent Owner asserts that the cited combination does not teach or suggest “a single airbag extending across . . . a lateral side of the vehicle” across two passenger compartments; or that the airbag “deploys downward.” *Id.* We address each of Patent Owner’s arguments in turn.²⁴

“single airbag extending across at least two seating positions”

Patent Owner argues that the “combination of Karlow and Lau would not have taught or suggested ‘a single airbag extending across at least two seating positions of a passenger compartment of a vehicle, the single airbag arranged to deploy into the passenger compartment along a lateral side of the vehicle and adjacent each of the at least two seating positions’ as recited in independent claim 36 and as similarly recited in each of the other independent claims including claim 37.” PO Resp. 20–21. In this regard, Patent Owner argues that Petitioner “admitted that Karlow does not explicitly disclose that its airbag extends across two seating positions that are longitudinally displaced along a lateral side of the vehicle.” *Id.* at 21 (citing Pet. 66–67)). Patent Owner points to the 364 Final Written Decision, arguing that Petitioner “here do[es] not address how the extended airbag

²⁴ Patent Owner directs its arguments specifically to claim 36, however, for convenience we address Patent Owner’s arguments in the context of claim 1, which contains similar limitations.

provides protection for front seat occupants during a side impact.” *Id.* (citing 364 FWD, 34). Patent Owner relies on the finding in the 364 Final Written Decision that merely extending the airbag of Karlow would reduce side airbag coverage for the front passenger. *Id.* at 22 (citing 364 FWD, 34–35). The 364 Final Written Decision, thus, found Petitioner’s evidence deficient because Petitioner did not address “how the extended airbag maintains sufficient protection for front seat occupants during a side impact.” 364 FWD, 34. Petitioner in *this* proceeding, however, presents evidence not of record in IPR2016-00364—evidence specifically directed to the question of the shape of the modified Karlow airbag. In particular, Dr. Rouhana testifies that “[t]he shape of the [extended] airbag could be trapezoidal, rectangular, or custom shaped to cover from the A-pillar to the C-pillar and extend below the window sill” in order to protect both front and rear occupants. Ex. 1003 ¶ 179; Pet. 68; Reply 5–6. Further, Mr. Nranian “acknowledged [during his deposition] that an airbag designer would consider different sizes and shapes for the airbag,” generally, when determining airbag design. Reply 6 (citing Ex. 1020, 39:23–40:2).

Based on the evidence presented, we find that it would have been within the level of ordinary skill to extend the side airbag of Karlow, and that a person of ordinary skill in the art would have done so in order to protect also passengers in the back seat, while maintaining sufficient side airbag coverage for passengers in the front seat as well. Thus, we find that the combination of Karlow and Lau teaches or suggests “single airbag extending across at least two seating positions . . . ,” as claimed, and that Petitioner has articulated reasoning with rational underpinning why a person

of ordinary skill in the art would have combined Karlow and Lau in the proposed manner.

“deploys downward”

Patent Owner argues that the “combination of Karlow and Lau would not have taught or suggested that the single, laterally extending airbag ‘deploys downward,’ as required by . . . claim 36.” PO Resp. 23. In this regard, Patent Owner asserts that Lau suggests deploying the airbag in a level direction, rather than downward. *Id.* at 23–24 (citing Ex. 1006, 2:61–63; Ex. 2026, 48:13–49:5). As discussed above, however, Petitioner relies on Karlow not Lau for the teaching that the airbag “deploys downward,” as claimed. *See* Pet. 81–82.

Based on the evidence presented, we find that Karlow teaches or suggests that “the single airbag is arranged to deploy downward into the passenger compartment,” as claimed.

Objective Indicia of Nonobviousness

For the same reasons discussed above with respect to the Leising and Lau combination, we are not persuaded that Patent Owner has shown a nexus between the objective evidence of non-obviousness and the challenged claims. We also determine that Patent Owner’s objective evidence is entitled to little or no weight.

Conclusion as to Obviousness of Claim 1

As discussed, we determine that Patent Owner has not established nexus between the objective evidence and the claimed invention. However, even were we to consider Patent Owner’s objective evidence, weighing it alongside the strength of the other *Graham* factors in the present record, we

still would conclude that, on balance, the evidence of obviousness outweighs the relatively weak evidence of nonobviousness.

