

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

KEMET ELECTRONICS, CORP. and VISHAY AMERICAS, INC.,
Petitioner,

v.

MEC RESOURCES, LLC,
Patent Owner.

IPR2019-00583
Patent 6,137,390

Before KALYAN K. DESHPANDE, TREVOR M. JEFFERSON, and
ROBERT J. WEINSCHENK, *Administrative Patent Judges*.

WEINSCHENK, *Administrative Patent Judge*.

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

ORDER
Denying Petitioner's Motion to Exclude
37 C.F.R. § 42.64(c)

I. INTRODUCTION

A. *Background and Summary*

KEMET Electronics, Corp. and Vishay Americas, Inc. (collectively, “Petitioner”) filed a Petition (Paper 3, “Pet.”) requesting an *inter partes* review of claims 1–20 (“the challenged claims”) of U.S. Patent No. 6,137,390 (Ex. 1001, “the ’390 patent”). MEC Resources, LLC (“Patent Owner”) filed a Preliminary Response (Paper 7, “Prelim. Resp.”) to the Petition. We instituted an *inter partes* review of the challenged claims on August 12, 2019. Paper 8 (“Dec. on Inst.”), 39. After institution, Patent Owner filed a Response (Paper 15, “PO Resp.”) to the Petition, Petitioner filed a Reply (Paper 20, “Pet. Reply”) to the Response, and Patent Owner filed a Sur-reply (Paper 21, “PO Sur-reply”) to the Reply. We held an oral hearing on May 13, 2020, and a transcript of the hearing is included in the record. Paper 30 (“Tr.”).

For the reasons set forth below, Petitioner has shown by a preponderance of the evidence that claims 1–20 of the ’390 patent are unpatentable.

B. *Real Parties in Interest*

Petitioner identifies the following real parties in interest: 1) KEMET Electronics, Corp.; 2) KEMET Corp.; 3) TOKIN Corp.; 4) Vishay Americas, Inc.; 5) Vishay Intertechnology, Inc.; and 6) Vishay Dale Electronics, LLC. Pet. 70. Patent Owner identifies itself as the only real party in interest. Paper 6, 2.

C. *Related Matters*

The parties indicate that the ’390 patent is the subject of the following district court cases: 1) *MEC Resources, LLC v. Vishay Americas, Inc.*, No.

3:18-cv-2770 (N.D. Tex.); and 2) *MEC Resources, LLC v. KEMET Electronics Corp.*, No. 3:18-cv-2771 (N.D. Tex.). Pet. 70; Paper 6, 2.

D. The '390 Patent

The '390 patent relates to an inductor “with improved inductance and minimized electromagnetic induction (EMI) interference.” Ex. 1001, 1:6–9. Specifically, the '390 patent explains that its improvement involves compression molding a conventional inductor coil with a layer of a magnetic resin mixture. *Id.* at 1:59–63, 2:60–64. According to the '390 patent, “[o]ne of the advantages of the method disclosed in the present invention is that the inductance of the coil can be controlled by adjusting the magnetic permeability of the magnetic-resin mixture, and/or the thickness of the magnetic-resin layer.” *Id.* at 2:1–5. Further, “[b]y using the compression molding process, the void space in the entire inductor is minimized,” which “minimizes the EMI interference and magnetic leakage, and increases the inductance per unit volume.” *Id.* at 2:5–8.

E. Illustrative Claim

Of the challenged claims, claims 1 and 11 are independent. Claim 1 is reproduced below.

1. An inductor with enhanced inductance comprising:
 - (a) a magnetic core;
 - (b) an electrically conducting coil wound about said magnetic core;
 - (c) a magnetic resin layer compression-molded to embed at least a portion of an outer periphery of said electrically conducting coil;
 - (d) wherein said magnetic resin layer contains a magnetic powder dispersed in a polymer resin.

Ex. 1001, 6:24–33.

F. Evidence

Petitioner submits the following evidence:

Evidence	Exhibit No.
Declaration of Robert W. Erickson, Ph.D. (“Erickson Declaration”)	Ex. 1003
Sergio Franco, ELECTRIC CIRCUITS FUNDAMENTALS (Emily Barrosse et al. eds., 1995) (“Franco”)	Ex. 1005
Amada, US 6,144,280, issued Nov. 7, 2000 (“Amada”)	Ex. 1006
Shafer, US 6,204,744 B1, issued Mar. 20, 2001 (“Shafer”)	Ex. 1007
Rittner, US 6,600,403 B1, issued July 29, 2003 (“Rittner”)	Ex. 1008
Kaneko, US 5,010,313, issued Apr. 23, 1991 (“Kaneko”)	Ex. 1009
Butherus, US 3,953,251, issued Apr. 27, 1976 (“Butherus”)	Ex. 1010
Ohkawa, EP 0265839 A2, published May 4, 1988 (“Ohkawa”)	Ex. 1011

Patent Owner submits the Declaration of Curt R. Raschke, Ph.D.
Ex. 2009 (“Raschke Declaration”).

G. Asserted Grounds

Petitioner asserts that the challenged claims are unpatentable on the following grounds:

Claims Challenged	35 U.S.C. §	References/Basis
1, 3, 4, 7, 9–11, 13, 14, 17, 19, 20	103 ¹	Franco, Shafer
2, 12	103	Franco, Shafer, Rittner
5, 15	103	Franco, Shafer, Butherus
6, 16	103	Franco, Shafer, Kaneko
8, 18	103	Franco, Shafer, Ohkawa

¹ The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, which was enacted on September 16, 2011, made amendments to 35 U.S.C. §§ 102, 103. AIA § 3(b), (c). Those amendments became effective on March 16, 2013. *Id.* at § 3(n). Because the challenged claims of the ’390 patent have an effective filing date before March 16, 2013, any citations herein to 35 U.S.C. §§ 102, 103 are to their pre-AIA versions.

Claims Challenged	35 U.S.C. §	References/Basis
1, 3, 4, 7, 9–11, 13, 14, 17, 19, 20 ²	103	Amada, Shafer
2, 12	103	Amada, Shafer, Rittner
5, 15	103	Amada, Shafer, Butherus
6, 16	103	Amada, Shafer, Kaneko
8, 18	103	Amada, Shafer, Ohkawa

II. ANALYSIS

A. Legal Standards

A claim is unpatentable as obvious under 35 U.S.C. § 103(a) if the differences between the claimed subject matter and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including 1) the scope and content of the prior art; 2) any differences between the claimed subject matter and the prior art; 3) the

² The Petition and the Decision on Institution inadvertently omitted claims 7 and 17 from the listing of challenged claims for the Amada and Shafer combination. Pet. 2, 40; Dec. on Inst. 4, 26; Pet. Reply 22 n.8. But the Petition substantively addresses claims 7 and 17 for the Amanda and Shafer combination, and the Decision on Institution instituted this *inter partes* review on all the asserted grounds in the Petition. Pet. 55; Dec. on Inst. 39. Patent Owner does not dispute that this *inter partes* review includes the asserted ground that claims 7 and 17 would have been obvious over Amada and Shafer. See PO Resp. 43–59; Tr. 45:10–23.

level of ordinary skill in the art; and 4) any objective indicia of non-obviousness.³ *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

B. Level of Ordinary Skill in the Art

Petitioner argues that “a person of ordinary skill in the art (‘POSITA’) at the time of the claimed invention (1999) would have had a bachelor’s degree in electrical engineering or materials science with two years of experience in designing electronic components.” Pet. 7–8 (citing Ex. 1003 ¶¶ 14–17). Patent Owner argues that “[a] hypothetical person of ordinary skill in the art (‘POSITA’) at the time of the filing of the patent (May 1999) would have been someone with a Bachelor’s degree in Material Science and Engineering, or in a related field, as well as about two years of experience with the fabrication of discrete electrical components.” PO Resp. 8 (citing Ex. 2009 ¶¶ 16–20). Patent Owner also contends that “[a]dditional graduate education could substitute for professional experience, while significant experience in the field might substitute for formal education.” *Id.* (citing Ex. 2009 ¶¶ 16–20).

Neither party identifies any specific instance in which the differences between the parties’ respective descriptions of the level of ordinary skill in the art impacts the analysis or conclusions of either party, or either party’s declarant, in this case. Tr. 6:26–7:5; 36:3–14. In fact, Patent Owner agrees with Petitioner’s description. *Id.* at 36:3–14. Further, our findings and

³ Patent Owner argues that Petitioner “fail[s] to present a proper *Graham* analysis by not addressing any differences between the claimed subject matter and the prior art.” PO Resp. 8. We disagree. As discussed herein, Petitioner explains in detail the differences between the challenged claims and each primary prior art reference, as well as how the other prior art references compensate for those differences. See Sections II.D–II.M.

conclusions in this case would be the same under either party's description of the level of ordinary skill in the art. To the extent necessary, though, we adopt Petitioner's description, which is supported by the testimony of Petitioner's declarant, Dr. Robert Erickson, and is consistent with the prior art. Pet. 7–8; Ex. 1003 ¶¶ 14–17.

C. Claim Construction

In an *inter partes* review proceeding, a claim of a patent is construed using the same standard used in federal district court, including construing the claim in accordance with the ordinary and customary meaning of the claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent. *See* Changes to the Claim Construction Standard for Interpreting Claims in Trial Proceedings Before the Patent Trial and Appeal Board, 83 Fed. Reg. 51,340, 51,340, 51,358 (Oct. 11, 2018) (amending 37 C.F.R. § 42.100(b), effective Nov. 13, 2018) (now codified at 37 C.F.R. § 42.100(b) (2019)).

1. Enhanced Inductance

Patent Owner proposes construing the term “enhanced inductance” to mean “the increase in inductance of the inductor described by the ’390 patent in comparison to the same inductor containing the same number of winding turns, but without the magnetic resin layer embedding the conducting coil.” PO Resp. 5 (citing Ex. 1001, 3:64–6:22; Ex. 2009 ¶ 31). Patent Owner argues that “[t]he specification contains tables that describe the ’390 patent’s ‘Enhancement in Inductance’ in terms of ‘factors of inductance enhancement’ compared with a baseline ‘Inductance per unit winding turn.’” *Id.* Patent Owner also contends that the term “enhanced inductance” does not include EMI properties because the ’390 patent

“specifically distinguishes ‘increased inductance’ from ‘reduced EMI effect and magnetic leaks.’” *Id.* at 5–6 (citing Ex. 1001, 3:27–31; Ex. 2009 ¶ 32).

Petitioner opposes Patent Owner’s proposed construction. Pet. Reply 6–7. Petitioner argues that the ’390 patent does not limit the term “enhanced inductance” to “a single metric.” *Id.* at 6 (citing Ex. 1001, 1:6–9, 1:50–53, 3:56–62). According to Petitioner, the term “enhanced inductance” refers to “a number of features, including greater inductance per unit volume, reduced EMI interference, and reduced magnetic leakage.” *Id.* at 6–7 (citing Ex. 1001, code (57), 1:6–14, 1:50–58, 2:37–50, 3:27–31).

The ’390 patent describes an inductor with “improved” inductance and, more specifically, with “increased inductance per unit volume.” Ex. 1001, 1:6–9, 1:50–53. Consistent with that description, the parties appear to agree that the term “enhanced inductance” refers to “increased inductance per unit volume.” *See* PO Resp. 5 (“the increase in inductance of the inductor . . . in comparison to the same inductor containing the same number of winding turns”); Pet. Reply 6 (“greater inductance per unit volume”). Thus, based on the specification, we also agree that the term “enhanced inductance” means “increased inductance per unit volume.”

As discussed above, Patent Owner further asserts that the increased inductance is relative to “the inductor described by the ’390 patent . . . , but without the magnetic resin layer embedding the conducting coil.” PO Resp. 5. To support that portion of its proposed construction, Patent Owner directs us to tables in the ’390 patent “that describe the ’390 patent’s ‘Enhancement in Inductance.’” *Id.* (citing Ex. 1001, 3:64–6:22). The tables in the ’390 patent appear to show the increase in inductance for several inductors with a magnetic resin layer relative to an inductor without a

magnetic resin layer. Ex. 1001, 3:56–6:22. The '390 patent, however, explains that those tables “are presented herein for purposes of illustration and description, and are not intended to be exhaustive or to limit the invention to the precise form disclosed.” *Id.* at 3:56–62. Thus, we are not persuaded that the increase in inductance must be relative to the specific inductor described in the '390 patent.⁴

Patent Owner also contends that the term “enhanced inductance” does not include EMI properties. PO Resp. 5–6. As discussed below, even if we assume that the term “enhanced inductance” does not include EMI properties, the asserted prior art nonetheless teaches an inductor with enhanced inductance. *See* Sections II.D.2, II.D.3, II.I.2, II.I.3. As a result, we need not resolve this particular claim construction issue in order to resolve the parties’ disputes about the asserted grounds of unpatentability.

For the foregoing reasons, we construe the term “enhanced inductance” to mean “increased inductance per unit volume.”

2. *Layer*

Patent Owner proposes construing the term “layer” to mean “an ascertainable thickness, and not a thickness that varies substantially along the circumference of the outside of the coil.” PO Resp. 7 (citing Ex. 2009 ¶ 35). Patent Owner argues that because the '390 patent describes “the amount of inductance enhancement” based on the thickness of the magnetic resin layer, the layer must have “an, at least somewhat, ascertainable thickness.” *Id.* at 6–7, 27 (citing Ex. 1001, 3:67, 4:35). Patent Owner also

⁴ Further, this portion of Patent Owner’s proposed construction does not appear to be relevant to the parties’ disputes about the asserted grounds of unpatentability. *See* Sections II.D.2, II.D.3, II.I.2, II.I.3.

cites a dictionary definition to support its proposed construction. *Id.* at 6 (citing Ex. 2002, 1168–1169). Patent Owner argued at the oral hearing that the term “layer” also requires a “concentric thickness.” Tr. 32:17–33:12, 46:11–47:15.

Petitioner opposes Patent Owner’s proposed construction. Pet. Reply 7. Petitioner argues that Patent Owner’s proposed construction “imports limitations found nowhere in the ’390 Patent, and injects uncertainty into otherwise plain language by imposing subjective requirements that the layer have ‘an *ascertainable* thickness’ that does not ‘var[y] *substantially*.’” *Id.* (citing Ex. 1033, 33:21–34:11).

As discussed below, even if we assume that the term “layer” requires an ascertainable thickness that does not vary substantially along the circumference of the outside of the coil, the asserted prior art nonetheless teaches such a layer. *See* Sections II.D.2, II.D.3, II.I.2, II.I.3. As a result, we need not resolve this particular claim construction issue in order to resolve the parties’ disputes about the asserted grounds of unpatentability.

As to Patent Owner’s argument that the term “layer” also requires a concentric thickness, that argument is not timely because it was presented for the first time at the oral hearing. *See* PO Resp. 6–7; Tr. 32:17–33:12, 46:11–47:15; Trial Practice Guide Update, 23 (Aug. 2018), *available at* https://www.uspto.gov/sites/default/files/documents/2018_Revised_Trial_Practice_Guide.pdf (“During an oral hearing, a party may . . . only present arguments relied upon in the papers previously submitted.”). Moreover, although Figures 2 and 3 of the ’390 patent show examples of an inductor with a concentric magnetic resin layer (*see* Ex. 1001, Figs. 2, 3), Patent Owner does not direct us to any portions of the ’390 patent indicating that

the magnetic resin layer is limited to the concentric shape shown in those figures (*see* PO Resp. 6–7; Ex. 2009 ¶¶ 34–35; Tr. 32:17–33:12, 46:11–47:15). Thus, we are not persuaded that the term “layer” requires a concentric thickness.

3. *Embed*

Patent Owner proposes construing the phrase “to embed at least a portion of an outer periphery of said electrically conducting coil” to mean “to embed only the outer periphery of said electrically conducting coil.” PO Resp. 4. Patent Owner argues that its proposed construction is consistent with Petitioner’s proposed construction of the same phrase in a related district court action. *Id.* (citing Ex. 2003). Patent Owner points out that “the ’390 patent discloses both *partially* enclosing the entire core and *completely* enclosing the entire core.” *Id.* (citing Ex. 1001, 2:64–67).

Petitioner opposes Patent Owner’s proposed construction. Pet. Reply 4–5. Petitioner argues that Patent Owner’s proposed construction “is inconsistent with the specification, which ‘discloses both *partially* enclosing [] and *completely* enclosing the entire core.’” *Id.* (citing Dec. on Inst. 8).

Claims 1 and 11 recite “to embed *at least a portion of* an outer periphery of said electrically conducting coil.” Ex. 1001, 6:29–31, 6:65–67 (emphasis added). Patent Owner’s proposed construction changes the phrase “at least a portion of” in claims 1 and 11 to the term “only.” PO Resp. 4. But other than directing us to Petitioner’s proposed construction in another proceeding, Patent Owner does not identify any evidence that supports changing the phrase “at least a portion of” to “only.” *See id.* In fact, Patent Owner acknowledges that the ’390 patent describes embedding the core as well, not only the outer periphery of the coil. *Id.* (citing Ex.

1001, 2:64–67, 6:54–56, 8:8–10). Thus, we decline to adopt Patent Owner’s proposed construction. No further construction of the phrase “to embed at least a portion of an outer periphery of said electrically conducting coil” is necessary to resolve the parties’ disputes about the asserted grounds of unpatentability. *See* Sections II.D.2, II.D.3, II.I.2, II.I.3.

4. *Consolidated*

Petitioner proposes construing the term “consolidated” to mean “the core and the magnetic resin layer coating the coil are the same material and formed at the same time.” Pet. 7. Petitioner argues that its proposed construction is supported by the specification of the ’390 patent. *Id.* (citing Ex. 1001, 3:44–55). Patent Owner does not oppose Petitioner’s proposed construction. PO Resp. 5.

The term “consolidated” appears in claim 15, which recites “wherein said magnetic core is a consolidated magnetic core made of the *same or different magnetic resin* as said magnetic resin layer.” Ex. 1001, 7:13–16 (emphasis added). In other words, the claim language expressly states that a consolidated magnetic core can be made of a *different* material than the magnetic resin layer. *Id.* Thus, because Petitioner’s proposed construction contradicts the express claim language, we decline to adopt it. No further construction of the term “consolidated” is necessary to resolve the parties’ disputes about the asserted grounds of unpatentability.⁵ *See* Sections II.F.1, II.K.1.

⁵ Petitioner alternatively argues in its Reply that the term “consolidated” means “compression molded.” Pet. Reply 5. We need not address Petitioner’s alternative construction to resolve the parties’ disputes about the asserted grounds of unpatentability. *See* Sections II.F.1, II.K.1.

D. Ground 1A – Obviousness of Claims 1, 3, 4, 7, 9–11, 13, 14, 17, 19, and 20 over Franco and Shafer

Petitioner argues that claims 1, 3, 4, 7, 9–11, 13, 14, 17, 19, and 20 would have been obvious over Franco and Shafer. Pet. 1, 8. For the reasons discussed below, Petitioner has shown by a preponderance of the evidence that claims 1, 3, 4, 7, 9–11, 13, 14, 17, 19, and 20 would have been obvious over Franco and Shafer.

