

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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HUTCHINSON TECHNOLOGY INC.,  
HUTCHINSON TECHNOLOGY OPERATIONS (Thailand) CO., LTD.,  
Petitioner,

v.

NITTO DENKO CORPORATION,  
Patent Owner.

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Case IPR2017-01421  
Patent 8,895,870 B2

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Before MELISSA A. HAAPALA, *Acting Vice Chief Administrative Patent Judge*, and THOMAS L. GIANNETTI and CHRISTA P. ZADO, *Administrative Patent Judges*.

GIANNETTI, *Administrative Patent Judge*.

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

## I. INTRODUCTION

Hutchinson Technology Incorporated and Hutchinson Technology Operations (Thailand) Co., Ltd. (“Petitioner”) filed a Petition requesting an *inter partes* review of claims 1, 2, and 4 of U.S. Patent No. 8,895,870 B2 (Ex. 1001, “the ’870 patent”). Paper 2 (“Pet.”). Nitto Denko Corporation (“Patent Owner”) filed a Preliminary Response. Paper 6 (“Prelim. Resp.”). Applying the standard set forth in 35 U.S.C. § 314(a), which requires demonstration of a reasonable likelihood that Petitioner would prevail with respect to at least one challenged claim, we granted Petitioner’s request and instituted an *inter partes* review on all challenged claims. Paper 8 (“Institution Dec.”). Following the Supreme Court’s decision in *SAS Inst. Inc. v. Iancu*, 138 S. Ct. 1348 (2018), we modified our Institution Decision to institute trial on all of the grounds presented in the Petition, specifically adding two additional grounds for claim 2. Paper 25.

Following institution, Patent Owner filed a Response to the Petition (Paper 15, “PO Resp.”) and Petitioner filed a Revised Reply (Paper 35, “Pet. Reply”). In addition, Patent Owner filed a Motion to Amend (Paper 16, “Mot. To Amend”). Petitioner filed a Revised Opposition to the Motion (Paper 36, “Mot. Amend Opp.”) and Patent Owner filed a Reply (Paper 40, “Mot. Amend Reply”).

An Oral Hearing was held on July 17, 2018. The Hearing Transcript (“Tr.”) is included in the record as Paper 50. Having considered the evidence of record, and for the reasons set forth below, we determine that Petitioner has failed to demonstrate by a preponderance of the evidence that claims 1 and 4 of the ’870 patent are unpatentable. In addition, for the

reasons that follow, we grant the Motion to Amend. Finally, we order cancellation of claim 2 and replacement by new claim 5.

## II. BACKGROUND

### *A. The '870 Patent*

The '870 patent is titled “Printed Circuit Board and Method of Manufacturing the Same.” The patent discloses a printed circuit board that reduces the effect “a lead wire for plating” has on the waveform of an electrical signal passing through the wiring traces present on the board. Ex. 1001, 1:60–63. The board includes various “conductor traces” (or “wiring traces”), typically made from copper, for transmitting electrical signals. *Id.* at 1:17–19. Figure 1 (as annotated by Patent Owner) is illustrative:

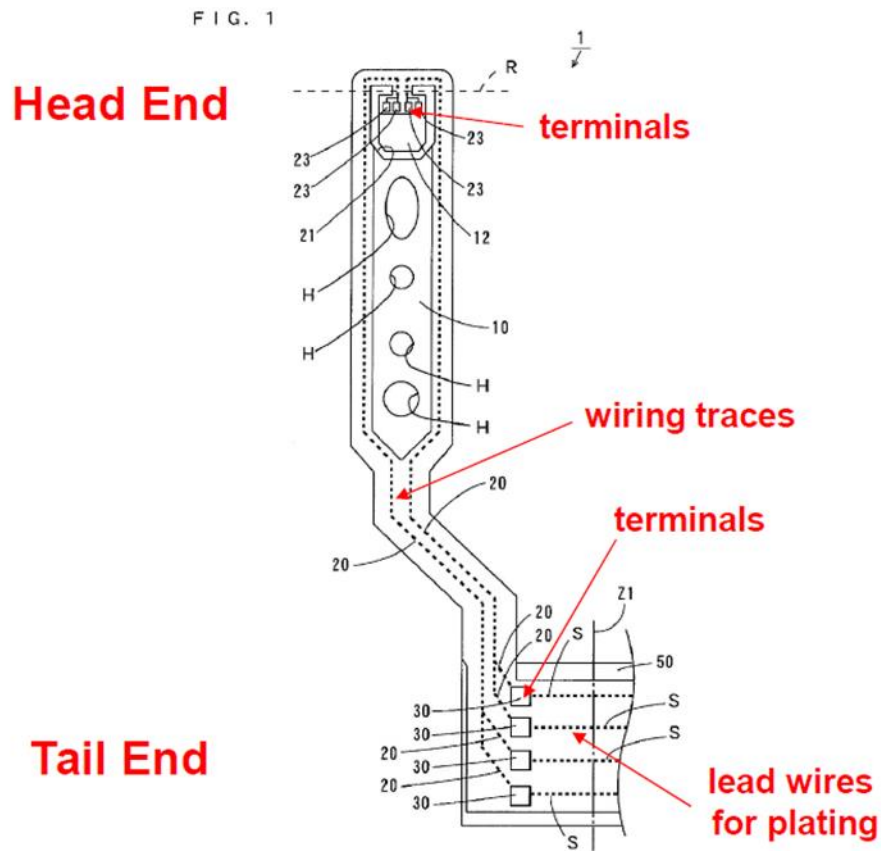


Figure 1 shows a circuit board with terminal pads 23 and 30 located at the opposite ends of wiring traces 20. *Id.* at 6:20–27. The particular type of circuit board shown in this figure and described in the patent is a “suspension board.” *Id.* at 6:20. This board is used in hard disk drives, to connect the magnetic head to other electrical hardware. *Id.* at 6:28–37.

The '870 patent further describes that a circuit board's connection terminals can be formed via electrolytic plating. *Id.* at 1:19–20. In this process, the circuit board is immersed in a solution that contains metal cations, such as nickel or gold, and power is applied to the conductor traces. This results in the deposition of a thin layer of nickel, gold, or other metal on the exposed trace surface and the formation of the desired terminal pad. *Id.*

at 8:12–15; *see also* Fig. 4(e)). To provide the electrical power needed for plating, during formation of the conductor traces, lead wires for plating are formed. Those leads extend from the portions at which the connection terminals are to be formed to one end of the substrate. *Id.* at 1:22–26. Power is fed to the conductor traces through the lead wires for plating. *Id.* at 1:26–27.

The '870 patent explains that once plating is complete, the plating leads are “unnecessary,” yet “remain on the printed circuit board.” *Id.* at 1:41–43. However, electrical signals reflected by the plating leads can interfere with the signals traveling through the functional wiring traces on the circuit board. *Id.* at 1:43–51. When an electrical signal is transmitted through the conductor traces while another electronic circuit is connected to the connection terminals of the printed circuit board, the lead wires for plating become stubs branched from transmission lines. *Id.* at 1:43–47. Resonance occurs at a particular frequency in such stubs. This causes a particular frequency component of the electrical signal to be attenuated. *Id.* at 1:47–50. This may result in disadvantages such as a blunt waveform of the electrical signal. *Id.* at 1:50–51,

The '870 patent explains that one solution is to “[r]emov[e] the lead wires for plating after the electrolytic plating.” *Id.* at 1:52–54. However, the patent says a process of removing the lead wires for plating is additionally required, thus leading to an increase in manufacturing cost. *Id.* at 1:54–56.

According to the '870 patent, rather than removing the leads, the leads are formed in a manner such that the effect of the resonance in the lead wire for plating to be exerted on the waveform of the electrical signal is reduced. *Id.* at 5:45–49. This will be discussed in more detail *infra*.

*B. Challenged Claims*

The '870 patent has four claims. All are independent. Claims 1, 2, and 4 are challenged. Claim 1 reads as follows:

1. A printed circuit board comprising:

a suspension body;

an insulating layer formed on said suspension body;

a plurality of wiring traces formed on said insulating layer;

a first terminal provided at one end of each of said plurality of wiring traces;

a second terminal provided at another end of each of said plurality of wiring traces; and

a plurality of lead wires for plating formed on said insulating layer, one of said plurality of lead wires extending from each first terminal of said plurality of wiring traces,

wherein the plurality of lead wires for plating are not connected to one another and each of said plurality of lead wires for plating includes:

a first linear portion extending from each first terminal and having a first width; and

a second linear portion extending from said first linear portion and having a second width that is smaller than said first width.

Claim 1 is directed to the embodiment of the invention illustrated in Figure 8 of the '870 patent:

FIG. 8

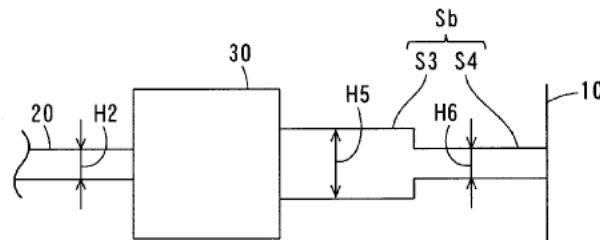


Figure 8 shows a lead wire for plating having the wider portion (H5) of the plating leads closer to terminal 30.

Claim 2 of the '870 patent is similar to claim 1, but is directed to the embodiment of the invention illustrated in Figure 7 of the patent:

FIG. 7

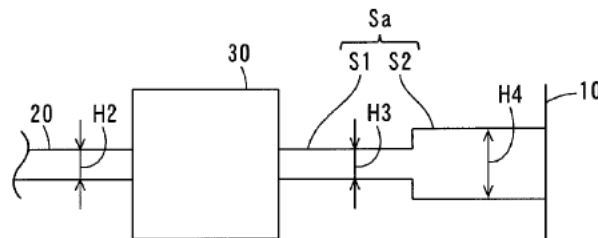


Figure 7 has the narrower portion (H3) of the plating leads closer to terminal 30.