Based on the evidence of record, we are persuaded that Petitioner has shown that the combination of Karlow and Lau teaches or suggests all of the limitations of claim 1, and has articulated reasoning with rational underpinning why a person of ordinary skill in the art would have combined these references in the proposed manner. Having considered all the evidence of record, including Patent Owner's secondary considerations arguments, we determine that Petitioner has shown, by a preponderance of the evidence, that the combination of Karlow and Lau renders claim 1 obvious.

3. Claims 10, 17–21, 26, 27, 33, 36, 37, 39, and 43: Obviousness in view of Karlow and Lau

Regarding independent claims 26, 36, 37, 39, and 43, Petitioner relies on similar arguments and evidence as presented with respect to claim 1, for corresponding claim limitations. *See* Pet. 77, 80–86; Ex. 1003 ¶¶ 199–200, 207–214. Claim 26 recites method steps that generally correspond to the elements of claim 1, but does not include the claimed cover.

Claim 36 further recites that the airbag is “arranged to deploy downward into the passenger compartment and the conduit is arranged at or adjacent to a top edge of the single airbag.” Claim 37 recites a similar feature. Petitioner asserts that Karlow discloses a “single airbag which deploys downward into the passenger compartment along a lateral side of the vehicle” and that the conduit is “arranged at or adjacent to a top edge of the single airbag.” Pet. 81–82 (citing Ex. 1014, 3:41–43, 3:49–59, 4:9–16, 4:39–62, 5:20–24, 8:14–23, Figs. 1, 2, 3a, 4, 5).

Claim 39 further recites that “the single airbag has a single inflating portion and no other inflating portion, wherein the single inflating portion consists of the plurality of compartments.” Claim 43 recites a similar feature. Petitioner, relying on testimony from Dr. Rouhana, asserts that “[t]he airbag in Karlow has an inflating portion and no other inflating portion, and . . . consists of a plurality of compartments as previously mentioned.”²⁵ *See id.* at 86 (citing Ex. 1003 ¶ 214).

Regarding dependent claims 10, 17–21, 27, and 33, Petitioner provides arguments and evidence as to how each claim limitation is taught or suggested by the cited combination of Karlow and Lau, and relies upon Dr. Rouhana’s testimony. *See* Pet. 74–79 (citing Ex. 1014, 2:37–42, 3:41–49, 5:20–24, 8:14–23, Figs. 4, 5; Ex. 1006, 1:66:68, 2:13–15, Fig. 3; Ex. 1003 ¶¶ 179, 180, 197, 198); Ex. 1003 ¶¶ 193–198, 201–206.

Apart from Patent Owner’s arguments directed to claim 36, discussed above with respect to claim 1, Patent Owner does not present separate arguments directed to any of claims 10, 17–21, 26, 27, 33, 37, 39, and 43. We agree with Petitioner and find that the combination of Karlow and Lau teaches or suggests all the limitations of claims 10, 17–21, 26, 27, 33, 37, 39, and 43, and has articulated sufficient reasoning why it would have been obvious to combine these references in the proposed manner. Having considered all the evidence of record, including Patent Owner’s secondary

²⁵ Petitioner’s discussion with respect to claim 39 refers to Leising, rather than Karlow. *See* Pet. 85; Ex. 1003 ¶ 212. Petitioner’s discussion with respect to claim 43, which includes the same limitation as claim 39, cites to Dr. Rouhana’s testimony regarding Karlow’s disclosure of this claim limitation. *See* Pet. 86; Ex. 1003 ¶ 214. In our Institution Decision (Inst. Dec. 42 n.9), we determined this was sufficient for both claims 39 and 43.

considerations arguments, we determine that Petitioner has demonstrated, by a preponderance of the evidence, that the combination of Karlow and Lau renders obvious claims 10, 17–21, 26, 27, 33, 37, 39, and 43.