1. Overview of Franco and Shafer

Franco teaches “an inductor [that] consists of a coil of insulated wire wound around a core.” Ex. 1005, 300. Franco also teaches that “the core is made of a highly permeable material such as iron or ferrite.” *Id.* at 301.

Shafer teaches an inductor with “a wire coil having an inner coil end and an outer coil end.” Ex. 1007, 1:62–63. Shafer also teaches that “a powdered magnetic material is pressure molded completely around the coil so as to create an inductor body.” *Id.* at 1:67–2:2. According to Shafer, “[t]he magnetic molding material is comprised of a first powdered iron, a second powdered iron, a filler, a resin, and a lubricant,” with “[t]he first and second powdered irons hav[ing] differing electrical characteristics that allow the device to have a high inductance yet low core losses so as to maximize its efficiency.” *Id.* at 3:24–29.

2. Claim 1

Claim 1 recites “[a]n inductor with enhanced inductance.”⁶ Ex. 1001, 6:25. Franco teaches an inductor with a coil of insulated wire wound around

⁶ For purposes of this Decision, we do not decide whether the preamble is limiting because we determine the prior art nonetheless teaches “an inductor with enhanced inductance.” Further, neither party argues that the preamble is not limiting. *See* Pet. 13; PO Resp. 26.

a core. Pet. 13; Ex. 1005, 300, Fig. 7.8. Shafer teaches an inductor with a coil embedded in a magnetic molding material that increases inductance per unit volume. Pet. 13, 17; Ex. 1003 ¶¶ 46–47; Ex. 1007, 3:24–29 (“The first and second powdered irons have differing electrical characteristics that allow the device to have a high inductance yet low core losses so as to maximize its efficiency.”); Dec. on Inst. 10. As discussed in more detail below, it would have been obvious to embed the outer periphery of Franco’s coil in Shafer’s magnetic molding material by compression molding. Pet. 10–12, 17; Ex. 1003 ¶¶ 35–41, 64; *see* Section II.D.9.

Patent Owner responds that the term “enhanced inductance” refers to “the increase in inductance of the inductor described by the ’390 patent in comparison to the same inductor containing the same number of winding turns, but without the magnetic resin layer embedding the conducting coil.” PO Resp. 26. Patent Owner contends that, therefore, Petitioner’s “arguments that the Franco-Shafer combination constitutes ‘an improved inductor’ because it is ‘smaller’ or because it ‘is magnetically self shielding’ are without merit.” *Id.*

Patent Owner’s argument is not persuasive for several reasons. First, Patent Owner’s argument is premised on its proposed construction of the term “enhanced inductance,” but, as discussed above, we adopt only a portion of that proposed construction. *See* Section II.C.1. Second, Patent Owner misinterprets Petitioner’s assertions regarding the prior art. Petitioner does not assert that the Franco and Shafer combination teaches an inductor with enhanced inductance simply because it is smaller. *See* Pet. 13. Rather, Petitioner asserts that Shafer’s “compression-molded magnetic powder resin layer *increases the inductance per unit volume*, which is why

the inductor can be made smaller.” *Id.* (emphasis added). Third, as discussed above, Shafer expressly teaches that its magnetic molding material increases inductance per unit volume. Pet. 13, 17; Ex. 1003 ¶¶ 46–47; Ex. 1007, 3:24–29 (“The first and second powdered irons have differing electrical characteristics that allow the device to have a high inductance yet low core losses so as to maximize its efficiency.”). Patent Owner does not address that specific teaching. *See* PO Resp. 26.

Claim 1 recites “a magnetic core.” Ex. 1001, 6:26. Franco teaches an inductor with a core made of iron or ferrite, both of which are magnetic. Pet. 13–14; Ex. 1003 ¶¶ 51–53; Ex. 1005, 301. Patent Owner responds that it would not have been obvious to combine Franco and Shafer (which we address below in Section II.D.9), but Patent Owner does not dispute that the Franco and Shafer combination teaches this limitation of claim 1. *See* PO Resp. 26–27.

Claim 1 recites “an electrically conducting coil wound about said magnetic core.” Ex. 1001, 6:27–28. Franco teaches an inductor with a coil of insulated wire wound around a magnetic core. Pet. 14–15; Ex. 1005, 300, Fig. 7.8. Patent Owner does not dispute that the Franco and Shafer combination teaches this limitation of claim 1.

Claim 1 recites “a magnetic resin layer compression-molded to embed at least a portion of an outer periphery of said electrically conducting coil.” Ex. 1001, 6:29–31. Shafer teaches a magnetic molding material comprising magnetic powders and a resin that is compression molded to embed an electrically conducting coil. Pet. 15–17; Ex. 1003 ¶¶ 60–63; Ex. 1007, 3:24–26, 4:1–6, 5:8–10, Fig. 6. As discussed in more detail below, it would have been obvious to embed the outer periphery of Franco’s coil in Shafer’s

magnetic molding material by compression molding. Pet. 10–12, 17; Ex. 1003 ¶¶ 35–41, 64; *see* Section II.D.9.

Patent Owner responds that the term “layer” requires “an, at least somewhat, ascertainable thickness.” PO Resp. 27. Patent Owner contends that Shafer’s Figure 6 depicts “a cubic . . . block of epoxy resin containing a round coil,” and, thus, does not have an at least somewhat ascertainable thickness. *Id.* at 27–28 (citing Ex. 1007, Fig. 6). Patent Owner’s argument is not persuasive. Patent Owner acknowledges that the ’390 patent does not expressly describe the thickness of the magnetic resin layer. *Id.* at 6–7. But Patent Owner contends that “a POSITA would have understood that the thickness of the magnetic resin layer was the difference between each inductor’s total outside diameter and the thickness of the coil, and was therefore an ascertainable thickness.” *Id.* at 7 (citing Ex. 1001, 3:67, 4:35; Ex. 2009 ¶ 35).

By the same rationale, a person of ordinary skill in the art could have ascertained the thickness of the magnetic molding material in the Franco and Shafer combination. For example, a person of ordinary skill in the art could have ascertained the difference between the total outside length of Shafer’s magnetic molding material and the thickness of its coil.⁷ *See* Pet. 15–16; Ex. 1007, Fig. 6. Therefore, even if we apply Patent Owner’s proposed

⁷ Shafer does not provide particular values for those dimensions or indicate that its figures are drawn to scale, but Patent Owner’s proposed construction of the term “layer” does not require a particular numeric value. *See* PO Resp. 27. Patent Owner’s proposed construction only requires that the thickness be at least somewhat ascertainable. *Id.* We do not see any reason why a person of ordinary skill in the art would not have been able to ascertain those dimensions for Shafer’s inductor.

construction of the term “layer,” the Franco and Shafer combination teaches a magnetic resin layer.⁸

Patent Owner also responds that “the core in Shafer is the entire material in Shafer Figure 6 that surrounds the winding, both down the middle and around the outside.” PO Resp. 28 (citing Ex. 2010, 10:5–12); *see* PO Sur-reply 18. Thus, according to Patent Owner, “Shafer’s magnetic resin layer cannot ‘embed at least a portion of an outer periphery of said electrically conducting coil’ because the outer periphery of the coil is embedded by the inductor core.” PO Resp. 28. Patent Owner’s argument is not persuasive. First, Patent Owner’s argument appears to be based on its proposed construction that requires the magnetic resin layer to embed “only” the outer periphery of the coil. *Id.* at 4, 28. As discussed above, we decline to adopt that construction. *See* Section II.C.3. Second, Patent Owner acknowledges that Shafer’s magnetic molding material “surrounds . . . the outside” of the coil, and, thereby, acknowledges that the magnetic molding material embeds at least the outer periphery of the coil. PO Resp. 28.

Claim 1 recites “wherein said magnetic resin layer contains a magnetic powder dispersed in a polymer resin.” Ex. 1001, 6:32–33. Shafer teaches that its magnetic molding material comprises iron powders and a polyester resin. Pet. 17–18; Ex. 1007, 3:24–47, 6:49–51. The evidence of record shows that a person of ordinary skill in the art would have known that

⁸ The thickness of the magnetic resin layer in the Franco and Shafer combination may vary somewhat because Shafer’s block of magnetic molding material embeds Franco’s round coil. *See* Ex. 1005, Fig. 7.8; Ex. 1007, Fig. 6. But Patent Owner does not argue or present evidence indicating that the thickness of the magnetic resin layer would vary substantially. *See* PO Resp. 27–28.

Shafer's iron powders are dispersed in the polyester resin, and that Shafer's polyester resin is a polymer resin. Pet. 17–18; Ex. 1003 ¶ 69; Ex. 1013, 1; Ex. 1017, 407; Ex. 1019, 1. Further, Petitioner's declarant, Dr. Erickson, and Patent Owner's declarant, Dr. Curt Raschke, agree that Shafer's polyester resin is a polymer resin. Ex. 1033, 144:5–15; Ex. 2010, 7:6–8.

Patent Owner responds that there are deficiencies in Petitioner's evidence, and, as a result, there is “no reliable evidence that Shafer's resin is a polymer.” PO Resp. 28–29. Patent Owner's argument is not persuasive. As discussed above, the parties' declarants agree that Shafer's polyester resin is a polymer resin. Ex. 1033, 144:5–15; Ex. 2010, 7:6–8. We find that alone to be reliable evidence that Shafer's polyester resin is a polymer resin. Nonetheless, we also address Patent Owner's arguments regarding Petitioner's other evidence.

Patent Owner argues that Exhibit 1013 “states that ‘an unsaturated polyester resin [is] a solid polymer at room temperature,’” whereas Shafer's polyester resin “is a liquid at room temperature.” PO Resp. 29 (citing Ex. 2005); *see* PO Sur-reply 18. Patent Owner, though, does not explain specifically why that distinction is relevant. *See* PO Resp. 29; PO Sur-reply 18. In fact, the evidence of record shows that a polyester resin is a polymer regardless of whether it is in solid or liquid form. Ex. 1013, 1 (“an unsaturated polyester resin (a *solid polymer* at room temperature)” (emphasis added)); Ex. 1019, 1 (“Specifically, the unsaturated polyester resin, also known by the English acronym UPR, is an easily printable *liquid polymer* which, once cured . . . , keeps the solid shape taken in the mold.” (emphasis added)).

Patent Owner argues that Exhibit 1017 indicates that “polymers may be polyester resins,” but “it does not follow that all polyester resins are also polymers.” PO Resp. 29. Patent Owner’s argument is not persuasive. Exhibit 1017 states that “polyester” is “[a] polymer containing ester groups in the main chain.” Ex. 1017, 407. Exhibit 1017 also states that “[o]ther important polymers are the linear unsaturated polyester resins, often simply called polyester resins, which form the basis of traditional glass reinforced plastics (GRP) products.” *Id.* (emphasis added). The above portions of Exhibit 1017 expressly show that a polyester resin is a type of polymer. *Id.*

Patent Owner argues that Exhibit 1019 “contradicts” Exhibit 1013, because Exhibit 1019 states that an unsaturated polyester resin is liquid, whereas Exhibit 1013 states that an unsaturated polyester resin is a solid. PO Resp. 29. Patent Owner’s argument is not persuasive. As discussed above, the evidence of record shows that a polyester resin is a polymer regardless of whether it is in solid or liquid form. Ex. 1013, 1 (“an unsaturated polyester resin (a *solid polymer* at room temperature)” (emphasis added)); Ex. 1019, 1 (“Specifically, the unsaturated polyester resin, also known by the English acronym UPR, is an easily printable *liquid polymer* which, once cured . . . , keeps the solid shape taken in the mold.” (emphasis added)).

3. *Claim 11*

Claim 11 recites “[a] method for making inductors with enhanced inductance.”⁹ Ex. 1001, 6:61–62. Franco teaches an inductor with a coil of insulated wire wound around a core. Pet. 13, 18; Ex. 1005, 300, Fig. 7.8. Shafer teaches an inductor with a coil embedded in a magnetic molding material that increases inductance per unit volume. Pet. 13, 17–19; Ex. 1003 ¶¶ 46–47, 74–75; Ex. 1007, 3:24–29 (“The first and second powdered irons have differing electrical characteristics that allow the device to have a high inductance yet low core losses so as to maximize its efficiency.”); Dec. on Inst. 10. As discussed in more detail below, it would have been obvious to embed the outer periphery of Franco’s coil in Shafer’s magnetic molding material by compression molding. Pet. 10–12, 17, 19; Ex. 1003 ¶¶ 35–41, 64, 76; *see* Section II.D.9.

Patent Owner refers to its argument regarding the preamble of claim 1. PO Resp. 26, 30. As discussed above, Patent Owner’s argument is not persuasive. *See* Section II.D.2.

Claim 11 recites “winding an electrically conducting coil about a magnetic core.” Ex. 1001, 6:63–64. Franco teaches an inductor with a core made of iron or ferrite, both of which are magnetic. Pet. 13–14, 20; Ex. 1003 ¶¶ 51–53; Ex. 1005, 301. Franco also teaches that its inductor has a coil of insulated wire wound around the magnetic core. Pet. 14–15, 20;

⁹ For purposes of this Decision, we do not decide whether the preamble is limiting because we determine the prior art nonetheless teaches “[a] method for making inductors with enhanced inductance.” Further, neither party argues that the preamble is not limiting. *See* Pet. 18; PO Resp. 30.

Ex. 1005, 300, Fig. 7.8. Patent Owner does not dispute that the Franco and Shafer combination teaches this limitation of claim 11. *See* PO Resp. 30.

Claim 11 recites “forming a magnetic resin layer by compression molding to embed at least a portion of an outer periphery of said electrically conducting coil.” Ex. 1001, 6:65–67. Shafer teaches a magnetic molding material comprising magnetic powders and a resin that is compression molded to embed an electrically conducting coil. Pet. 15–17, 20; Ex. 1003 ¶¶ 60–63; Ex. 1007, 3:24–26, 4:1–6, 5:8–10, Fig. 6. As discussed in more detail below, it would have been obvious to embed the outer periphery of Franco’s coil in Shafer’s magnetic molding material by compression molding. Pet. 10–12, 17, 20; Ex. 1003 ¶¶ 35–41, 64; *see* Section II.D.9.

Patent Owner responds that “Shafer does not disclose or suggest a ‘layer,’ but instead a cubic block of material.” PO Resp. 30. Patent Owner’s argument is not persuasive for the same reasons discussed above for claim 1. *See* Section II.D.2.

Claim 11 recites “wherein said magnetic resin matrix contains a magnetic powder dispersed in a polymer resin.” Ex. 1001, 7:1–2. Shafer teaches that its magnetic molding material comprises iron powders and a polyester resin. Pet. 17–18, 20; Ex. 1007, 3:24–47, 6:49–51. The evidence of record shows that a person of ordinary skill in the art would have known that Shafer’s iron powders are dispersed in the polyester resin, and that Shafer’s polyester resin is a polymer resin. Pet. 17–18, 20; Ex. 1003 ¶ 69; Ex. 1013, 1; Ex. 1017, 407; Ex. 1019, 1. Further, Petitioner’s declarant, Dr. Erickson, and Patent Owner’s declarant, Dr. Raschke, agree that Shafer’s polyester resin is a polymer resin. Ex. 1033, 144:5–15; Ex. 2010, 7:6–8. The evidence of record also shows that a person of ordinary skill the art

would have known that Shafer's magnetic molding material is a matrix material. Pet. 20–21; Ex. 1003 ¶ 82; Ex. 1023, 3:28–31.

Patent Owner responds that Petitioner “do[es] not provide evidence that Shafer's magnetic material is a polymer alloy.” PO Resp. 30. Patent Owner's argument is not persuasive for the same reasons discussed above for claim 1. *See* Section II.D.2.

Patent Owner also responds that Petitioner provides evidence that “unsaturated polyesters [] are [] matrix material,” but provides “no evidence that Shafer's magnetic material is an unsaturated polyester.” PO Resp. 30; *see* PO Sur-reply 19. Patent Owner's argument is not persuasive. The evidence of record shows that a person of ordinary skill in the art would have known that “unsaturated polyester resins” are “often simply called polyester resins.” Pet. Reply 21; Ex. 1017, 407; Ex. 1026 ¶ 8. In other words, the evidence of record shows that a person of ordinary skill in the art would have known that Shafer's polyester resin is an unsaturated polyester resin. Pet. 20–21; Pet. Reply 21; Ex. 1017, 407; Ex. 1023, 3:28–31; Ex. 1026 ¶ 8.

Moreover, Petitioner's declarant, Dr. Erickson, explains that a matrix material is a material that has particles suspended in a medium. Pet. Reply 21; Ex. 2010, 5:15–17, 7:12–18. As discussed above, the evidence of record shows that a person of ordinary skill in the art would have known that Shafer's magnetic molding material is a material that has iron powders dispersed in a polyester resin, i.e., that Shafer's magnetic molding material is a matrix material. Pet. 17–18, 20; Ex. 1003 ¶ 69.

4. *Claim 3 and 13*

Claim 3 depends from claim 1, and recites “wherein said magnetic core is a metal or metal oxide magnetic core.” Ex. 1001, 6:38–39. Claim 13 depends from claim 11, and recites a similar limitation. *Id.* at 7:6–8. Franco teaches an inductor with a core made of iron, which is a magnetic metal, or made of ferrite, which is a magnetic metal oxide. Pet. 21; Ex. 1003 ¶¶ 83–85; Ex. 1005, 301. Patent Owner responds that it would not have been obvious to combine Franco and Shafer (which we address below in Section II.D.9), but Patent Owner does not dispute that the Franco and Shafer combination teaches the limitation of claims 3 and 13. *See* PO Resp. 31–32.

5. *Claims 4 and 14*

Claim 4 depends from claim 1, and recites “wherein said magnetic core is made of a ferromagnetic metal, a metal alloy, a ferrimagnetic metal oxide, or a mixture thereof.” Ex. 1001, 6:40–42. Claim 14 depends from claim 11, and recites a similar limitation. *Id.* at 7:9–12. Franco teaches an inductor with a core made of iron, which is a ferromagnetic metal, or made of ferrite, which is a ferrimagnetic metal oxide. Pet. 21–22; Ex. 1003 ¶¶ 86–87; Ex. 1005, 301. Patent Owner responds that it would not have been obvious to combine Franco and Shafer (which we address below in Section II.D.9), but Patent Owner does not dispute that the Franco and Shafer combination teaches the limitation of claims 4 and 14. *See* PO Resp. 31–32.

6. *Claims 7 and 17*

Claim 7 depends from claim 1, and recites “wherein said polymer resin is a thermosetting polymer.” Ex. 1001, 6:50–51. Claim 17 depends from claim 11, and recites a similar limitation. *Id.* at 8:4–5. Shafer teaches that its magnetic molding material comprises a polyester resin. Pet. 22; Ex.

1007, 3:24–47. The evidence of record shows that a person of ordinary skill in the art would have known that Shafer’s polyester resin is a thermosetting polymer. Pet. 22; Ex. 1003 ¶¶ 89–91; Ex. 1015, 1633; Ex. 1022, 1.