4. Claims 2, 3, 11, 28–32, and 41: Obviousness in view of Karlow, Lau, and Davis

Petitioner refers back to its previous discussion regarding claims 2, 3, 11, 28–32, and 41, and Davis’s disclosure of the limitations thereof. Pet. 86–87. Petitioner further asserts that “[i]t would have been obvious to modify Karlow based on the teachings of Lau and Davis for the same reasons discussed above with respect to Leising (e.g., avoiding undesirably high inflation rate and pressure).” *Id.* Patent Owner does not address this asserted ground substantively, beyond the arguments discussed above with respect to claim 1. For reasons similar to those discussed above, having considered all the evidence of record, including Patent Owner’s secondary considerations arguments, we are persuaded that Petitioner has demonstrated, by a preponderance of the evidence, that the combination of Karlow, Lau, and Davis renders obvious claims 2, 3, 11, 28–32, and 41.

5. Claims 4, 6, 8, and 12–15: Obviousness in view of Karlow, Lau, and Daniel

Petitioner refers back to its previous discussion regarding claims 4 and 13–15, and Daniel’s disclosure of the limitations thereof. Pet. 87. Petitioner asserts that Daniel also discloses “an airbag assembly in the roof rail (claim 12),” and that “inflator housing 46 includes a propellant boss 54 housing stored gas (claim 6).” *Id.* (citing Ex. 1008, 2:37–39). Regarding claim 8, Petitioner points to Karlow’s disclosure of directing the gas to the airbag via a conduit. *Id.* (citing Ex. 1014, Fig. 5). Petitioner further asserts that “[i]t would have been obvious to modify Karlow based on the teachings

of Lau and Daniel for the same reasons discussed above with respect to Leising.” *Id.*

Patent Owner does not address this asserted ground substantively, beyond the arguments discussed above with respect to claim 1. For reasons similar to those discussed above, having considered all the evidence of record, including Patent Owner’s secondary considerations arguments, we are persuaded that Petitioner has demonstrated, by a preponderance of the evidence, that the combination of Karlow, Lau, and Daniel renders obvious claims 4, 6, 8, and 12–15.

6. Claims 5, 7, 34, and 35: Obviousness in view of Karlow, Lau, and Kaji

Petitioner refers back to its previous discussion regarding claims 5, 7, 34, and 35, and Kaji’s disclosure of the limitations thereof. Pet. 87. Petitioner further asserts that “it would have been obvious to modify Karlow based on the teachings of Lau and Kaji for the same reasons discussed above with respect to Leising (e.g., lighter weight).” *Id.* Patent Owner does not address this asserted ground substantively, beyond the arguments discussed above with respect to claim 1. For reasons similar to those discussed above, having considered all the evidence of record, including Patent Owner’s secondary considerations arguments, we are persuaded that Petitioner has demonstrated, by a preponderance of the evidence, that the combination of Karlow, Lau, and Kaji renders obvious claims 5, 7, 34, and 35.

7. Claims 9, 38, 40, 42, and 44: Obviousness in view of Karlow, Lau, and Steffens

Petitioner refers back to its previous discussion regarding claims 9, 38, 40, 42, and 44, and Steffens’s disclosure of the limitations thereof. Pet. 88. Petitioner further asserts that “[i]t would have been obvious to

modify Karlow based on the teachings of Lau and Steffens for the same reasons discussed above with respect to Leising (e.g., considering design parameters of size, weight, propellant toxicity, cost).” *Id.* Patent Owner does not address this asserted ground substantively, beyond the arguments discussed above with respect to claim 1. For reasons similar to those discussed above, having considered all the evidence of record, including Patent Owner’s secondary considerations arguments, we are persuaded that Petitioner has demonstrated, by a preponderance of the evidence, that the combination of Karlow, Lau, and Steffens renders obvious claims 9, 38, 40, 42, and 44.

8. Claims 22, 24, and 25: Obviousness in view of Karlow, Lau, and Suzuki

Petitioner refers back to its previous discussion regarding claims 22, 24, and 25, and Suzuki’s disclosure of the limitations thereof. Pet. 88. Petitioner further asserts that “[i]t would have been obvious to modify Karlow based on the teachings of Lau and Suzuki for the same reasons discussed above with respect to Leising (e.g., controlling inflation rate with a nozzle and reducing injury).” *Id.* Patent Owner does not address this asserted ground substantively, beyond the arguments discussed above with respect to claim 1. For reasons similar to those discussed above, having considered all the evidence of record, including Patent Owner’s secondary considerations arguments, we are persuaded that Petitioner has demonstrated, by a preponderance of the evidence, that the combination of Karlow, Lau, and Suzuki renders obvious claims 22, 24, and 25.