Patent Owner responds that although Petitioner presents evidence that “[t]he most frequently used thermosetting resin . . . [is] polyester,” “this does not mean that all polyesters resins are thermosetting resins.” PO Resp. 33 (citing Ex. 2009 ¶¶ 70–71; Ex. 2010, 8:7–8). Patent Owner’s argument is not persuasive. Even if Patent Owner is correct that not all polyester resins are thermosetting resins, Patent Owner’s declarant, Dr. Raschke, acknowledges that Shafer’s polyester resin is a thermosetting resin. Ex. 1033, 120:23–121:6; Tr. 44:19–45:9.

7. Claims 9 and 19

Claim 9 depends from claim 1, and recites “wherein said magnetic resin layer buries both said magnetic core and said electrically conducting coil.” Ex. 1001, 6:54–56. Claim 19 depends from claim 11, and recites a similar limitation. *Id.* at 8:8–10. Shafer teaches that its magnetic molding material is compression molded completely around the coil so that the inductor has no air spaces. Pet. 23–24; Ex. 1007, 1:28–31, 1:54–2:2, 4:1–6, Fig. 6. As a result, in the Franco and Shafer combination, Shafer’s magnetic molding material is compression molded completely around the outer periphery of Franco’s core and coil. Pet. 23; Ex. 1003 ¶ 95. Patent Owner does not dispute that the Franco and Shafer combination teaches the limitation of claims 9 and 19.

8. Claims 10 and 20

Claim 10 depends from claim 1, and recites “wherein said magnetic powder is made of a ferromagnetic metal powder, a metal alloy powder, a

ferrimagnetic metal oxide powder, or a mixture thereof.” Ex. 1001, 6:57–60. Claim 20 depends from claim 11, and recites a similar limitation. *Id.* at 8:11–14. Shafer teaches that its magnetic molding material is made of iron powders, which are ferromagnetic metal powders. Pet. 24–25; Ex. 1003 ¶¶ 99–100; Ex. 1007, 3:24–38. Patent Owner does not dispute that the Franco and Shafer combination teaches the limitation of claims 10 and 20.

9. Reasons for Combining Franco and Shafer

Petitioner presents evidence that a person of ordinary skill in the art would have had reason to combine the cited teachings of Franco and Shafer. Pet. 10–12 (citing Ex. 1003 ¶¶ 35–41). We agree with and adopt Petitioner’s reasoning. Specifically, Franco and Shafer relate to the same field of endeavor as the ’390 patent, namely, inductors. Pet. 8–10; Ex. 1001, 1:6–9; Ex. 1003 ¶ 36; Ex. 1005, 300; Ex. 1007, 1:25–27. It would have been obvious to modify Franco to embed the outer periphery of Franco’s coil in Shafer’s magnetic molding material using compression molding. Pet. 10–12; Ex. 1003 ¶¶ 35, 40. Doing so would have been obvious because it would provide Franco’s inductor with the following benefits: 1) magnetic shielding; 2) physical protection; 3) increased inductance; 4) decreased size for a given inductance; and 5) reduced manufacturing costs.¹⁰ Pet. 10–12; Ex. 1003 ¶¶ 37–40. Further, combining the cited teachings of Franco and Shafer would have been within the level of ordinary skill in the art. Pet. 12; Ex. 1003 ¶ 41.

¹⁰ Petitioner also asserts that the Franco and Shafer combination would minimize air spaces in Franco’s inductor. Pet. 11–12. We do not rely on that particular reason to combine Franco and Shafer.

Patent Owner responds that Petitioner fails to explain how and why Franco and Shafer would have been combined. PO Resp. 9–12. Patent Owner’s argument is not persuasive. As discussed above, Petitioner explains how Franco and Shafer would have been combined, namely, by embedding the outer periphery of Franco’s coil in Shafer’s magnetic molding material using compression molding. Pet. 10–12; Ex. 1003 ¶¶ 35, 40. Petitioner also explains why it would have been obvious to combine Franco and Shafer, specifically, because it would provide Franco’s inductor with the following benefits: 1) magnetic shielding; 2) physical protection; 3) increased inductance; 4) decreased size for a given inductance; and 5) reduced manufacturing costs.¹¹ Pet. 10–12; Ex. 1003 ¶¶ 37–40.

a. *Patent Owner’s Arguments Regarding How to Combine Franco and Shafer*

Patent Owner responds that Petitioner “simply state[s] that the proposed combination of Franco and Shafer ‘would have been within the level of ordinary skill in the art,’” which “should be given no probative value.” PO Resp. 12–13; *see* PO Sur-reply 5–8. Patent Owner’s argument is not persuasive. Shafer teaches that its compression molding process and magnetic molding material can be used to embed an inductor coil, which supports Petitioner’s argument that it would have been within the level of ordinary skill in the art to use Shafer’s compression molding process and magnetic molding material to embed the outer periphery of Franco’s coil. Pet. 15–17; Ex. 1007, 3:24–26, 4:1–6, 5:8–10, Fig. 6. Further, Petitioner’s declarant, Dr. Erickson, explains that it would have been within the level of

¹¹ Any one of these identified benefits individually provides a sufficient reason to combine Franco and Shafer.

ordinary skill in the art to modify Shafer's compression molding process to accommodate the size and shape of Franco's inductor. Pet. 12; Ex. 1003 ¶ 41.

Patent Owner responds that Franco's core and Shafer's core are not interchangeable. PO Resp. 13–14. Specifically, Patent Owner argues that “Franco discloses the use of a core that is iron or ferrite,” whereas “Shafer is unequivocal in requiring the use of a magnetic resin core.” *Id.* at 13 (citing Pet. 4; Ex. 2009 ¶ 44; Ex. 2010, 11:7, 11:21–22, 11:25–12:2, 22:10–12, 22:15–16). Patent Owner's argument is not persuasive because it misinterprets Petitioner's proposed combination. Petitioner does not propose interchanging the cores of Franco and Shafer. *See* Pet. 10–12; Ex. 1003 ¶¶ 35, 40. Rather, in the proposed combination, Franco retains its iron or ferrite core, and Shafer's magnetic molding material is compression molded around the outer periphery of Franco's coil. Pet. 10–12; Ex. 1003 ¶¶ 35, 40. Further, Patent Owner does not identify any portions of Shafer that criticize, discredit, or otherwise discourage using an iron or ferrite core. *See* PO Resp. 13–14; Ex. 2009 ¶ 44.

Patent Owner responds that “[t]he Shafer molding process does not accommodate [Franco's] solid core.” PO Resp. 14 (citing Ex. 2009 ¶ 47). In particular, Patent Owner argues that 1) Shafer's die “can only accommodate leads on one side of the platen,” but “Franco uses leads on opposite ends of the coil”; 2) “the vertical pressure of Shafer's pressure-inducing apparatus would distort the shape” of Franco's horizontal coil; and 3) Franco's solid core “would hamper the even distribution of the resin within the coil envelope.” *Id.* at 14–18 (citing Ex. 2009 ¶¶ 47, 49–50, 54–55); *see* PO Sur-reply 8–9 (citing Ex. 1033, 105:15–20; Ex. 2009 ¶ 50).

Further, Patent Owner alleges that “[t]he modifications that would have been needed to the teachings of Shafer to accommodate the teachings of Franco would not have been within the capabilities of one of ordinary skill.” PO Resp. 16 (citing Ex. 2009 ¶ 50). And, according to Patent Owner, Petitioner’s declarant, Dr. Erickson, “could not explain how a POSITA would modify Shafer to accommodate Franco.” *Id.* at 17 (citing Ex. 2010, 14:19–24).

Patent Owner’s arguments are not persuasive. With respect to the lead location issue, Shafer’s Figure 6 shows coil 90 with leads 98 and 100 on opposite sides,¹² and Shafer teaches compression molding a magnetic molding material around the outer periphery of coil 90. Pet. 15–16; Ex. 1007, 5:1–10, Fig. 6. Thus, contrary to Patent Owner’s argument, Shafer teaches that its compression molding process can accommodate coils with different lead locations.

With respect to the coil orientation issue, Shafer’s Figure 6 shows a coil that is similar to Franco’s coil, with the only apparent difference being that Shafer’s coil is oriented vertically and Franco’s coil is oriented horizontally. Pet. 15–16; Ex. 1005, Fig. 7.8; Ex. 1007, Fig. 6. Patent Owner contends that “rotating the coil of Franco to a vertical orientation would (1) interfere with Shafer’s compression mechanism (because the core inside the coil would not compress) and (2) introduce a new problem with the routing of the core leads.” PO Resp. 15. But Patent Owner does not explain specifically why rotating Franco’s coil would create those issues. *See id.*

¹² Shafer’s Figures 3 and 5C show leads 16 and 18 on the same side of platen 71, whereas Figure 6 shows leads 98 and 100 on opposite sides. *Compare* Ex. 1007, 3:1–9, Figs. 3, 5C, *with id.* at 5:1–10, Fig. 6.

Patent Owner cites to paragraph 50 of the Raschke Declaration to support its argument, but that paragraph of the Raschke Declaration does not mention anything about coil orientation. *See id.* at 16; Ex. 2009 ¶ 50.

With respect to the solid core issue, Shafer teaches compression molding a magnetic molding material around a solid coil. Pet. 15–16; Ex. 1007, 4:3–6. Patent Owner contends, though, that compression molding Shafer’s magnetic molding material around Franco’s solid core would cause “an uneven distribution of resin, likely accompanied by the introduction of potential voids.” PO Resp. 15–16 (citing Ex. 2009 ¶ 50); *see id.* at 31–32 (citing Ex. 2004, 1; Ex. 2009 ¶¶ 68–69), *see* PO Sur-reply 19–20. But neither Patent Owner nor its declarant, Dr. Raschke, explain specifically why Shafer’s compression molding process can accommodate Shafer’s solid coil, but would cause an uneven resin distribution when used with Franco’s solid core.¹³ *See* PO Resp. 15–16, 31–32; PO Sur-reply 19–20; Ex. 2009 ¶¶ 50, 68–69. Further, as Patent Owner acknowledges, the ’390 patent describes compression molding a magnetic resin layer around a solid core, but does not mention any issues with uneven distribution of resin or potential voids. Ex. 1001, 3:12–19; Tr. 38:4–39:3.

For those reasons, we are not persuaded that Schafer’s compression molding process cannot accommodate Franco’s inductor. Nonetheless, even if some modifications to Shafer’s compression molding process would have

¹³ Patent Owner and Dr. Raschke reproduce images that allegedly show voids created when a compression molding process is used with a solid core. PO Resp. 32; Ex. 2009 ¶ 68. But neither Patent Owner nor Dr. Raschke explain, *inter alia*, how those images were produced or otherwise acquired. *See id.* Thus, we give no weight to those images. *See* 37 C.F.R. §§ 42.65(a), (b).

been necessary to accommodate Franco's inductor, the parties' declarants agree that those modifications would have been within the level of ordinary skill in the art. Ex. 1003 ¶ 41; Ex. 1033, 115:6–13, 116:8–20; Tr. 35:15–22.

Patent Owner responds that “[a]ttempting to combine the teachings of Franco and Shafer would result in other non-trivial challenges.” PO Resp. 16. Specifically, Patent Owner contends that combining Franco's “‘conventional’ core with the use of a magnetic resin material around the coil introduces ‘the need for a high-temperature sintering process,’ and it introduces ‘the commonly encountered problems involving molding, fabrication, coiling, and packaging, etc.’” *Id.* (citing Ex. 1001, 3:44–55; Ex. 2009 ¶ 51); *see* PO Sur-reply 9.

Patent Owner's argument is not persuasive. The '390 patent describes an embodiment in which a magnetic resin layer is compression molded around a conventional magnetic core. Ex. 1001, 2:60–3:19. Patent Owner's argument relies on another embodiment in which the conventional magnetic core is eliminated. PO Resp. 16 (citing Ex. 1001, 3:44–55). Specifically, Patent Owner cites the following portion of the '390 patent:

In yet another modification of the process of the present invention, the magnetic core can be eliminated and the entire conducting coil is embedded inside a matrix of the magnetic-resin mixture. This [] embodiment is most advantageous for manufacturing inductors wherein the required value of inductance is only moderate. This embodiment eliminates the need for a high-temperature sintering process, it also eliminates many of the commonly encountered problems involving molding, fabrication, coiling, and packaging, etc. This process involves placing the coil only into the compression mold, followed by the step of pouring the magnetic resin into the mold to enclose the coil.

Ex. 1001, 3:44–55. In other words, the '390 patent describes two different embodiments, one that includes a conventional magnetic core but requires using a sintering process and addressing some common problems, and one that eliminates the conventional magnetic core but only provides moderate inductance. *Id.*

The '390 patent, however, does not indicate that using a sintering process or addressing the common problems with a conventional magnetic core would have been beyond the level of ordinary skill in the art. *See id.* Similarly, neither Patent Owner nor its declarant, Dr. Raschke, indicate that doing so would have been beyond the level of ordinary skill in the art. *See* PO Resp. 16; Ex. 2009 ¶ 51. In fact, as discussed above, the parties' declarants agree that using Shafer's compression molding process with Franco's conventional magnetic core would have been within the level of ordinary skill in the art. Ex. 1003 ¶ 41; Ex. 1033, 115:6–13, 116:8–20.

Patent Owner responds that “a POSITA would understand that putting a magnetic resin layer (Shafer) around the outside of a coil having a solid core (Franco) would not have predictable results as compared with putting a magnetic resin layer (Shafer) around a coil having a magnetic resin core (Shafer).” PO Resp. 16 (citing Ex. 2009 ¶ 52); *see* PO Sur-reply 10 (citing Ex. 1033, 135:15–19). Patent Owner contends that Petitioner's declarant, Dr. Erickson, “agrees that the inductance value resulting from the alleged combination is not predictable, and instead depends upon other factors, specifically the reluctance of the added resin layer in relation to the reluctance of the core.” PO Resp. 17 (citing Ex. 2010, 4:7–5:14).

Patent Owner's argument is not persuasive. Shafer describes an inductor with a *resin* core and teaches that embedding the outer periphery of

the inductor coil in a magnetic molding material “allow[s] the device to have a high inductance.” Pet. 11, 13, 16–17; Ex. 1007, 3:24–29, 4:3–6. Amada describes an inductor with a *solid* core and teaches that embedding the outer periphery of the inductor coil in a magnetic coating “increases inductance.” Pet. 11, 44–45; Ex. 1006, 3:38–42, 5:38–42. Thus, the evidence of record shows that a person of ordinary skill in the art would have had a reasonable expectation that embedding the outer periphery of an inductor coil in a magnetic resin layer would increase its inductance regardless of whether the core was solid or resin.¹⁴ See *In re O’Farrell*, 853 F.2d 894, 903–04 (Fed. Cir. 1988) (“Obviousness does not require absolute predictability of success . . . all that is required is a reasonable expectation of success.”).

Patent Owner responds that “Shafer cannot wrap an electrically conducting coil around a magnetic core because there is no magnetic core at the time that the coil is placed into Shafer’s mold.” PO Resp. 18 (citing Ex. 2009 ¶ 54; Ex. 2010, 15:17–16:1). Patent Owner’s argument is not persuasive because Petitioner does not rely on Shafer to teach an electrically conducting coil wound around a magnetic core. See Pet. 14–15. As

¹⁴ The deposition testimony of Dr. Erickson and Dr. Raschke cited by Patent Owner does not indicate that the Franco and Shafer combination would not have predictable results. See Ex. 1033, 134:2–135:19; Ex. 2010, 4:7–5:4. Rather, the cited testimony of Dr. Erickson simply indicates that adding a magnetic resin layer to an inductor with a solid core may not result in the exact same increase in inductance as adding a magnetic resin layer to an inductor with a resin core. Ex. 2010, 4:7–5:4. And the cited testimony of Dr. Raschke simply indicates that a person of ordinary skill in the art would need to perform certain calculations to determine the exact increase in inductance that results from adding a magnetic resin layer to an inductor. Ex. 1033, 134:2–135:19.

discussed above, Franco teaches an inductor with a coil of insulated wire wound around a magnetic core. *Id.*; Ex. 1005, 300–301, Fig. 7.8.

b. *Patent Owner’s Arguments Regarding Why to Combine Franco and Shafer*

Patent Owner responds that a person of ordinary skill in the art “would not have been motivated to combine Franco with Shafer” because “Franco ‘teaches away’ from the invention.” PO Resp. 19 (citing Ex. 1005, 301; Ex. 2009 ¶ 41; Ex. 2011, 540); *see* PO Sur-reply 2–3 (citing Ex. 2009 ¶ 41). Patent Owner argues that “[b]y treating the space surrounding the coil and core as irrelevant to the inductance value, Franco and other authors not only provide no motivation to consider adding a surrounding magnetic layer, but provide motivation not to consider such an enhancement.” PO Resp. 20–21 (citing Ex. 2009 ¶ 41); *see* PO Sur-reply 2–3 (citing Ex. 2009 ¶ 41).

Patent Owner’s argument is not persuasive.

A reference teaches away “when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken” in the claim. A reference that “merely expresses a general preference for an alternative invention but does not criticize, discredit, or otherwise discourage investigation into” the claimed invention does not teach away.

Meiresonne v. Google, Inc., 849 F.3d 1379, 1382 (Fed. Cir. 2017) (quoting *Galderma Labs., L.P. v. Tolmar, Inc.*, 737 F.3d 731, 738 (Fed. Cir. 2013)). In other words, Franco’s alleged silence about the impact of adding material to the space around an inductor’s core and coil does not teach away from Petitioner’s proposed combination. *See id.* Patent Owner does not identify any portions of Franco that criticize, discredit, or otherwise discourage

investigation into the impact of adding material to the space around an inductor's core and coil. *See* PO Resp. 19–21; PO Sur-reply 2–3.

Patent Owner responds that “Shafer does not disclose anything about the impact on the device inductance as to the process of molding the magnetic mixture around the coil.” PO Resp. 21 (citing Ex. 1007, 1:18–24, 1:32–35, 1:41–42, 1:45–50; Ex. 2009 ¶ 45). According to Patent Owner, “[b]ecause the impact on inductance of the material surrounding the coil is never addressed there is no motivation for a POSITA to investigate such an effect.” *Id.* at 21. Patent Owner's argument is not persuasive. As discussed above, Shafer teaches that its magnetic molding material includes powdered irons that “allow the device to have a high inductance yet low core losses so as to maximize its efficiency.” Ex. 1007, 3:24–29; *see* Pet. 11. 17. Patent Owner does not address that specific teaching. *See* PO Resp. 21; Ex. 2009 ¶ 45. Further, Shafer alone does not have to provide the reason for combining Franco and Shafer. *See KSR*, 550 U.S. at 418 (“Often, it will be necessary for a court to look to interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art, all in order to determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue.”). As Petitioner explains, a person of ordinary skill in the art also would have known from Amada that a magnetic coating, such as Shafer's magnetic molding material, increases inductance. Pet. 11; Ex. 1003 ¶ 39; Ex. 1006, 5:38–42.

Patent Owner responds that a person of ordinary skill in the art would not have considered combining Franco and Shafer because “the technique of

Shafer is only practical for inductors having low inductance values.” PO Resp. 21–22 (citing Ex. 1001, 3:44–49; Ex. 2009 ¶ 56); *see* PO Sur-reply 3 (citing Ex. 2009 ¶ 56). Patent Owner’s argument is not persuasive. Patent Owner does not direct us to any portion of Shafer that indicates its compression molding process or magnetic molding material are only practical for inductors having low inductance values. *See* PO Resp. 21–22; PO Sur-reply 3; Ex. 2009 ¶ 56. Rather, Patent Owner relies on a portion of the ’390 patent that describes a particular embodiment with only “moderate” inductance because the magnetic core is eliminated. Ex. 1001, 3:44–49. However, as discussed above, Petitioner does not propose eliminating Franco’s magnetic core. *See* Pet. 10–12; Ex. 1003 ¶¶ 35, 40. In the proposed combination, Franco retains its iron or ferrite core, and Shafer’s magnetic molding material is compression molded around the outer periphery of Franco’s coil. Pet. 10–12; Ex. 1003 ¶¶ 35, 40.

Patent Owner also responds to each of the benefits that Petitioner identifies for the Franco and Shafer combination. PO Resp. 22–26. As discussed above, Petitioner presents evidence that compression molding Shafer’s magnetic molding material around the outer periphery of Franco’s coil would provide magnetic shielding for Franco’s inductor. Pet. 11; Ex. 1003 ¶ 38; Ex. 1007, 1:32–35. Patent Owner responds that magnetic shielding would not have provided a reason to combine Franco and Shafer because “magnetic shielding of inductors was generally accomplished using a metal sheath around the inductor.” PO Resp. 23 (citing Ex. 1009; Ex. 2009 ¶ 59). Patent Owner also argues that the Franco and Shafer combination would not “result in less energy loss than Shafer alone.” *Id.* at

23–24 (citing Ex. 2009 ¶ 59; Ex. 2010, 22:22–24:5); *see* PO Sur-reply 15 (citing Ex. 2009 ¶ 59; Ex. 2010, 22:22–24:5).

Patent Owner’s arguments are not persuasive. The evidence of record shows that compression molding Shafer’s magnetic molding material around the outer periphery of Franco’s coil would provide magnetic shielding for Franco’s inductor. Pet. 11; Ex. 1003 ¶ 38; Ex. 1007, 1:32–35. Therefore, even if alternative methods of magnetic shielding were available, a person of ordinary skill in the art nonetheless would have had reason to combine Franco and Shafer to provide magnetic shielding for Franco’s inductor. *See In re Mouttet*, 686 F.3d 1322, 1334 (Fed. Cir. 2012) (“[J]ust because better alternatives exist in the prior art does not mean that an inferior combination is inapt for obviousness purposes.”). Further, Patent Owner’s argument that the Franco and Shafer combination would not result in less energy loss for Shafer’s inductor misinterprets Petitioner’s proposed combination.

Petitioner does not propose using Franco’s teachings to improve Shafer. *See* Pet. 11–12; Ex. 1003 ¶¶ 38, 40. Rather, Petitioner asserts that compression molding Shafer’s magnetic molding material around the outer periphery of Franco’s coil would improve Franco’s inductor by providing magnetic shielding. Pet. 11–12; Ex. 1003 ¶¶ 38, 40. Patent Owner does not dispute that the combination would result in less energy loss for Franco’s inductor. *See* PO Resp. 23–24; PO Sur-reply 15.

As discussed above, Petitioner presents evidence that compression molding Shafer’s magnetic molding material around the outer periphery of Franco’s coil would provide physical protection for Franco’s inductor. Pet. 10–11; Ex. 1003 ¶ 37; Ex. 1006, 4:4–6; Ex. 1008, 4:1–5. Patent Owner responds that physical protection would not have provided a reason to

combine Franco and Shafer because “physical protection of the inductor could be realized by simply using a polymer resin (without any magnetic materials) or similar coating over the inductor solely for environmental protection.” PO Resp. 24 (citing Ex. 2009 ¶ 60; Ex. 2010, 35:2–9); *see* PO Sur-reply 15–16.

Patent Owner’s argument is not persuasive. The evidence of record shows that compression molding Shafer’s magnetic molding material around the outer periphery of Franco’s coil would provide physical protection for Franco’s inductor. Pet. 10–11; Ex. 1003 ¶ 37; Ex. 1006, 4:4–6; Ex. 1008, 4:1–5. Therefore, even if alternative methods of protection were available, a person of ordinary skill in the art would have had a reason to combine Franco and Shafer to provide physical protection for Franco’s inductor. *See Mouttet*, 686 F.3d at 1334.

As discussed above, Petitioner presents evidence that compression molding Shafer’s magnetic molding material around the outer periphery of Franco’s coil would increase its inductance, decrease its size for a given inductance, and reduce its manufacturing cost. Pet. 11–12; Ex. 1003 ¶¶ 38–40; Ex. 1006, 5:38–42; Ex. 1007, 1:25–27, 1:36–49, 3:24–29. Patent Owner responds that “the core of Franco introduced into the apparatus of Shafer would not necessarily increase inductance.” PO Resp. 24 (citing Ex. 2009 ¶ 61; Ex. 2010, 22:17–21); *see* PO Sur-reply 16–17 (citing Ex. 2009 ¶ 61; Ex. 2010, 22:17–21). Patent Owner argues that “there is no reason why the size of the inductor would decrease when Franco’s coil was used in Shafer’s apparatus.” PO Resp. 24 (citing Ex. 2009 ¶ 62). Patent Owner also argues that “there is no reason why the manufacturing cost would decrease when Franco’s coil was used in Shafer’s apparatus.” *Id.* at 25 (citing Ex. 2009

¶ 63). Lastly, Patent Owner contends that Petitioner “cite[s] only to the conclusory testimony of its expert” to support the above reasons to combine Franco and Shafer. PO Sur-reply 17.

Patent Owner’s arguments are not persuasive because Patent Owner misinterprets Petitioner’s proposed combination. Each of Patent Owner’s arguments is based on the premise that incorporating Franco’s core and/or coil into Shafer’s inductor would not improve Shafer’s inductor. *See* PO Resp. 24–25. But Petitioner does not propose incorporating Franco’s core or coil into Shafer’s inductor. *See* Pet. 10–12; Ex. 1003 ¶¶ 35, 40. Rather, as explained above, Petitioner proposes adding Shafer’s magnetic molding material to the outer periphery of Franco’s coil. Pet. 10–12; Ex. 1003 ¶¶ 35, 40. Patent Owner does not dispute that adding a magnetic material to the outer periphery of Franco’s inductor would improve Franco’s inductor by increasing its inductance, decreasing its size for a given inductance, and reducing its manufacturing cost. *See* PO Resp. 24–25; PO Sur-reply 17. Further, the evidence cited by Petitioner to support its reasons for combining Franco and Shafer is not conclusory. Both Petitioner and its declarant, Dr. Erickson, identify portions of Shafer and Amada that support their reasoning. Pet. 11–12 (citing Ex. 1006, 5:38–42; Ex. 1007, 1:22–49); Ex. 1003 ¶¶ 38–40 (citing Ex. 1006, 5:38–42; Ex. 1007, 1:22–49).

Patent Owner responds that “Franco discloses the use of a core that is iron or ferrite.” PO Resp. 25 (citing Ex. 2009 ¶ 64). According to Patent Owner, “Shafer is incompatible with, and teaches away from, the use of ferrite material because the combination ‘results in an inductor which saturates at a much lower level’ than Shafer’s invention.” *Id.* at 25, 31 (citing Ex. 2004, 2; Ex. 2009 ¶ 67); *see* PO Sur-reply 20–21 (citing

Ex. 2004, 2; Ex. 2009 ¶ 67). Patent Owner further argues that “even considering the use of an iron powder contained in a resin base is very much different from using solid iron . . . [a]nd Franco discloses only a solid core – not the use of powder.” PO Resp. 25 (citing Ex. 2009 ¶ 64).

Patent Owner’s arguments are not persuasive. First, Patent Owner does not direct us to any portion of Shafer that indicates its inductor would not work with a ferrite material or otherwise teaches away from using a ferrite material. *See* PO Resp. 25, 31; PO Sur-reply 20–21; Ex. 2009 ¶¶ 64, 67. Patent Owner only directs us to a declaration submitted during prosecution of Shafer that describes certain advantages of using an iron material. Ex. 2004, 2. Second, even if we assume that Shafer teaches away from using a ferrite material, Petitioner does not propose incorporating Franco’s ferrite core into Shafer’s inductor. *See* Pet. 10–12; Ex. 1003 ¶¶ 35, 40. As discussed above, Petitioner proposes compression molding Shafer’s magnetic molding material around the outer periphery of Franco’s coil. Pet. 10–12; Ex. 1003 ¶¶ 35, 40. Third, Franco also teaches an iron core, not just a ferrite core. Pet. 13–14; Ex. 1005, 301.

Patent Owner responds that “[t]he asserted ‘order’ of the proffered combination of references is not relevant” because “[t]he question is whether a POSITA would have been motivated to combine the references.” PO Sur-reply 12 (emphasis omitted). Patent Owner’s argument is not persuasive. As discussed above, the evidence of record shows that compression molding Shafer’s magnetic molding material around the outer periphery of Franco’s coil would provide several benefits to Franco’s inductor. Pet. 10–12; Ex. 1003 ¶¶ 35–40. Even if Patent Owner is correct that incorporating Franco’s core and/or coil into Shafer would not improve Shafer’s inductor, we see no

reason why that would deter a person of ordinary skill in the art from incorporating Shafer's compression molding process and magnetic molding material into Franco as proposed by Petitioner.

10. Summary

For the foregoing reasons, Petitioner has shown by a preponderance of the evidence that claims 1, 3, 4, 7, 9–11, 13, 14, 17, 19, and 20 would have been obvious over Franco and Shafer.

E. Ground 1B - Obviousness of Claims 2 and 12 over Franco, Shafer, and Rittner

Petitioner argues that claims 2 and 12 would have been obvious over Franco, Shafer, and Rittner. Pet. 2, 25. For the reasons discussed below, Petitioner has shown by a preponderance of the evidence that claims 2 and 12 would have been obvious over Franco, Shafer, and Rittner.

1. Claims 2 and 12

Claim 2 depends from claim 1, and recites “wherein said magnetic resin layer has a thickness determined matching a predetermined inductance of said inductor.” Ex. 1001, 6:35–37. Claim 12 depends from claim 11, and recites a similar limitation. *Id.* at 7:3–5. Rittner teaches setting the inductance value of an inductor by adjusting the thickness of a covering paste that includes a ferromagnetic material. Pet. 28–29; Ex. 1008, code (57), 1:10–22, 2:20–48, 5:10–6:5. Patent Owner responds that it would not have been obvious to combine Franco, Shafer, and Rittner (which we address below in Section II.E.2), but Patent Owner does not dispute that the combination of Franco, Shafer, and Rittner teaches the limitation of claims 2 and 12. *See* PO Resp. 37.

2. Reasons for Combining Franco, Shafer, and Rittner

Petitioner presents evidence that a person of ordinary skill in the art would have had reason to combine the cited teachings of Franco, Shafer, and Rittner. Pet. 26–28 (citing Ex. 1003 ¶¶ 104–107). We agree with and adopt Petitioner’s reasoning. Specifically, Rittner relates to the same field of endeavor as the ’390 patent, namely, inductors. Pet. 26; Ex. 1001, 1:6–9; Ex. 1003 ¶ 104; Ex. 1008, 1:6–9. It would have been obvious to adjust the thickness of the magnetic molding material in the Franco and Shafer combination in order to set a required inductance value, as taught by Rittner. Pet. 26–27; Ex. 1003 ¶ 105. Doing so would have been obvious because it would benefit manufacturers by allowing them to supply inductors with different inductance values for different applications. Pet. 26–27; Ex. 1003 ¶ 105; Ex. 1008, 1:48–53. Further, combining Rittner’s teachings with Franco and Shafer would have been nothing more than using Rittner’s teachings to improve the Franco and Shafer combination in the same way. Pet. 27; Ex. 1003 ¶ 106; *see KSR*, 550 U.S. at 417 (“[I]f a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill.”).

Patent Owner responds that Petitioner “advance[s] no meaningful motivation to combine Franco, Shafer, and Rittner” and, “[t]hus, there are no rational underpinnings for Petitioner[’s] attempt to paste the proffered references together.” PO Resp. 33–34. Patent Owner’s argument is not persuasive. As discussed above, we find that Petitioner’s evidence shows that it would have been obvious to combine Rittner with Franco and Shafer

because 1) it would benefit manufacturers by allowing them to supply inductors with different inductance values for different applications; and 2) it would have been nothing more than using Rittner's technique to improve a similar inductor in the same way. Pet. 26–27; Ex. 1003 ¶¶ 105–106; Ex. 1008, 1:48–53.

Patent Owner responds that Franco and Shafer relate to conventional (or discrete) inductors, whereas Rittner relates to planar (or spiral) conductors. PO Resp. 33–34. Patent Owner contends that it would not have been obvious to combine Rittner with Franco and Shafer because “the magnetic fields are significantly different as [] between discrete and spiral inductors.” *Id.* at 34–35 (citing Ex. 2006, 1:21–41, 1:55–58, 2:24–39; Ex. 2009 ¶¶ 73, 78). Patent Owner further contends that “[i]n a conventional inductor, it was known that the use of a ferromagnetic core increases inductance value,” but “for spiral inductors, the inductance value is adjusted ‘such that the pattern width of all of the portions of one or more coil patterns . . . is made wider or narrower.’” *Id.* at 35–36 (citing Ex. 2006, 1:29–34; Ex. 2007 ¶ 4; Ex. 2008, 12; Ex. 2009 ¶¶ 74–75). According to Patent Owner, “[t]here is no evidence in the prior art of record that inductance values can be set or controlled for wire-wound inductors by varying the amount of resin shield surrounding a wire wound inductor.” *Id.* at 36 (citing Ex. 2009 ¶ 77); *see* PO Sur-reply 19.

Patent Owner's argument is not persuasive. The evidence of record shows that embedding the outer periphery of a *conventional* inductor in a magnetic material increases its inductance. Pet. 11, 13, 17; Ex. 1003 ¶ 39; Ex. 1006, 5:38–42; Ex. 1007, 3:24–29. The evidence of record similarly shows that embedding the outer periphery of a *planar* inductor in a magnetic

material increases its inductance. Pet. 25–26; Ex. 1008, 2:38–41. In other words, the evidence of record shows that a magnetic coating has a similar impact on inductance for both conventional and planar inductors. As a result, a person of ordinary skill in the art would have reasonably expected that Rittner’s teaching about adjusting the thickness of a magnetic coating to set an inductance value also would apply to both conventional and planar inductors. Pet. 26; Ex. 1003 ¶ 103; *see O’Farrell*, 853 F.2d at 903–04. Further, although Patent Owner identifies several differences between conventional and planar inductors, Patent Owner does not explain why those differences would prevent Rittner’s specific teaching about adjusting the thickness of a magnetic coating from applying to a conventional inductor. *See* PO Resp. 33–36; PO Sur-reply 19; Ex. 2009 ¶¶ 72–79; Tr. 42:10–20.

3. *Summary*

For the foregoing reasons, Petitioner has shown by a preponderance of the evidence that claims 2 and 12 would have been obvious over Franco, Shafer, and Rittner.

F. Ground 1C - Obviousness of Claims 5 and 15 over Franco, Shafer, and Butherus

Petitioner argues that claims 5 and 15 would have been obvious over Franco, Shafer, and Butherus. Pet. 2, 29. For the reasons discussed below, Petitioner has shown by a preponderance of the evidence that claims 5 and 15 would have been obvious over Franco, Shafer, and Butherus.

1. *Claims 5 and 15*

Claim 5 depends from claim 1, and recites “wherein said magnetic core is a compression molded magnetic core made of the same or different magnetic resin as said magnetic resin layer.” Ex. 1001, 6:43–46. Claim 15 depends from claim 11, and recites a similar limitation. *Id.* at 7:13–16.

Butherus teaches forming a magnetic core by compressing particles of an iron powder and a thermoplastic or thermosetting resin. Pet. 32; Ex. 1010, 1:17–20, 2:32–39, 3:32–39, 6:34–36.

Patent Owner responds that under Petitioner’s proposed construction of the term “consolidated,” claim 15 requires that the magnetic core and the magnetic resin layer “be formed at the same time.” PO Resp. 39. Patent Owner argues that Butherus teaches “a core that is separate from the resin material surrounding the outside of the coil,” and, thus, the core and the resin material were not formed at the same time. *Id.* (citing Ex. 1010, 3:32–35). Patent Owner’s argument is not persuasive because it is premised on Petitioner’s proposed construction of the term “consolidated,” which we do not adopt for the reasons discussed above. *See* Section II.C.4.

2. *Reasons for Combining Franco, Shafer, and Butherus*

Petitioner presents evidence that a person of ordinary skill in the art would have had reason to combine the cited teachings of Franco, Shafer, and Butherus. Pet. 30–31 (citing Ex. 1003 ¶¶ 115–118). We agree with and adopt Petitioner’s reasoning. Specifically, Butherus relates to the same field of endeavor as the ’390 patent, namely, inductors. Pet. 30; Ex. 1001, 1:6–9; Ex. 1003 ¶ 115; Ex. 1010, 2:13–15. It would have been obvious to use Butherus’s compression molded magnetic resin core in the Franco and Shafer combination because it would allow a manufacturer to set certain inductor parameters and would lower energy loss. Pet. 30–31; Ex. 1003 ¶¶ 117–118; Ex. 1010, 2:32–35, 2:41–45. In addition, combining Butherus with Franco and Shafer would have been nothing more than using Butherus’s compression molded magnetic resin core to improve the Franco

and Shafer combination in the same way. Pet. 31; Ex. 1003 ¶ 118; *see KSR*, 550 U.S. at 417.

Patent Owner responds that Petitioner “advance[s] no meaningful motivation to combine Franco, Shafer and Butherus,” and, “[t]hus, there are no rational underpinnings for Petitioner[’s] attempt to paste the proffered references together.” PO Resp. 37–38. Patent Owner’s argument is not persuasive. As discussed above, Petitioner’s evidence shows that it would have been obvious to combine Butherus with Franco and Shafer because 1) it would allow a manufacturer to set certain inductor parameters; 2) it would lower energy loss; and 3) it would have been nothing more than using Butherus’s compression molded magnetic resin core to improve the Franco and Shafer combination in the same way. Pet. 30–31; Ex. 1003 ¶¶ 117–118; Ex. 1010, 2:32–35, 2:41–45.

Patent Owner responds that because “Franco requires a solid iron or ferrite core” and “Butherus discloses only a magnetic resin core,” “[a] POSITA would . . . not attempt to combine Franco and Butherus, as the two are mutually exclusive approaches.” PO Resp. 38. Patent Owner’s argument is not persuasive. Franco teaches that “[w]hen a high inductance value is needed, the core is made of a highly permeable material such as iron or ferrite.” Ex. 1005, 301 (emphasis added). But Patent Owner does not direct us to any portion of Franco that requires a solid iron or ferrite core. *See* PO Resp. 38. Nor does Patent Owner direct us to any portion of Franco that criticizes, discredits, or otherwise discourages use of a resin core. *See id.* Thus, we are not persuaded that Franco teaches away from Butherus’s resin core.