9. Claim 16: Obviousness in view of Karlow, Lau, and Paxton

Petitioner refers back to its previous discussion regarding claim 16, and Paxton’s disclosure of the limitations thereof. Pet. 88. Petitioner further asserts that “it would have been obvious to modify Karlow based on the teachings of Lau and Paxton for the same reasons discussed above with respect to Leising (e.g., controlling inflation rate and reducing injuries).” *Id.* at 88–89. Patent Owner does not address this asserted ground substantively, beyond the arguments discussed above with respect to claim 1. For reasons similar to those discussed above, having considered all the evidence of record, including Patent Owner’s secondary considerations arguments, we are persuaded that Petitioner has demonstrated, by a preponderance of the evidence, that the combination of Karlow, Lau, and Paxton renders obvious claim 16.

10. Claim 23: Obviousness in view of Karlow, Lau, Suzuki, and Marlow

Petitioner refers back to its previous discussion regarding claim 23, and Marlow’s disclosure of the limitations thereof. Pet. 89. Petitioner further asserts that “[i]t would have been obvious to modify Karlow based on the teachings of Lau, Suzuki, and Marlow for the same reasons discussed above with respect to Leising.” *Id.* Patent Owner does not address this asserted ground substantively, beyond the arguments discussed above with respect to claim 1. For reasons similar to those discussed above, having considered all the evidence of record, including Patent Owner’s secondary considerations arguments, we are persuaded that Petitioner has demonstrated, by a preponderance of the evidence, that the combination of Karlow, Lau, Suzuki, and Marlow renders obvious claim 23.

III. CONCLUSION

For the foregoing reasons, we determine that Petitioner has demonstrated, by a preponderance of the evidence, that claims 1–44 are unpatentable based on the following grounds:

claims 1, 6, 8, 10, 12, 17–21, 26, 27, 33, 39, 43, and 44 are unpatentable under 35 U.S.C. § 103(a) as obvious in view of Leising and Lau;

claims 2, 3, 11, 28–32, and 41 would have been obvious under 35 U.S.C. § 103(a) in view of Leising, Lau, and Davis;

claims 4 and 13–15 would have been obvious under 35 U.S.C. § 103(a) in view of Leising, Lau, and Daniel;

claims 5, 7, 34, and 35 would have been obvious under 35 U.S.C. § 103(a) in view of Leising, Lau, and Kaji;

claims 9, 38, 40, 42, and 44 would have been obvious under 35 U.S.C. § 103(a) in view of Leising, Lau, and Steffens;

claims 22, 24, and 25 would have been obvious under 35 U.S.C. § 103(a) in view of Leising, Lau, and Suzuki;

claim 16 would have been obvious under 35 U.S.C. § 103(a) in view of Leising, Lau, and Paxton;

claim 23 would have been obvious under 35 U.S.C. § 103(a) in view of Leising, Lau, Suzuki, and Marlow;

claims 1, 10, 17–21, 26, 27, 33, 36, 37, 39, and 43 would have been obvious under 35 U.S.C. § 103(a) in view of Karlow and Lau;

claims 2, 3, 11, 28–32, and 41 would have been obvious under 35 U.S.C. § 103(a) in view of Karlow, Lau, and Davis;

claims 4, 6, 8, and 12–15 would have been obvious under 35 U.S.C. § 103(a) in view of Karlow, Lau, and Daniel;
claims 5, 7, 34, and 35 would have been obvious under 35 U.S.C. § 103(a) in view of Karlow, Lau, and Kaji;
claims 9, 38, 40, 42, and 44 would have been obvious under 35 U.S.C. § 103(a) in view of Karlow, Lau, and Steffens;
claims 22, 24, and 25 would have been obvious under 35 U.S.C. § 103(a) in view of Karlow, Lau, and Suzuki;
claim 16 would have been obvious under 35 U.S.C. § 103(a) in view of Karlow, Lau, and Paxton; and
claim 23 would have been obvious under 35 U.S.C. § 103(a) in view of Karlow, Lau, Suzuki, and Marlow.

IV. ORDER

Accordingly, it is:

ORDERED, based on a preponderance of the evidence, that claims 1–44 of U.S. Patent No. 9,043,093 B2 are *unpatentable*.

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.

IPR2016-01790
Patent 9,043,093 B2

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