Patent Owner responds that “Shafer discloses only a ‘unitized’ inductor in which the outside enclosure and inner core are molded as a single integral unitized body,” whereas Butherus “describes . . . a core that is separate from the resin material surrounding the outside of the coil.” PO Resp. 38 (citing Ex. 1007, 4:41–44; Ex. 1010, 3:32–35). Thus, according to Patent Owner, a person of ordinary skill in the art would not combine Shafer and Butherus because “(1) the approaches teach away from one another, (2) a POSITA would not have a reasonable expectation of success in attempting to combine the two, and (3) the Petition does not explain how a POSITA would go about combining the two.” *Id.* at 38–39.

Patent Owner’s arguments are not persuasive. First, even if we assume that Shafer only teaches an inductor with an integral body, Patent Owner does not identify any portion of Shafer that criticizes, discredits, or otherwise discourages use of a core that is separate from the resin material around the outside of the coil. *See id.* at 38–39. Thus, we are not persuaded that Shafer teaches away from Butherus’s approach. *See Meiresonne*, 849 F.3d at 1382. Second, as discussed above, in the Franco and Shafer combination, Franco’s core is separate from Shafer’s magnetic molding material that embeds the outer periphery of the coil. Pet. 10–12; Ex. 1003 ¶¶ 35, 40. Thus, Butherus’s teaching of a separate core is compatible with the Franco and Shafer combination.

3. Summary

For the foregoing reasons, Petitioner has shown by a preponderance of the evidence that claims 5 and 15 would have been obvious over Franco, Shafer, and Butherus.

G. Ground 1D - Obviousness of Claims 6 and 16 over Franco, Shafer, and Kaneko

Petitioner argues that claims 6 and 16 would have been obvious over Franco, Shafer, and Kaneko. Pet. 2, 33. For the reasons discussed below, Petitioner has shown by a preponderance of the evidence that claims 6 and 16 would have been obvious over Franco, Shafer, and Kaneko.

1. Claims 6 and 16

Claim 6 depends from claim 1, and recites that the inductor “further comprises a metal magnetic sheath outside of said magnetic resin layer.” Ex. 1001, 6:47–49. Claim 16 depends from claim 11, and recites a similar limitation. *Id.* at 8:1–3. Kaneko teaches an inductor with a metal magnetic sleeve enclosing a coil. Pet. 35–36; Ex. 1003 ¶ 130; Ex. 1009, 2:20–34, 4:5–9. Patent Owner responds that it would not have been obvious to combine Franco, Shafer, and Kaneko (which we address below in Section II.G.2), but Patent Owner does not dispute that the combination of Franco, Shafer, and Kaneko teaches the limitation of claims 6 and 16. *See* PO Resp. 41.

2. Reasons for Combining Franco, Shafer, and Kaneko

Petitioner presents evidence that a person of ordinary skill in the art would have had reason to combine the cited teachings of Franco, Shafer, and Kaneko. Pet. 33–35 (citing Ex. 1003 ¶¶ 124–126). We agree with and adopt Petitioner’s reasoning. Specifically, Kaneko relates to the same field of endeavor as the ’390 patent, namely, inductors. Pet. 33–34; Ex. 1001, 1:6–9; Ex. 1003 ¶ 124; Ex. 1009, 1:28–30, 1:50–53. It would have been obvious to use Kaneko’s metal magnetic sleeve to surround the inductor of the Franco and Shafer combination. Pet. 34; Ex. 1003 ¶ 125. Doing so would have been obvious because it would further confine magnetic leakage flux and further increase inductance. Pet. 34; Ex. 1003 ¶ 125. Adding Kaneko’s

metal magnetic sleeve to the inductor of the Franco and Shafer combination also would permit the inductance to be adjusted to meet tight manufacturing tolerances. Pet. 34; Ex. 1003 ¶ 126; Ex. 1009, 1:43–58. Further, combining Kaneko’s magnetic sleeve with Franco and Shafer would have been nothing more than combining known prior art elements according to known methods to yield predictable results. Pet. 35; Ex. 1003 ¶ 127; *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.”).

Patent Owner responds that Petitioner “advance[s] no meaningful motivation to combine Franco, Shafer, and Kaneko.” PO Resp. 40. Patent Owner’s argument is not persuasive. As discussed above, Petitioner’s evidence shows that it would have been obvious to combine Kaneko’s metal magnetic sleeve with Franco and Shafer because 1) it would further confine magnetic leakage; 2) it would further increase inductance; 3) it would permit the inductance to be adjusted to meet tight manufacturing tolerances; and 4) it would have been nothing more than combining known prior art elements according to known methods to yield predictable results. Pet. 34–35; Ex. 1003 ¶¶ 125–127; Ex. 1009, 1:43–58.

Patent Owner responds that that “[t]here would have been no reason to combine Shafer and Kaneko since Shafer claims that the inductance value of his invention is already optimized and there would be no need to adjust it.” PO Resp. 40 (citing Ex. 2009 ¶ 81). Patent Owner’s argument is not persuasive. Neither Patent Owner nor its declarant, Dr. Raschke, identify any portion of Shafer that states there is no need to adjust the inductance value of its inductor. *See* PO Resp. 40; Ex. 2009 ¶ 81. Further, Petitioner does not propose adding Kaneko’s metal magnetic sleeve to Shafer’s

inductor. *See* Pet. 34; Ex. 1003 ¶ 125. Rather, Petitioner proposes using Kaneko’s metal magnetic sleeve to surround the inductor of the Franco and Shafer combination, which includes Franco’s core and coil. Pet. 34; Ex. 1003 ¶ 125. Patent Owner does not argue or identify evidence indicating that the inductor of the Franco and Shafer combination would not need any adjustment. *See* PO Resp. 40; Ex. 2009 ¶ 81.

Patent Owner responds that “Shafer already ‘provides a self shielding capability’ because it ‘includes a magnetic material completely surrounding the coil,’” and, thus, “the shield effects of Shafer and Kaneko are redundant.” Pet. 40–41 (citing Ex. 1007, 1:34–35; Ex. 1009, 1:8–9; Ex. 2009 ¶¶ 82–84). Patent Owner’s argument is not persuasive. Even if we assume that the Franco and Shafer combination includes some magnetic shielding from Shafer’s magnetic molding material, the evidence of record shows that Kaneko’s metal magnetic sleeve would “*further* improve on the confinement of magnetic leakage flux and thereby reduce EMI.” Pet. 34; Ex. 1003 ¶ 125 (emphasis added).

Patent Owner also responds that Kaneko’s “use of a ‘filling adhesive’ between the coil and the sleeve core . . . is incompatible with Shafer, because Shafer ‘includes a magnetic material completely surrounding the coil.’” PO Resp. 41 (citing Ex. 1007, 1:30–31; Ex. 1009, 2:30–32; Ex. 2009 ¶ 85). Patent Owner’s argument is not persuasive. Although Kaneko teaches adhering its magnetic sleeve over a coil, the evidence of record shows that Kaneko’s magnetic sleeve could also be used over Shafer’s magnetic molding material. Pet. 36; Ex. 1003 ¶ 131. Further, Patent Owner does not provide any specific reason why a person of ordinary skill in the art would not reasonably expect Kaneko’s magnetic sleeve to work over

Shafer's magnetic molding material. *See* PO Resp. 41; Ex. 2009 ¶ 85; *O'Farrell*, 853 F.2d at 903–04.

3. *Summary*

For the foregoing reasons, Petitioner has shown by a preponderance of the evidence that claims 6 and 16 would have been obvious over Franco, Shafer, and Kaneko.

H. Ground 1E - Obviousness of Claims 8 and 18 over Franco, Shafer, and Ohkawa

Petitioner argues that claims 8 and 18 would have been obvious over Franco, Shafer, and Ohkawa. Pet. 2, 36. For the reasons discussed below, Petitioner has shown by a preponderance of the evidence that claims 8 and 18 would have been obvious over Franco, Shafer, and Ohkawa.

1. *Claims 8 and 18*

Claim 8 depends from claim 1, and recites “wherein said polymer resin is a thermoplastic polymer.” Ex. 1001, 6:52–53. Claim 18 depends from claim 11, and recites a similar limitation. *Id.* at 8:6–7. Ohkawa teaches using a thermoplastic resin for compression molding of electrical devices. Pet. 36–37, 39; Ex. 1003 ¶¶ 134–135, 140–141; Ex. 1011, 2:18–22, 3:1–26. Patent Owner responds that it would not have been obvious to combine Franco, Shafer, and Ohkawa (which we address below in Section II.H.2), but Patent Owner does not dispute that the combination of Franco, Shafer, and Ohkawa teaches the limitation of claims 8 and 18. *See* PO Resp. 42.

2. *Reasons for Combining Franco, Shafer, and Ohkawa*

Petitioner presents evidence that a person of ordinary skill in the art would have had reason to combine the cited teachings of Franco, Shafer, and Ohkawa. Pet. 36–38 (citing Ex. 1003 ¶¶ 133–138). We agree with and

adopt Petitioner’s reasoning. Specifically, Ohkawa relates to the same field of endeavor as the ’390 patent, namely, inductors. Pet. 37; Ex. 1001, 1:6–9; Ex. 1003 ¶¶ 134, 136; Ex. 1011, 8:5–12. Ohkawa also is reasonably pertinent to a particular problem with which the inventors of the ’390 patent were involved, namely, providing electromagnetic shielding for an electronic device. Pet. 37–38; Ex. 1001, 1:50–58; Ex. 1003 ¶¶ 134, 137; Ex. 1011, 8:5–12; Dec. on Inst. 25–26. It would have been obvious to use Ohkawa’s thermoplastic resin in the magnetic molding material that embeds the outer periphery of the coil in the Franco and Shafer combination. Pet. 38; Ex. 1003 ¶ 137. Doing so would have been obvious because Ohkawa’s thermoplastic resin provides several benefits, including 1) good moldability; 2) high mechanical properties and dimensional stability; and 3) suitability for secondary machining. Pet. 38; Ex. 1003 ¶ 137; Ex. 1011, 3:1–9.

Patent Owner responds that “any connection [between Ohkawa and] electronic components generally, let alone inductors specifically, is tenuous.” PO Resp. 42 (citing Ex. 1011, 8:6–12). Patent Owner’s argument is not persuasive. Ohkawa teaches that its molding composition has applications in the “structural and functional parts in electric and electronic instruments.” Ex. 1011, 8:5–8. And Petitioner’s declarant, Dr. Erickson, explains that a person of ordinary skill in the art “would have understood that ‘functional parts in electric and electronic instruments’ includes discrete electric components, such as inductors.” Ex. 1003 ¶ 134. Further, as discussed above, Ohkawa also is analogous art because it is reasonably pertinent to a particular problem with which the inventors of the ’390 patent were involved, namely, providing electromagnetic shielding for an electronic device. Pet. 37–38; Ex. 1001, 1:50–58; Ex. 1003 ¶¶ 134, 137; Ex.

1011, 8:5–12 (“shielding materials for electro-magnetic waves”); Dec. on Inst. 25–26.

Patent Owner responds that Petitioner “advance[s] no meaningful motivation to combine Franco, Shafer, and [Ohkawa],” and, “[t]hus, there are no rational underpinnings for Petitioner[’s] attempt to paste the proffered references together.” PO Resp. 42. According to Patent Owner, Petitioner “point[s] to no advantages of using the Ohkawa material instead of the Shafer material in the Shafer invention,” and “[t]here is no evidence that the Shafer material was deficient in any way.” *Id.* Patent Owner’s argument is not persuasive. As discussed above, Ohkawa’s thermoplastic resin provides several benefits, including 1) good moldability; 2) high mechanical properties and dimensional stability; and 3) suitability for secondary machining. Pet. 38; Ex. 1003 ¶ 137; Ex. 1011, 3:1–9.

3. *Summary*

For the foregoing reasons, Petitioner has shown by a preponderance of the evidence that claims 8 and 18 would have been obvious over Franco, Shafer, and Ohkawa.

I. Ground 2A – Obviousness of Claims 1, 3, 4, 7, 9–11, 13, 14, 17, 19, and 20 over Amada and Shafer

Petitioner argues that claims 1, 3, 4, 7, 9–11, 13, 14, 17, 19, and 20 would have been obvious over Amada and Shafer. Pet. 2, 40, 55. For the reasons discussed below, Petitioner has shown by a preponderance of the evidence that claims 1, 3, 4, 7, 9–11, 13, 14, 17, 19, and 20 would have been obvious over Amada and Shafer.

1. Overview of Amada

Amada teaches an inductor with a magnetic bobbin that includes a core and flanges. Ex. 1006, 3:38–42. Amada teaches that its inductor

includes an electrically conducting coil wound around the magnetic core. *Id.* at 3:51–59. Amada also teaches that a coating comprising a magnetic powder and an epoxy resin is formed on the entire circumference of the coil. *Id.* at 4:4–6, 5:38–42, Figs. 1(A), 1(B).

2. Claim 1

Claim 1 recites “[a]n inductor with enhanced inductance.”¹⁵ Ex. 1001, 6:25. Amada teaches an inductor with a coil embedded in a magnetic coating that increases inductance per unit volume. Pet. 44–45; Ex. 1003 ¶¶ 155–156; Ex. 1006, 1:53–62, 5:38–42. Shafer teaches an inductor with a coil embedded in a magnetic molding material that increases inductance per unit volume. Pet. 13, 17, 45; Ex. 1003 ¶¶ 157–158; Ex. 1007, 3:24–29 (“The first and second powdered irons have differing electrical characteristics that allow the device to have a high inductance yet low core losses so as to maximize its efficiency.”); Dec. on Inst. 10.

Patent Owner responds that the term “enhanced inductance” refers to “the increase in inductance of the inductor described by the ’390 patent in comparison to the same inductor containing the same number of winding turns, but without the magnetic resin layer embedding the conducting coil.” PO Resp. 54. Patent Owner contends that Petitioner “state[s] that a magnetic resin coating is used by Amada to improve the productivity of a wire wound electronic component,” but “the cited portion of Amada does

¹⁵ For purposes of this Decision, we do not decide whether the preamble is limiting because we determine the prior art nonetheless teaches “an inductor with enhanced inductance.” Further, neither party argues that the preamble is not limiting. *See* Pet. 44–45; PO Resp. 54–55.

not support Petitioner[’s] assertion.” *Id.* at 54–55 (citing Pet. 44; Ex. 1006, 1:53–63).

Patent Owner’s argument is not persuasive. First, Patent Owner’s argument is premised on its proposed construction of the term “enhanced inductance,” but, as discussed above, we adopt only a portion of that proposed construction. *See* Section II.C.1. Second, Amada teaches that its magnetic coating “increases inductance and thereby allows the number of turns of the coil . . . to be reduced.” Ex. 1006, 5:38–42. Patent Owner does not address that specific teaching of Amada. *See* PO Resp. 54–55.

Claim 1 recites “a magnetic core.” Ex. 1001, 6:26. Amada teaches an inductor with a magnetic bobbin that comprises a core and flanges. Pet. 45–46; Ex. 1006, 3:38–42.

Patent Owner responds that Amada only “describes that the flanges of the bobbin are magnetic – note the core.” PO Resp. 55 (citing Ex. 1006, 3:38–43, 4:15–17, 5:1–2). Patent Owner’s argument is not persuasive. Amada teaches the following:

Referring to FIG. 1, (A) and (B), a specific configuration of a chip inductor is shown and includes a magnetic bobbin 1. The bobbin 1 has a core 1*a* having a circular cross-section and rectangular flanges 1*b* formed at both ends of the core 1*a*.
Ex. 1006, 3:38–42 (bolding omitted). The first sentence above indicates that the entire bobbin is magnetic, and the second sentence indicates that the magnetic bobbin includes a core and flanges. *Id.* In other words, Amada teaches that the entire bobbin, including the core, is magnetic. *Id.*

Claim 1 recites “an electrically conducting coil wound about said magnetic core.” Ex. 1001, 6:27–28. Amada teaches an inductor with an electrically conducting coil wound around a magnetic core. Pet. 46; Ex.

1006, 3:51–59. Patent Owner does not dispute that the Amada and Shafer combination teaches this limitation of claim 1.

Claim 1 recites “a magnetic resin layer compression-molded to embed at least a portion of an outer periphery of said electrically conducting coil.” Ex. 1001, 6:29–31. Amada teaches a coating comprising a magnetic powder and an epoxy resin that is formed on the entire circumference of an electrically conducting coil. Pet. 46–47; Ex. 1003 ¶¶ 167–168; Ex. 1006, 4:4–6, 5:38–42, Figs. 1(A), 1(B), 4(A). Shafer teaches a magnetic molding material comprising magnetic powders and a resin that is compression molded to embed an electrically conducting coil. Pet. 47–49; Ex. 1003 ¶¶ 169–172; Ex. 1007, 3:24–26, 4:1–6, 5:8–10, Fig. 6. As discussed in more detail below, it would have been obvious to embed the outer periphery of Amada’s coil in either Amada’s magnetic coating or Shafer’s magnetic molding material using Shafer’s compression molding. Pet. 41–44; Ex. 1003 ¶¶ 146, 149, 151; *see* Section II.I.9.

Patent Owner responds that “the core in Shafer is the entire material in Shafer Figure 6 that surrounds the winding, both down the middle and around the outside.” PO Resp. 56 (citing Ex. 2010, 10:5–12); *see* PO Sur-reply 18. Thus, according to Patent Owner, “Shafer’s magnetic resin layer cannot ‘embed at least a portion of an outer periphery of said electrically conducting coil’ because the outer periphery of the coil is embedded by the

inductor core.”¹⁶ PO Resp. 56. Patent Owner’s argument is not persuasive. First, Patent Owner’s argument appears to be based on its proposed construction that requires the magnetic resin layer to embed “only” the outer periphery of the coil. *Id.* at 4, 56. As discussed above, we decline to adopt that construction. *See* Section II.C.3. Second, Amada teaches that its magnetic coating is formed on the outer periphery of the inductor coil. Pet. 46–47; Ex. 1003 ¶¶ 167–168; Ex. 1006, 4:4–6, 5:38–42, Figs. 1(A), 1(B), 4(A). Patent Owner does not address that specific teaching of Amada. *See* PO Resp. 56. Third, Patent Owner acknowledges that Shafer’s magnetic molding material “surrounds . . . the outside” of the coil, and, thereby, acknowledges that the magnetic molding material embeds the outer periphery of the coil. *Id.*

Claim 1 recites “wherein said magnetic resin layer contains a magnetic powder dispersed in a polymer resin.” Ex. 1001, 6:32–33. Amada teaches that its magnetic coating contains a magnetic powder and an epoxy resin. Pet. 49; Ex. 1003 ¶ 176; Ex. 1006, 5:38–40. The evidence of record shows that a person of ordinary skill in the art would have known that Amada’s magnetic powder is dispersed in the epoxy resin, and that Amada’s epoxy resin is a polymer resin. Pet. 49–50; Ex. 1001, 1:65–67; Ex. 1003 ¶¶ 176–177. Shafer teaches that its magnetic molding material comprises iron powders and a polyester resin. Pet. 17–18, 50; Ex. 1007, 3:24–47, 6:49–51.

¹⁶ Patent Owner does not dispute that the Amada and Shafer combination teaches a layer. *See* PO Resp. 55–56. Nonetheless, we note that, like the ’390 patent and Shafer, a person of ordinary skill in the art could have ascertained the thickness of Amada’s magnetic coating by taking the difference between the total outside length of Amada’s magnetic coating and the thickness of its coil. *See* Pet. 46–47; Ex. 1006, Figs. 1(B), 1(C), 4(A).

The evidence of record shows that a person of ordinary skill in the art would have known that Shafer's iron powders are dispersed in the polyester resin, and that Shafer's polyester resin is a polymer resin. Pet. 17–18, 50; Ex. 1003 ¶¶ 179–180; Ex. 1013, 1; Ex. 1017, 407; Ex. 1019, 1; Ex. 1033, 144:5–15; Ex. 2010, 7:6–8. Patent Owner does not dispute that the Amada and Shafer combination teaches this limitation of claim 1.

3. *Claim 11*

Claim 11 recites “[a] method for making inductors with enhanced inductance.”¹⁷ Ex. 1001, 6:61–62. Amada teaches an inductor with a coil embedded in a magnetic coating that increases inductance per unit volume. Pet. 44–45, 51; Ex. 1003 ¶¶ 155–156, 183; Ex. 1006, 1:53–62, 5:38–42. Shafer teaches an inductor with a coil embedded in a magnetic molding material that increases inductance per unit volume. Pet. 13, 17, 45, 51–52; Ex. 1003 ¶¶ 157–158, 184; Ex. 1007, 3:24–29 (“The first and second powdered irons have differing electrical characteristics that allow the device to have a high inductance yet low core losses so as to maximize its efficiency.”); Dec on Inst. 10.

Patent Owner responds that Petitioner's “argument that Shafer discloses ‘an improved inductor’ because it is ‘smaller’ is without merit.” PO Resp. 56–57. Patent Owner's argument is not persuasive. As discussed above, Amada teaches that its magnetic coating “increases inductance and thereby allows the number of turns of the coil . . . to be reduced.” Ex. 1006,

¹⁷ For purposes of this Decision, we do not decide whether the preamble is limiting because we determine the prior art nonetheless teaches “[a] method for making inductors with enhanced inductance.” Further, neither party argues that the preamble is not limiting. See Pet. 51–52; PO Resp. 56–57.

5:38–42. Patent Owner does not address that specific teaching of Amada. *See* PO Resp. 56–57. Further, Patent Owner misinterprets Petitioner’s assertions regarding Shafer. Petitioner does not assert that Shafer teaches an inductor with enhanced inductance simply because it is smaller. *See* Pet. 45, 51. Rather, Petitioner asserts that Shafer’s “compression-molded magnetic powder resin layer *increases the inductance per unit volume*, which is why the inductor can be made smaller.” *Id.* (emphasis added).

Claim 11 recites “winding an electrically conducting coil about a magnetic core.” Ex. 1001, 6:63–64. Amada teaches an inductor with an electrically conducting coil wound around a magnetic core. Pet. 45–46, 52; Ex. 1006, 3:38–42, 3:51–59.

Patent Owner responds that “the core in Shafer is the entire material in Shafer Figure 6 that surrounds the winding, both down the middle and around the outside.” PO Resp. 57 (citing Ex. 2010, 10:5–12). Thus, according to Patent Owner, “in the hypothetical combination of Amada and Shafer, the coil is within the core, instead of being wound about the core.” *Id.* Further, Patent Owner contends that “in the alternative, Shafer cannot wrap an electrically conducting coil around a magnetic core because there is no magnetic core at the time that the coil is placed into Shafer’s mold.” *Id.* (citing Ex. 1007, Fig. 4). Patent Owner’s argument is not persuasive because it only addresses Shafer, not Amada. *See id.* As discussed above, Amada teaches an inductor with an electrically conducting coil wound around a magnetic core. Pet. 45–46, 52; Ex. 1006, 3:38–42, 3:51–59. Patent Owner does not address that specific teaching of Amada. *See* PO Resp. 57.

Claim 11 recites “forming a magnetic resin layer by compression molding to embed at least a portion of an outer periphery of said electrically

conducting coil.” Ex. 1001, 6:65–67. Amada teaches a coating comprising a magnetic powder and an epoxy resin that is formed on the entire circumference of an electrically conducting coil. Pet. 46–47, 53; Ex. 1003 ¶¶ 167–168, 190; Ex. 1006, 4:4–6, 5:38–42, Figs. 1(A), 1(B), 4(A). Shafer teaches a magnetic molding material comprising magnetic powders and a resin that is compression molded to embed an electrically conducting coil. Pet. 47–49, 53; Ex. 1003 ¶¶ 169–172, 190; Ex. 1007, 3:24–26, 4:1–6, 5:8–10, Fig. 6. As discussed in more detail below, it would have been obvious to embed the outer periphery of Amada’s coil in either Amada’s magnetic coating or Shafer’s magnetic molding material using Shafer’s compression molding. Pet. 41–44; Ex. 1003 ¶¶ 146, 149, 151; *see* Section II.I.9. Patent Owner responds that it would not have been obvious to combine Amada and Shafer (which we address below in Section II.I.9), but Patent Owner does not dispute that the Amada and Shafer combination teaches this limitation of claim 11. *See* PO Resp. 57–58.

Claim 11 recites “wherein said magnetic resin matrix contains a magnetic powder dispersed in a polymer resin.” Ex. 1001, 7:1–2. Amada teaches that its magnetic coating contains a magnetic powder and an epoxy resin. Pet. 49, 53; Ex. 1003 ¶ 176; Ex. 1006, 5:38–40. The evidence of record shows that a person of ordinary skill in the art would have known that 1) Amada’s magnetic powder is dispersed in the epoxy resin; 2) Amada’s epoxy resin is a polymer resin; and 3) Amada’s magnetic coating is a matrix. Pet. 49–50, 53; Ex. 1001, 1:65–67; Ex. 1003 ¶¶ 176–177, 191; Ex. 1023, 3:38–41. Shafer teaches that its magnetic molding material comprises iron powders and a polyester resin. Pet. 17–18, 50, 53; Ex. 1007, 3:24–47, 6:49–51. The evidence of record shows that a person of ordinary skill in the art

would have known that 1) Shafer's iron powders are dispersed in the polyester resin; 2) Shafer's polyester resin is a polymer resin; and 3) Shafer's magnetic molding material is a matrix material. Pet. 17–18, 50, 53; Ex. 1003 ¶¶ 179–180, 191; Ex. 1013, 1; Ex. 1017, 407; Ex. 1019, 1; Ex. 1023, 3:28–31; Ex. 1033, 144:5–15; Ex. 2010, 7:6–8. Patent Owner does not dispute that the Amada and Shafer combination teaches this limitation of claim 11.

4. Claim 3 and 13

Claim 3 depends from claim 1, and recites “wherein said magnetic core is a metal or metal oxide magnetic core.” Ex. 1001, 6:38–39. Claim 13 depends from claim 11, and recites a similar limitation. *Id.* at 7:6–8. Amada teaches an inductor with a magnetic core made of ferrite, which is a metal oxide. Pet. 45–46, 53–54; Ex. 1003 ¶ 192; Ex. 1006, 3:38–42, 14:1–3.

Patent Owner responds that Amada teaches a bobbin with “flanges [that] are made of ferrite,” but “there is no indication that Amada's core is metal or a magnetic metal oxide.” PO Resp. 58 (citing Ex. 1006, 3:38–43, 4:15–17, 5:1–2). Patent Owner's argument is not persuasive. As discussed above, Amada teaches that the entire bobbin, including the core, is magnetic. Ex. 1006, 3:38–42; *see* Section II.I.2. Amada further teaches that “*the bobbin having the flanges at its ends may be formed by baking, e.g., ferrite or alumina.*” Ex. 1006, 14:1–3 (emphases added). Thus, Amada teaches that the entire bobbin, including the core, may be formed of ferrite. *Id.*

5. Claims 4 and 14

Claim 4 depends from claim 1, and recites “wherein said magnetic core is made of a ferromagnetic metal, a metal alloy, a ferrimagnetic metal oxide, or a mixture thereof.” Ex. 1001, 6:40–42. Claim 14 depends from

claim 11, and recites a similar limitation. *Id.* at 7:9–12. Amada teaches an inductor with a magnetic core made of ferrite, which is a ferrimagnetic metal oxide. Pet. 45–46, 54–55; Ex. 1003 ¶ 193; Ex. 1006, 3:38–42, 14:1–3.

Patent Owner responds that it would not have been obvious to combine Amada and Shafer (which we address below in Section II.I.9), but Patent Owner does not dispute that the Amada and Shafer combination teaches the limitation of claims 4 and 14. *See* PO Resp. 58–59.

6. *Claims 7 and 17*

Claim 7 depends from claim 1, and recites “wherein said polymer resin is a thermosetting polymer.” Ex. 1001, 6:50–51. Claim 17 depends from claim 11, and recites a similar limitation. *Id.* at 8:4–5. Amada teaches a magnetic coating that contains a magnetic powder and an epoxy resin. Pet. 49, 55; Ex. 1003 ¶ 176; Ex. 1006, 5:38–40. The evidence of record shows that a person of ordinary skill in the art would have known that Amada’s epoxy resin is a thermosetting polymer. Pet. 55; Ex. 1001, 1:65–67; Ex. 1003 ¶ 195; Ex. 1022, 1. Shafer teaches that its magnetic molding material comprises a polyester resin. Pet. 22, 55; Ex. 1007, 3:24–47. The evidence of record shows that a person of ordinary skill in the art would have known that Shafer’s polyester resin is a thermosetting polymer. Pet. 22, 55; Ex. 1003 ¶¶ 89–91, 196; Ex. 1015, 1633; Ex. 1022, 1; Ex. 1033, 120:23–121:6; Tr. 44:19–45:9. Patent Owner does not dispute that the Amada and Shafer combination teaches the limitation of claims 7 and 17.

7. *Claims 9 and 19*

Claim 9 depends from claim 1, and recites “wherein said magnetic resin layer buries both said magnetic core and said electrically conducting coil.” Ex. 1001, 6:54–56. Claim 19 depends from claim 11, and recites a

similar limitation. *Id.* at 8:8–10. Amada teaches that its magnetic coating buries the core and coil. Pet. 56–57; Ex. 1003 ¶¶ 199–201; Ex. 1006, Figs. 1(A), 17(B). Shafer teaches that its magnetic molding material is compression molded completely around the coil so that the inductor has no air spaces. Pet. 23–24, 57; Ex. 1003 ¶ 95; Ex. 1007, 1:28–31, 1:54–2:2, 4:1–6, Fig. 6.

Patent Owner responds that, in Amada, “[t]he flanges ‘bury’ the end portions of the core,” and, “[t]hus, the magnetic resin layer cannot bury the entire core.” PO Resp. 59 (citing Ex. 1006, 3:38–42, 4:15–17, 5:1–2). Patent Owner’s argument is not persuasive. Amada’s Figure 1(A) and Figure 17(B) show that its magnetic coating covers any exposed portions of the core and coil. Pet. 56–57; Ex. 1003 ¶¶ 199–202; Ex. 1006, Figs. 1(A), 17(B); Dec. on Inst. 30. Patent Owner does not dispute that specific teaching of Amada, nor does Patent Owner provide a specific construction of the term “bury” that requires more than what Amada teaches. *See* PO Resp. 59.

Patent Owner also responds that Petitioner’s “citation to Amada Figure 17(B) is misleading.” *Id.* Specifically, Patent Owner argues that “[e]lements 358 and 362 shown on Figure 17(B) are not the ‘epoxy resin or similar resin, e.g., ferrite powder’ disclosed at Amada 5:37–39,” because “[t]hat disclosure of coating 6 applied to Amada embodiments 1–4.” *Id.* (citing Ex. 1006, 5:26, 9:12). According to Patent Owner, “[i]ntervening references to a coating over the coils include the use of paint.” *Id.* (citing Ex. 1006, 8:65). Patent Owner’s argument is not persuasive. Amada describes the embodiment of Figure 17(B) as including “a coating or armor.” Ex. 1006, 9:5–10. As discussed above, Amada teaches that a coating or

armor may contain a magnetic powder and an epoxy resin. *Id.* at 4:4–6, 5:7–10; 5:38–42. Even if Patent Owner is correct that Amada’s coating may also be a paint, we do not see any portion of Amada that limits the Figure 17(B) embodiment to just a paint coating. *See id.* at 9:5–23.

8. *Claims 10 and 20*

Claim 10 depends from claim 1, and recites “wherein said magnetic powder is made of a ferromagnetic metal powder, a metal alloy powder, a ferrimagnetic metal oxide powder, or a mixture thereof.” Ex. 1001, 6:57–60. Claim 20 depends from claim 11, and recites a similar limitation. *Id.* at 8:11–14. Amada teaches that its magnetic coating is made of ferrite powder, which is a ferrimagnetic metal oxide powder. Pet. 58; Ex. 1003 ¶ 205; Ex. 1006, 5:38–42. Shafer teaches that its magnetic molding material is made of iron powders, which are ferromagnetic metal powders. Pet. 58; Ex. 1003 ¶ 206; Ex. 1007, 3:24–26. Patent Owner does not dispute that the Amada and Shafer combination teaches the limitation of claims 10 and 20.

9. *Reasons for Combining Amada and Shafer*

Petitioner presents evidence that a person of ordinary skill in the art would have had reason to combine the cited teachings of Amada and Shafer. Pet. 41–44 (citing Ex. 1003 ¶¶ 147–153). We agree with and adopt Petitioner’s reasoning. Specifically, Amada and Shafer relate to the same field of endeavor as the ’390 patent, namely, inductors. Pet. 40–41; Ex. 1001, 1:6–9; Ex. 1003 ¶ 148; Ex. 1006, 3:38–40; Ex. 1007, 1:25–27. It would have been obvious to embed the outer periphery of Amada’s coil in Amada’s magnetic coating using Shafer’s compression molding. Pet. 41–42; Ex. 1003 ¶ 149. Doing so would have been obvious because it would

provide Amada's inductor with a uniform magnetic coating.¹⁸ Pet. 41–42; Ex. 1003 ¶ 149. Alternatively, it would have been obvious to embed the outer periphery of Amada's coil in Shafer's magnetic molding material using Shafer's compression molding. Pet. 42–43; Ex. 1003 ¶ 151. Doing so would have been obvious because Shafer's magnetic molding material (which is made with iron powder) exhibits higher saturation flux density than Amada's magnetic coating (which is made with ferrite), and, thus, would make Amada's inductor capable of higher currents. Pet. 42–43; Ex. 1003 ¶ 151. Further, combining the cited teachings of Amada and Shafer would have been within the level of ordinary skill in the art. Pet. 43–44; Ex. 1003 ¶ 152.

Patent Owner responds that Petitioner fails to explain how and why Amada and Shafer would have been combined. PO Resp. 43–44. Patent Owner's argument is not persuasive. As discussed above, Petitioner explains how Amada and Shafer would have been combined, namely, by embedding the outer periphery of Amada's coil in either Amada's magnetic coating or Shafer's magnetic molding material using Shafer's compression molding. Pet. 41–44; Ex. 1003 ¶¶ 146, 149, 151. Petitioner also explains why it would have been obvious to combine Amada and Shafer. Specifically, Shafer's compression molding process would provide Amada's inductor with a uniform magnetic coating, and Shafer's magnetic molding material would make Amada's inductor capable of higher currents. Pet. 41–43; Ex. 1003 ¶¶ 149, 151.

¹⁸ Petitioner also asserts that the Amada and Shafer combination would minimize air spaces in Amada's inductor. Pet. 42. We do not rely on that particular reason to combine Amada and Shafer.

a. *Patent Owner's Arguments Regarding How to Combine Amada and Shafer*

Patent Owner responds that Petitioner “simply state[s] that the proposed combination of Amada and Shafer ‘would have been within the level of ordinary skill in the art,’” which “should be given no probative value.” PO Resp. 44; *see* PO Sur-reply 5–8. Patent Owner’s argument is not persuasive. Shafer teaches that its compression molding process and magnetic molding material can be used to embed an inductor coil, which supports Petitioner’s argument that it would have been within the level of ordinary skill in the art to use Shafer’s compression molding process and/or magnetic molding material to embed the outer periphery of Amada’s coil. Pet. 15–17, 47–48; Ex. 1007, 3:24–26, 4:1–6, 5:8–10, Fig. 6. Further, Petitioner’s declarant, Dr. Erickson, explains that it would have been within the level of ordinary skill in the art to modify Shafer’s compression molding process to accommodate the size and shape of Amada’s inductor. Pet. 43–44; Ex. 1003 ¶ 152.

Patent Owner responds that Amada’s core and Shafer’s core are not interchangeable. PO Resp. 44–45. Specifically, Patent Owner argues that “Amada discloses the use of a solid metal core,” whereas “Shafer is unequivocal in requiring the use of a magnetic resin core.” *Id.* (citing Ex. 2009 ¶ 89; Ex. 2010, 14:13–14). Patent Owner’s argument is not persuasive because it misinterprets Petitioner’s proposed combination. Petitioner does not propose interchanging the cores of Amada and Shafer. *See* Pet. 41–44; Ex. 1003 ¶¶ 149, 151. Rather, in the proposed combination, Amada retains its solid core, and either Amada’s magnetic coating or Shafer’s magnetic molding material is compression molded around the outer periphery of Amada’s coil. Pet. 41–44; Ex. 1003 ¶¶ 149, 151. Further,

Patent Owner does not identify any portions of Shafer that criticize, discredit, or otherwise discourage using a solid metal core. *See* PO Resp. 44–45; Ex. 2009 ¶ 89.

Patent Owner responds that “[t]he Shafer molding process does not accommodate [Amada’s] solid core.” PO Resp. 45 (citing Ex. 2009 ¶ 91). In particular, Patent Owner argues that 1) Shafer’s die “can only accommodate leads on one side of the platen,” but “Amada uses leads on opposite ends of the coil”; 2) “the vertical pressure of Shafer’s pressure-inducing apparatus would distort the shape” of Amada’s horizontal coil; 3) Amada’s solid core “would hamper the even distribution of the resin within the coil envelope”; and 4) Amada’s “bobbin design of the core . . . is not compatible with” Shafer’s compression molding machine. *Id.* at 45–47 (citing Ex. 2009 ¶¶ 95–96); *see* PO Sur-reply 8–9 (citing Ex. 1033, 105:15–20; Ex. 2009 ¶ 50). Further, Patent Owner alleges that “the modifications that would have been needed to the teachings of Shafer to accommodate the teachings of Amada would not have been within the capabilities of a POSITA.” PO Resp. 49 (citing Ex. 2009 ¶ 97). And, according to Patent Owner, Petitioner’s declarant, Dr. Erickson, “did not know why a POSITA would modify Shafer to accommodate Amada.” *Id.* at 48 (citing Ex. 2010, 14:19–24).

Patent Owner’s arguments are not persuasive. With respect to the lead location issue, Shafer’s Figure 6 shows coil 90 with leads 98 and 100 on opposite sides,¹⁹ and Shafer teaches compression molding a magnetic

¹⁹ Shafer’s Figures 3 and 5C show leads 16 and 18 on the same side of platen 71, whereas Figure 6 shows leads 98 and 100 on opposite sides. *Compare* Ex. 1007, 3:1–9, Figs. 3, 5C, *with id.* at 5:1–10, Fig. 6.

molding material around the outer periphery of coil 90. Pet. 47–48; Ex. 1007, 5:1–10, Fig. 6. Thus, contrary to Patent Owner’s argument, Shafer teaches that its compression molding process can accommodate coils with different lead locations.

With respect to the coil orientation issue, Shafer’s Figure 6 shows a coil that is similar to Amada’s coil, with the only apparent difference being that Shafer’s coil is oriented vertically and Amada’s coil is oriented horizontally. Pet. 46–48; Ex. 1006, Fig. 1(C); Ex. 1007, Fig. 6. Patent Owner contends that “rotating the coil of Amada such that it was vertical would (1) interfere with Shafer’s compression mechanism (because the core inside the coil would not compress) and (2) introduce a problem with the routing of the core leads.” PO Resp. 46. But Patent Owner does not explain specifically why rotating Amada’s coil would create those issues. *See id.* Patent Owner cites to paragraph 96 of the Raschke Declaration to support its argument (*id.*), but that paragraph of the Raschke Declaration does not mention anything about coil orientation (*see* Ex. 2009 ¶ 96).

With respect to the solid core issue, Shafer teaches compression molding a magnetic molding material around a solid coil. Pet. 47–48; Ex. 1007, 4:3–6. Patent Owner contends, though, that compression molding Shafer’s magnetic molding material around Amada’s solid core would cause “an uneven distribution of resin, likely accompanied by the introduction of potential voids.” PO Resp. 46–47 (citing Ex. 2009 ¶ 96); *see id.* at 58–59; *see* PO Sur-reply 19–20. But neither Patent Owner nor its declarant, Dr. Raschke, explain specifically why Shafer’s compression molding process can accommodate Shafer’s solid coil, but would cause an uneven resin distribution when used with Amada’s solid core. *See* PO Resp. 46–47,

58–59; PO Sur-reply 19–20; Ex. 2009 ¶ 96. Further, as Patent Owner acknowledges, the '390 patent describes compression molding a magnetic resin layer around a solid core, but does not mention any issues with uneven distribution of resin or potential voids. Ex. 1001, 3:12–19; Tr. 38:4–39:3.

With respect to the bobbin issue, Patent Owner simply states that “[o]ne of the most glaring issues with Amada is the bobbin design of the core, which is not compatible with the pressure molding machine 68 of Shafer.” PO Resp. 47 (citing Ex. 1006, Fig. 27). But neither Patent Owner nor its declarant, Dr. Raschke, explain specifically why Shafer’s compression molding process cannot accommodate Amada’s bobbin. *See* PO Resp. 47; Ex. 2009 ¶ 96.

For those reasons, we are not persuaded that Schafer’s compression molding process cannot accommodate Amada’s inductor. Nonetheless, even if some modifications to Shafer’s compression molding process would have been necessary to accommodate Amada’s inductor, the parties’ declarants agree that those modifications would have been within the level of ordinary skill in the art. Ex. 1003 ¶ 152; Ex. 1033, 115:6–13, 116:8–20; Tr. 35:15–22.

Patent Owner responds that “[a]ttempting to combine the teachings of Amada and Shafer would result in a number of other non-trivial challenges.” PO Resp. 47. Specifically, Patent Owner contends that combining Amada’s “‘conventional’ core with the use of a magnetic resin material around the coil introduces ‘the need for a high-temperature sintering process,’ and it introduces ‘the commonly encountered problems involving molding, fabrication, coiling, and packaging, etc.’” *Id.* (citing Ex. 1001, 3:44–55; Ex. 2009 ¶ 98); *see* PO Sur-reply 9.

Patent Owner's argument is not persuasive. The '390 patent describes an embodiment in which a magnetic resin layer is compression molded around a conventional magnetic core. Ex. 1001, 2:60–3:19. Patent Owner's argument relies on another embodiment in which the conventional magnetic core is eliminated. PO Resp. 47 (citing Ex. 1001, 3:44–55). Specifically, Patent Owner cites the following portion of the '390 patent:

In yet another modification of the process of the present invention, the magnetic core can be eliminated and the entire conducting coil is embedded inside a matrix of the magnetic-resin mixture. This [] embodiment is most advantageous for manufacturing inductors wherein the required value of inductance is only moderate. This embodiment eliminates the need for a high-temperature sintering process, it also eliminates many of the commonly encountered problems involving molding, fabrication, coiling, and packaging, etc. This process involves placing the coil only into the compression mold, followed by the step of pouring the magnetic resin into the mold to enclose the coil.

Ex. 1001, 3:44–55. In other words, the '390 patent describes two different embodiments, one that includes a conventional magnetic core but requires using a sintering process and addressing some common problems, and one that eliminates the conventional magnetic core but only provides moderate inductance. *Id.*

The '390 patent, however, does not indicate that using a sintering process or addressing the common problems with a conventional magnetic core would have been beyond the level of ordinary skill in the art. *See id.* Similarly, neither Patent Owner nor its declarant, Dr. Raschke, indicate that doing so would have been beyond the level of ordinary skill in the art. *See* PO Resp. 47; Ex. 2009 ¶ 98. In fact, as discussed above, the parties' declarants agree that using Shafer's compression molding process with

Amada's conventional magnetic core would have been within the level of ordinary skill in the art. Ex. 1003 ¶ 152; Ex. 1033, 115:6–13, 116:8–20.

Patent Owner responds that “[a] POSITA would understand that putting a magnetic resin layer (Shafer) around the outside of a coil having a solid core (Amada) would not have predictable results as compared with putting a magnetic resin layer (Shafer) around a coil having a magnetic resin core (Shafer).” PO Resp. 48 (citing Ex. 2009 ¶¶ 52, 99); *see id.* at 53 (citing Ex. 2009 ¶ 109); *see* PO Sur-reply 10 (citing Ex. 1033, 135:15–19). Patent Owner contends that Petitioner's declarant, Dr. Erickson, “agrees, in that the results depend upon other factors, specifically the reluctance of the added resin layer in relation to the reluctance of the core.” PO Resp. 48 (citing Ex. 2010, 4:7–5:14).

Patent Owner's argument is not persuasive. Shafer describes an inductor with a *resin* core and teaches that embedding the outer periphery of the inductor coil in a magnetic molding material “allow[s] the device to have a high inductance.” Pet. 11, 13, 16–17, 47–48; Ex. 1007, 3:24–29, 4:3–6. Amada describes an inductor with a *solid* core and teaches that embedding the outer periphery of the inductor coil in a magnetic resin coating “increases inductance.” Pet. 11, 44–45; Ex. 1006, 3:38–42, 5:38–42. Thus, the evidence of record shows that a person of ordinary skill in the art would have had a reasonable expectation that embedding the outer periphery of an inductor coil in a magnetic resin layer would increase its inductance

regardless of whether the core was solid or resin.²⁰ *See O’Farrell*, 853 F.2d at 903–04 (Fed. Cir. 1988).

Patent Owner responds that “Shafer cannot wrap an electrically conducting coil around a magnetic core because there is no magnetic core at the time that the coil is placed into Shafer’s mold.” PO Resp. 49 (citing Ex. 1007, Fig. 4; Ex. 2010, 15:17–16:1). Patent Owner’s argument is not persuasive because Petitioner does not rely on Shafer to teach an electrically conducting coil wound around a magnetic core. *See* Pet. 46. As discussed above, Amada teaches an inductor with an electrically conducting coil wound around a magnetic core. *Id.*; Ex. 1006, 3:51–59.

b. *Patent Owner’s Arguments Regarding Why to Combine Amada and Shafer*

Patent Owner responds that “[s]ince neither Amada, Shafer or Franco even mention using surrounding magnetic layers to increase the inductance of a wound coil inductor, a POSITA would not conclude the adding magnetic material to Amada’s armor coating would improve the coil inductor in any way.” PO Resp. 50 (citing Ex. 2009 ¶ 87). Patent Owner also argues that “Shafer does not disclose or suggest anything about the

²⁰ The deposition testimony of Dr. Erickson and Dr. Raschke cited by Patent Owner does not indicate that the Amada and Shafer combination would not have predictable results. *See* Ex. 1033, 134:2–135:19; Ex. 2010, 4:7–5:4. Rather, the cited testimony of Dr. Erickson simply indicates that adding a magnetic resin layer to an inductor with a solid core may not result in the exact same increase in inductance as adding a magnetic resin layer to an inductor with a resin core. Ex. 2010, 4:7–5:4. And the cited testimony of Dr. Raschke simply indicates that a person of ordinary skill in the art would need to perform certain calculations to determine the exact increase in inductance that results from adding a magnetic resin layer to an inductor. Ex. 1033, 134:2–135:19.

impact on the device inductance as to the process of molding the magnetic mixture around the coil.” *Id.* (citing Ex. 1007, 1:18–24, 1:32–35, 1:41–42, 1:45–50; Ex. 2009 ¶ 45). According to Patent Owner, “[b]ecause the impact on inductance of the material surrounding the coil is never addressed there is no motivation for a POSITA to investigate such an effect.” *Id.* at 51.

Patent Owner’s argument is not persuasive. Both Amada and Shafer teach that embedding the outer periphery of an inductor coil in a magnetic resin material increases inductance. Specifically, Shafer teaches that its magnetic molding material includes powdered irons that “allow the device to have a high inductance yet low core losses so as to maximize its efficiency.” Ex. 1007, 3:24–29; *see* Pet. 11, 13, 17, 45. Amada teaches that its magnetic coating includes a ferrite powder that “increases inductance.” Ex. 1006, 5:38–42; *see* Pet. 44–45.

Patent Owner responds that a person of ordinary skill in the art would not have considered combining Amada and Shafer because “the technique of Shafer is only practical for inductors having low inductance values.” PO Resp. 51–52 (citing Ex. 1001, 3:44–49; Ex. 2009 ¶ 103); *see* PO Sur-reply 3 (citing Ex. 2009 ¶ 56). Patent Owner’s argument is not persuasive. Patent Owner does not direct us to any portion of Shafer that indicates its compression molding process or magnetic molding material are only practical for inductors having low inductance values. *See* PO Resp. 51–52; PO Sur-reply 3; Ex. 2009 ¶¶ 56, 103. Rather, Patent Owner relies on a portion of the ’390 patent that describes a particular embodiment with only “moderate” inductance because the magnetic core is eliminated. Ex. 1001, 3:44–49. However, Petitioner does not propose eliminating Amada’s magnetic core. *See* Pet. 41–44; Ex. 1003 ¶¶ 149, 151. In the proposed

combination, Amada retains its magnetic core, and either Amada's magnetic coating or Shafer's magnetic molding material is compression molded around the outer periphery of Amada's coil. Pet. 41–44; Ex. 1003 ¶¶ 149, 151.

Patent Owner responds that a person of ordinary skill in the art “would not have anticipated a benefit” from the Amada and Shafer combination.²¹ PO Resp. 52–54. Patent Owner's argument is not persuasive. As discussed above, Petitioner presents evidence that it would have been obvious to embed the outer periphery of Amada's coil in Amada's magnetic coating using Shafer's compression molding because it would provide Amada's inductor with a uniform magnetic coating. Pet. 41–42; Ex. 1003 ¶ 149. Patent Owner does dispute that the Amada and Shafer combination would provide Amada's inductor with a uniform magnetic coating. *See* PO Resp. 52–54.

As also discussed above, Petitioner presents evidence that it would have been obvious to embed the outer periphery of Amada's coil in Shafer's magnetic molding material using Shafer's compression molding because Shafer's magnetic molding material (which is made with iron powder) exhibits higher saturation flux density than Amada's magnetic coating (which is made with ferrite), and, thus, would make Amada's inductor capable of higher currents. Pet. 42–43; Ex. 1003 ¶ 151. Patent Owner contends that “Shafer's magnetic powder resin material would not

²¹ Patent Owner disputes whether a person of ordinary skill in the art would have combined Amada and Shafer in order to provide physical protection for the inductor. PO Resp. 52–53. But Petitioner does not rely on physical protection as a reason for combining Amada and Shafer. *See* Pet. 41–44; Ex. 1003 ¶¶ 149, 151.

necessarily exhibit greater flux density than Amada's magnetic material (made with ferrite)." PO Resp. 53 (citing Ex. 2009 ¶ 107). According to Patent Owner, "the results of any comparison between the two materials would not be predictable" and "would need to be determined through extensive experimentation." *Id.* (citing Ex. 2009 ¶ 107).

Patent Owner's argument is not persuasive. Petitioner and its declarant, Dr. Erickson, identify documentary evidence showing that an inductor made with an iron material exhibits higher saturation flux density than an inductor made with a ferrite material. Pet. 42–43; Pet. Reply 17; Ex. 1003 ¶ 151; Ex. 1007, 1:45–49, 6:33–34; Ex. 1032, 17 ("Ferrite cores are ceramic materials having low saturation flux density."); 41 ("Laminated iron alloy cores exhibit the highest [saturation flux density] . . . while ferrite cores exhibit . . . the lowest [saturation flex density]"). On the other hand, Patent Owner and its declarant, Dr. Raschke, do not identify any documentary evidence indicating that the result of using Shafer's magnetic molding material would be unpredictable and require undue experimentation. *See* PO Resp. 53; PO Sur-reply 16–17; Ex. 2009 ¶ 107.

Patent Owner responds that "Amada discloses the use of a solid ferrite core." PO Resp. 53 (citing Ex. 2009 ¶ 110). According to Patent Owner, "Shafer actually explains that the use of ferrite as the powdered material does not work with Shafer's invention because the combination 'results in an inductor which saturates at a much lower level' than Shafer's invention." *Id.* at 53, 58 (citing Ex. 2004, 2; Ex. 2009 ¶¶ 67, 110); *see* PO Sur-reply 20–21 (citing Ex. 2004, 2; Ex. 2009 ¶ 67). Patent Owner further argues that "even considering the use of an iron powder contained in a resin base is very much

different from using solid iron” and “Amada discloses only a solid core – not the use of a powder.” PO Resp. 53–54 (citing Ex. 2004, 2; Ex. 2009 ¶ 110).

Patent Owner’s arguments are not persuasive. First, Patent Owner does not direct us to any portion of Shafer that indicates its inductor would not work with a ferrite material or otherwise teaches away from using a ferrite material. *See* PO Resp. 53–54, 59; PO Sur-reply 20–21; Ex. 2009 ¶¶ 67, 110. Patent Owner only directs us to a declaration submitted during prosecution of Shafer that describes certain advantages of using an iron material. Ex. 2004, 2. Second, even if we assume that Shafer teaches away from using a ferrite material, Petitioner does not propose incorporating Amada’s ferrite core into Shafer’s inductor. *See* Pet. 41–44; Ex. 1003 ¶¶ 146, 149, 151. As discussed above, Petitioner proposes embedding the outer periphery of Amada’s coil in either Amada’s magnetic coating or Shafer’s magnetic molding material using Shafer’s compression molding. Pet. 41–44; Ex. 1003 ¶¶ 146, 149, 151.

Patent Owner responds that “[t]he asserted ‘order’ of the proffered combination of references is not relevant” because “[t]he question is whether a POSITA would have been motivated to combine the references.” PO Sur-reply 12 (emphasis omitted). Patent Owner’s argument is not persuasive. As discussed above, the evidence of record shows that the Amada and Shafer combination would improve Amada’s inductor. Pet. 41–44; Ex. 1003 ¶¶ 149, 151. Even if Patent Owner is correct that incorporating Amada’s core and/or coil into Shafer would not improve Shafer’s inductor, we see no reason why that would deter a person of ordinary skill in the art from incorporating Shafer’s compression molding process and/or magnetic molding material into Amada as proposed by Petitioner.

10. Summary

For the foregoing reasons, Petitioner has shown by a preponderance of the evidence that claims 1, 3, 4, 7, 9–11, 13, 14, 17, 19, and 20 would have been obvious over Amada and Shafer.

J. Ground 2B - Obviousness of Claims 2 and 12 over Amada, Shafer, and Rittner

Petitioner argues that claims 2 and 12 would have been obvious over Amada, Shafer, and Rittner. Pet. 2, 58. For the reasons discussed below, Petitioner has shown by a preponderance of the evidence that claims 2 and 12 would have been obvious over Amada, Shafer, and Rittner.

1. Claims 2 and 12

Claim 2 depends from claim 1, and recites “wherein said magnetic resin layer has a thickness determined matching a predetermined inductance of said inductor.” Ex. 1001, 6:35–37. Claim 12 depends from claim 11, and recites a similar limitation. *Id.* at 7:3–5. Rittner teaches setting the inductance value of an inductor by adjusting the thickness of a covering paste that includes a ferromagnetic material. Pet. 28–29, 61; Ex. 1003 ¶¶ 103, 215 Ex. 1008, code (57), 1:10–22, 2:20–48, 5:10–6:5.

Patent Owner responds that “because Amada is a rectangular device, a POSITA would not identify any sort of a consistent thickness of the resin layer in Amada because Amada is a rectangular block placed over a cylindrical coil.” PO Resp. 60. Patent Owner’s argument is not persuasive. Amada’s Figure 1(B) shows that the thickness of coating 6 varies somewhat along the circumference of coil 4 because coating 6 is rectangular and coil 4 is round. Ex. 1006, Fig. 1(B). But Patent Owner acknowledges that the thickness of the claimed magnetic resin layer may vary somewhat, just not substantially. PO Resp. 7 (“the term ‘layer’ . . . refers to an ascertainable

thickness, and *not a thickness that varies substantially* along the circumference of the outside of the coil.” (emphasis added)). Patent Owner does not provide a specific explanation or identify specific evidence indicating that the thickness of Amada’s coating varies substantially such that it would prevent a person of ordinary skill in the art from setting the thickness to match a required inductance, as taught by Rittner. *See id.* at 60.

2. *Reasons for Combining Amada, Shafer, and Rittner*

Petitioner presents evidence that a person of ordinary skill in the art would have had reason to combine the cited teachings of Amada, Shafer, and Rittner. Pet. 59–60 (citing Ex. 1003 ¶¶ 208–213). We agree with and adopt Petitioner’s reasoning. Specifically, Rittner relates to the same field of endeavor as the ’390 patent, namely, inductors. Pet. 59; Ex. 1001, 1:6–9; Ex. 1003 ¶ 209; Ex. 1008, 1:6–9. It would have been obvious to adjust the thickness of the magnetic coating or molding material in the Amada and Shafer combination in order to set a required inductance value, as taught by Rittner. Pet. 59; Ex. 1003 ¶ 211. Doing so would have been obvious because it would benefit manufacturers by allowing them to supply inductors with different inductance values for different applications. Pet. 59–60; Ex. 1003 ¶ 211; Ex. 1008, 1:48–53. Further, combining Rittner’s teachings with Amada and Shafer would have been nothing more than using Rittner’s teachings to improve the Amada and Shafer combination in the same way. Pet. 60; Ex. 1003 ¶ 212; *see KSR*, 550 U.S. at 417 (“[I]f a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill.”).

Patent Owner refers to its arguments regarding the Franco, Shafer, and Rittner combination. PO Resp. 60. As discussed above, Patent Owner's arguments are not persuasive. *See* Section II.E.2.

3. *Summary*

For the foregoing reasons, Petitioner has shown by a preponderance of the evidence that claims 2 and 12 would have been obvious over Amada, Shafer, and Rittner.

K. Ground 2C - Obviousness of Claims 5 and 15 over Amada, Shafer, and Butherus

Petitioner argues that claims 5 and 15 would have been obvious over Amada, Shafer, and Butherus. Pet. 2, 62. For the reasons discussed below, Petitioner has shown by a preponderance of the evidence that claims 5 and 15 would have been obvious over Amada, Shafer, and Butherus.

1. *Claims 5 and 15*

Claim 5 depends from claim 1, and recites “wherein said magnetic core is a compression molded magnetic core made of the same or different magnetic resin as said magnetic resin layer.” Ex. 1001, 6:43–46. Claim 15 depends from claim 11, and recites a similar limitation. *Id.* at 7:13–16. Butherus teaches forming a magnetic core by compressing particles of an iron powder and a thermoplastic or thermosetting resin. Pet. 32, 64; Ex. 1010, 1:17–20, 2:32–39, 3:32–39, 6:34–36.

Patent Owner refers to its arguments regarding the Franco, Shafer, and Butherus combination. PO Resp. 62. As discussed above, Patent Owner's arguments are not persuasive. *See* Section II.F.1.

2. *Reasons for Combining Amada, Shafer, and Butherus*

Petitioner presents evidence that a person of ordinary skill in the art would have had reason to combine the cited teachings of Amada, Shafer,

and Butherus. Pet. 62–63 (citing Ex. 1003 ¶¶ 220–223). We agree with and adopt Petitioner’s reasoning. Specifically, Butherus relates to the same field of endeavor as the ’390 patent, namely, inductors. Pet. 62; Ex. 1001, 1:6–9; Ex. 1003 ¶ 220; Ex. 1010, 2:13–15. It would have been obvious to use Butherus’s compression molded magnetic resin core in the Amada and Shafer combination because it would allow a manufacturer to set certain inductor parameters and would lower energy loss. Pet. 62–63; Ex. 1003 ¶¶ 222–223; Ex. 1010, 2:32–35, 2:41–45. In addition, combining Butherus with Amada and Shafer would have been nothing more than using Butherus’s compression molded magnetic resin core to improve the Amada and Shafer combination in the same way. Pet. 63; Ex. 1003 ¶ 223; *see KSR*, 550 U.S. at 417.

Patent Owner refers to its arguments regarding the Franco, Shafer, and Butherus combination. PO Resp. 61. As discussed above, Patent Owner’s arguments are not persuasive. *See* Section II.F.2.

Patent Owner also responds that because the Amada and Shafer combination “require[s] some type of solid iron or ferrite (not resin) core” and Butherus “discloses only a magnetic resin core,” “[a] POSITA would . . . not attempt to combine Amada and Butherus, as the two are mutually exclusive approaches.” PO Resp. 61. Patent Owner’s argument is not persuasive. Patent Owner does not direct us to any portion of Amada or Shafer that criticizes, discredits, or otherwise discourages use of a resin core. *See id.* Thus, we are not persuaded that Amada or Shafer teaches away from Butherus’s resin core.

3. *Summary*

For the foregoing reasons, Petitioner has shown by a preponderance of the evidence that claims 5 and 15 would have been obvious over Amada, Shafer, and Butherus.

L. Ground 2D - Obviousness of Claims 6 and 16 over Amada, Shafer, and Kaneko

Petitioner argues that claims 6 and 16 would have been obvious over Amada, Shafer, and Kaneko. Pet. 2, 64. For the reasons discussed below, Petitioner has shown by a preponderance of the evidence that claims 6 and 16 would have been obvious over Amada, Shafer, and Kaneko.

1. Claims 6 and 16

Claim 6 depends from claim 1, and recites that the inductor “further comprises a metal magnetic sheath outside of said magnetic resin layer.” Ex. 1001, 6:47–49. Claim 16 depends from claim 11, and recites a similar limitation. *Id.* at 8:1–3. Kaneko teaches an inductor with a metal magnetic sleeve enclosing a coil. Pet. 35–36, 66–67; Ex. 1003 ¶¶ 130, 235–236; Ex. 1009, 2:20–34, 4:5–9. Patent Owner responds that it would not have been obvious to combine Amada, Shafer, and Kaneko (which we address below in Section II.L.2), but Patent Owner does not dispute that the combination of Amada, Shafer, and Kaneko teaches the limitation of claims 6 and 16. *See* PO Resp. 62.

2. Reasons for Combining Amada, Shafer, and Kaneko

Petitioner presents evidence that a person of ordinary skill in the art would have had reason to combine the cited teachings of Amada, Shafer, and Kaneko. Pet. 65–66 (citing Ex. 1003 ¶¶ 229–231). We agree with and adopt Petitioner’s reasoning. Specifically, Kaneko relates to the same field of endeavor as the ’390 patent, namely, inductors. Pet. 65; Ex. 1001, 1:6–9;

Ex. 1003 ¶ 229; Ex. 1009, 1:28–30, 1:50–53. It would have been obvious to use Kaneko’s metal magnetic sleeve to surround the inductor of the Amada and Shafer combination. Pet. 65; Ex. 1003 ¶ 230. Doing so would have been obvious because it would further confine magnetic leakage flux and further increase inductance. Pet. 65; Ex. 1003 ¶ 230. Adding Kaneko’s metal magnetic sleeve to the inductor of the Amada and Shafer combination also would permit the inductance to be adjusted to meet tight manufacturing tolerances. Pet. 65–66; Ex. 1003 ¶ 231; Ex. 1009, 1:43–58. Further, combining Kaneko’s magnetic sleeve with Amada and Shafer would have been nothing more than combining known prior art elements according to known methods to yield predictable results. Pet. 66; Ex. 1003 ¶ 231; *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.”).

Patent Owner refers to its arguments regarding the Franco, Shafer, and Butherus combination. PO Resp. 62. As discussed above, Patent Owner’s arguments are not persuasive. *See* Section II.G.2.

3. *Summary*

For the foregoing reasons, Petitioner has shown by a preponderance of the evidence that claims 6 and 16 would have been obvious over Amada, Shafer, and Kaneko.

M. Ground 2E - Obviousness of Claims 8 and 18 over Amada, Shafer, and Ohkawa

Petitioner argues that claims 8 and 18 would have been obvious over Amada, Shafer, and Ohkawa. Pet. 2, 67. For the reasons discussed below, Petitioner has shown by a preponderance of the evidence that claims 8 and 18 would have been obvious over Amada, Shafer, and Ohkawa.

1. Claims 8 and 18

Claim 8 depends from claim 1, and recites “wherein said polymer is a thermoplastic polymer.” Ex. 1001, 6:52–53. Claim 18 depends from claim 11, and recites a similar limitation. *Id.* at 8:6–7. Ohkawa teaches using a thermoplastic resin for compression molding of electrical devices. Pet. 36–37, 39, 69; Ex. 1003 ¶¶ 134–135, 140–141, 244; Ex. 1011, 2:18–22, 3:1–26. Patent Owner responds that it would not have been obvious to combine Amada, Shafer, and Ohkawa (which we address below in Section II.M.2), but Patent Owner does not dispute that the combination of Amada, Shafer, and Ohkawa teaches the limitation of claims 8 and 18. *See* PO Resp. 63.

2. Reasons for Combining Amada, Shafer, and Ohkawa

Petitioner presents evidence that a person of ordinary skill in the art would have had reason to combine the cited teachings of Amada, Shafer, and Ohkawa. Pet. 67–69 (citing Ex. 1003 ¶¶ 240–242). We agree with and adopt Petitioner’s reasoning. Specifically, Ohkawa relates to the same field of endeavor as the ’390 patent, namely, inductors. Pet. 37, 67; Ex. 1001, 1:6–9; Ex. 1003 ¶¶ 134, 136, 240; Ex. 1011, 8:5–12. Ohkawa also is reasonably pertinent to a particular problem with which the inventors of the ’390 patent were involved, namely, providing electromagnetic shielding for an electronic device. Pet. 37–38, 67–68; Ex. 1001, 1:50–58; Ex. 1003 ¶¶ 134, 137, 241; Ex. 1011, 8:5–12; Dec. on Inst. 37–38. It would have been obvious to use Ohkawa’s thermoplastic resin in the magnetic coating or magnetic molding material that embeds the outer periphery of the coil in the Amada and Shafer combination. Pet. 68; Ex. 1003 ¶ 241. Doing so would have been obvious because Ohkawa’s thermoplastic resin provides several benefits, including 1) good moldability; 2) high mechanical properties and

dimensional stability; and 3) suitability for secondary machining. Pet. 68; Ex. 1003 ¶ 241; Ex. 1011, 3:1–9.

Patent Owner refers to its arguments regarding the Franco, Shafer, and Butherus combination. PO Resp. 63. As discussed above, Patent Owner’s arguments are not persuasive. *See* Section II.H.2.

3. *Summary*

For the foregoing reasons, Petitioner has shown by a preponderance of the evidence that claims 8 and 18 would have been obvious over Amada, Shafer, and Ohkawa.

N. Constitutionality

Patent Owner argues that Administrative Patent Judges (“APJs”) “are principal officers” who “must be appointed by the President and confirmed by the Senate,” but “because they are not, the current structure of the Board violates the Appointments Clause.” PO Resp. 63–64. We decline to consider Patent Owner’s constitutional challenge as the Federal Circuit addressed this issue in *Arthrex, Inc. v. Smith & Nephew, Inc.*, 941 F.3d 1320, 1325 (Fed. Cir. 2019).

Patent Owner argues that “[i]t is also unconstitutional to retroactively apply *inter partes* review to the ’390 Patent, which was filed in 1999 and issued in 2000, prior to the enactment of the AIA.” PO Resp. 64. We decline to consider Patent Owner’s constitutional challenge as the Federal Circuit addressed this issue in *Celgene Corp. v. Peter*, 931 F.3d 1342, 1362–63 (Fed. Cir. 2019).

O. Petitioner’s Motion to Exclude

Petitioner filed a Motion to Exclude (Paper 24, “Pet. Mot. Excl.”), Patent Owner filed an Opposition (Paper 26, “PO Opp. Excl.”) to the

Motion, and Petitioner filed a Reply (Paper 27, “Pet. Reply Excl.”) to the Opposition. We have considered the parties’ arguments, and, for the reasons discussed below, Petitioner’s Motion to Exclude is *denied*.

1. Exhibits 2001 and 2002

Exhibits 2001 and 2002 are excerpts from an Encarta World English Dictionary. Petitioner argues that Exhibits 2001 and 2002 should be excluded under Fed. R. Evid. 901, as lacking authentication. Pet. Mot. Excl. 2. Specifically, Petitioner contends that “[b]oth documents indicate only that they were ‘First published in 1999’ by Bloomsbury Publishing Plc,” which “is insufficient as a matter of law to establish the authenticity of the documents.” *Id.* at 2–3.

The proponent of an item of evidence must produce evidence sufficient to support a finding that the item is what the proponent claims it is. Fed. R. Evid. 901. Here, Exhibits 2001 and 2002 indicate that they are excerpts from an Encarta World English Dictionary. Ex. 2001; Ex. 2002. Petitioner does not provide any specific reason for us to believe that Exhibits 2001 and 2002 are not what they purport to be. *See* Pet. Mot. Excl. 2–3. Absent a persuasive explanation, Petitioner’s Motion to Exclude is *denied* with respect to Exhibits 2001 and 2002.

2. Exhibit 2005

Exhibit 2005 is a product datasheet for a powder coating known as Interpon 700. Petitioner argues that Exhibit 2005 should be excluded under Fed. R. Evid. 401, 402, 403, 801, 802, and 901, as irrelevant, prejudicial, inadmissible hearsay, and lacking authentication. Pet. Mot. Excl. 3–5. Specifically, Petitioner contends that Exhibit 2005 1) is irrelevant because “[w]hat was written in Exhibit 2005 in 2011 . . . does not make any fact

relating to 1999 or earlier, more or less probable”; 2) “constitutes inadmissible hearsay without an exception to support its admissibility”; and 3) lacks authentication because “there is no specific proof that . . . the exhibit is a true and correct copy of the document.” *Id.* at 4–5.

Petitioner’s argument regarding the relevance of Exhibit 2005 raises a question of sufficiency of proof, not admissibility. Further, as discussed above, we considered Exhibit 2005 in connection with Patent Owner’s arguments in the Response, but we do not find Patent Owner’s arguments that rely on Exhibit 2005 to be persuasive. *See* Section II.D.2. As a result, Petitioner does not suffer any prejudice by our admission of Exhibit 2005.

Petitioner does not explain specifically why the statements in Exhibit 2005 are inadmissible hearsay. *See* Pet. Mot. Excl. 4. Further, hearsay is limited to a statement that a party offers in evidence to prove the truth of the matter asserted in the statement. Fed. R. Evid. 801. Patent Owner offers, and we consider, Exhibit 2005 as evidence of the effect that the statements in Exhibit 2005 would have had on a person of ordinary skill in the art considering the prior art combinations proposed by Petitioner in this case. *See* Section II.D.2. Thus, the statements in Exhibit 2005 are not hearsay because they are not offered as evidence of the truth of the matter asserted.

The proponent of an item of evidence must produce evidence sufficient to support a finding that the item is what the proponent claims it is. Fed. R. Evid. 901. Here, Exhibit 2005 indicates that it is a product datasheet for a powder coating known as Interpon 700. Ex. 2005. Petitioner does not provide any specific reason for us to believe that Exhibit 2005 is not what it purports to be. *See* Pet. Mot. Excl. 4.

Therefore, Petitioner's Motion to Exclude is *denied* with respect to Exhibit 2005.

3. *Exhibit 2008*

Exhibit 2008 is a document entitled "The Different Types of Inductors and Their Affecting Factors" that is available at <http://www.elprocus.com>. Petitioner argues that Exhibit 2008 should be excluded under Fed. R. Evid. 401, 402, 403, 801, 802, and 901, as irrelevant, prejudicial, inadmissible hearsay, and lacking authentication. Pet. Mot. Excl. 5–6. Specifically, Petitioner contends that Exhibit 2008 1) is irrelevant because it "almost certainly postdates the Shafer references (dated 1997) and thus is not within the prior art"; 2) "constitutes inadmissible hearsay without an exception to support its admissibility"; and 3) lacks authentication because there is no evidence that it is a true and correct copy. *Id.*

Petitioner's argument regarding the relevance of Exhibit 2005 raises a question of sufficiency of proof, not admissibility. Further, as discussed above, we considered Exhibit 2008 in connection with Patent Owner's arguments in the Response, but we do not find Patent Owner's arguments that rely on Exhibit 2008 to be persuasive. *See* Section II.E.2. As a result, Petitioner does not suffer any prejudice by our admission of Exhibit 2008.

Petitioner does not explain specifically why the statements in Exhibit 2008 are inadmissible hearsay. *See* Pet. Mot. Excl. 6. Further, hearsay is limited to a statement that a party offers in evidence to prove the truth of the matter asserted in the statement. Fed. R. Evid. 801. Patent Owner offers, and we consider, Exhibit 2008 as evidence of the effect that the statements in Exhibit 2008 would have had on a person of ordinary skill in the art considering the prior art combinations proposed by Petitioner in this case.

See Section II.E.2. Thus, the statements in Exhibit 2008 are not hearsay because they are not offered as evidence of the truth of the matter asserted.

The proponent of an item of evidence must produce evidence sufficient to support a finding that the item is what the proponent claims it is. Fed. R. Evid. 901. Here, Exhibit 2008 indicates that it is a document entitled “The Different Types of Inductors and Their Affecting Factors” that is available at <http://www.elprocus.com>. Ex. 2008. Petitioner does not provide any specific reason for us to believe that Exhibit 2008 is not what it purports to be. *See* Pet. Mot. Excl. 5–6.

4. *Exhibit 2009*

Exhibit 2009 is the Raschke Declaration. Petitioner argues that Exhibit 2009 should be excluded under Fed. R. Evid. 401, 402, 403, 702, 703, as irrelevant, prejudicial, and unreliable. Pet. Mot. Excl. 6–10. Specifically, Petitioner argues that the Raschke Declaration 1) contains “[n]umerous statements” that “are conclusory and/or unsupported by additional evidence”; 2) “implicate[s] Dr. Raschke’s understanding of United States patent law and patent examination practice with respect to a person of ordinary skill in the art (POSITA), a subject on which he is not an expert”; and 3) contains statements that “are vague, conclusory, and generally unhelpful in analyzing the prior art or why a person of ordinary skill in the art would not have been motivated to combine the references.” *Id.* Petitioner’s arguments raise a question of the weight that should be given to Dr. Raschke’s testimony, not admissibility. Therefore, Petitioner’s Motion to Exclude is *denied* with respect to Exhibit 2009.

5. *Summary*

For the foregoing reasons, Petitioner’s Motion to Exclude is *denied*.

III. CONCLUSION²²

Petitioner has shown by a preponderance of the evidence that claims 1–20 of the '390 patent are unpatentable.

IV. ORDER

It is hereby

ORDERED that claims 1–20 of the '390 patent are shown unpatentable;

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

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

In summary:

Claims	35 U.S.C. §	References/Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1, 3, 4, 7, 9–11, 13, 14, 17, 19, 20	103	Franco, Shafer	1, 3, 4, 7, 9– 11, 13, 14, 17, 19, 20	
2, 12	103	Franco, Shafer, Rittner	2, 12	

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

Claims	35 U.S.C. §	References/Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
5, 15	103	Franco, Shafer, Butherus	5, 15	
6, 16	103	Franco, Shafer, Kaneko	6, 16	
8, 18	103	Franco, Shafer, Ohkawa	8, 18	
1, 3, 4, 7, 9–11, 13, 14, 17, 19, 20	103	Amada, Shafer	1, 3, 4, 7, 9– 11, 13, 14, 17, 19, 20	
2, 12	103	Amada, Shafer, Rittner	2, 12	
5, 15	103	Amada, Shafer, Butherus	5, 15	
6, 16	103	Amada, Shafer, Kaneko	6, 16	
8, 18	103	Amada, Shafer, Ohkawa	8, 18	
Overall Outcome			1–20	

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