Claim 4 covers a circuit board with plating leads that are of uniform width. The leads are also wider than the regular traces on the circuit board. Claim 4 is directed to the embodiment of Figure 3 of the patent:

F I G. 3

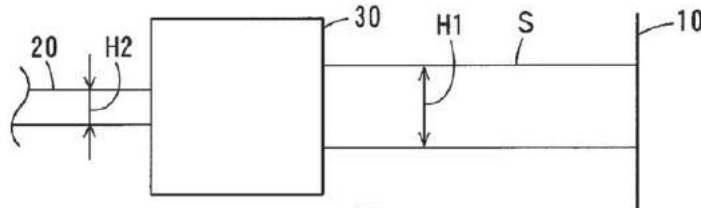


Figure 3 shows a lead wire for plating having a uniform width (H1) that is greater than the width (H2) of the regular traces on the circuit board.

As indicated *supra*, claim 3 was not challenged.

#### C. Real Parties-in-Interest

Petitioner identifies the following additional real parties-in-interest:

1. Magnecomp Precision Technology Public Company Limited
2. Magnecomp Corporation
3. Headway Technologies, Inc.
4. TDK Corporation
5. TDK U.S.A. Corporation
6. SAE Magnetics (Hong Kong) Limited
7. Acrathon Precision Technologies (HK) Limited
8. Acrathon Precision Technologies (Dong Guan) Co., Ltd

Pet. 3–4. Patent Owner identifies no additional real parties-in-interest.

Paper 4, 1.

#### D. Related Matters

The parties identify the following civil action involving the '870 patent: *Nitto Denko Corporation v. Hutchinson Technology Incorporated*,

C.A. No. 2:16-cv-03595-MF, pending in the United States District Court for the District of New Jersey. Pet. 4; Paper 4, 1.

*E. References and Other Evidence*

Petitioner relies upon the following references (Pet. 6–7):

|            |                    |               |            |
|------------|--------------------|---------------|------------|
| Ohsawa     | US 2009/0283314    | Nov. 19, 2009 | (Ex. 1003) |
| Lennard    | US 6,543,673       | Apr. 8, 2003  | (Ex. 1004) |
| Kuzawinski | US 6,882,038       | Apr. 19, 2005 | (Ex. 1005) |
| Zeng       | US 2007/0145543 A1 | Jun. 28, 2007 | (Ex. 1006) |
| Ishii      | US 2008/0102608 A1 | May 1, 2008   | (Ex. 1007) |
| Chou       | US 2008/0185177 A1 | Aug. 7, 2008  | (Ex. 1008) |
| Yang       | US 2007/0211386 A1 | Sep. 13, 2007 | (Ex. 1011) |

In addition, both parties also rely on declaration testimony. Petitioner relies on first and second declarations of a technical expert, Dr. Thomas M. Coughlin (“Coughlin I Decl.,” Ex. 1009; “Coughlin II Decl.” Ex. 1029). Petitioner also relies on declarations of several other witnesses: A David Erpelding (Ex. 1014, “Erpelding Decl.”), Jacob B. Bjorstrom (Ex. 1016, “Bjorstrom Decl.”), and Nobuhito Sawasaki (Ex. 1017, “Sawasaki Decl.”).

Patent Owner relies on declarations of two witnesses: Dr. Giora J. Tarnopolsky, a technical expert (Ex. 2002, “Tarnopolsky Decl.”), and Toshiki Naito (Ex. 2007, “Naito Decl.”). The record also includes deposition transcripts for several of these witnesses.<sup>1</sup>

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<sup>1</sup> Ex. 1018 (“Tarnopolsky Dep.”), Ex. 1019 (“Naito Dep.”), Ex. 2006 (“Coughlin I Dep.”), Ex. 2009 (“Erpelding Dep.”), and Ex. 2015 (“Coughlin II Dep.”).

*F. Grounds Asserted*

We instituted *inter partes* review of the claims of the '870 patent on three separate grounds. One of those grounds (anticipation by Ohsawa) related to claim 2. For two additional grounds relating to claim 2, however, we determined that Petitioner had not established a reasonable likelihood of prevailing and did not institute trial: obviousness of claim 2 over Ishii and Lennard (Institution Dec. 17–18) and anticipation of claim 2 by Yang (*id.* at 13). Following the Supreme Court’s decision in *SAS Inst. Inc. v. Iancu*, 138 S. Ct. 1348 (2018), we entered an order adding those additional grounds. Paper 25.

At the Oral Hearing, Patent Owner confirmed its intent to cancel claim 2. Tr. 4:1–14; *see also* Mot. To Amend 2 (“[T]his motion to amend [claim 2] is not contingent on the outcome of this IPR.”). Thus, in addition to claim 5 presented in the Motion to Amend, the following patentability challenges remain for decision:

| Claim | Basis    | Reference(s)                |
|-------|----------|-----------------------------|
| 1     | § 103(a) | Ishii and Zeng              |
| 4     | § 103(a) | Ishii, Chou, and Kuzawinski |

III. ANALYSIS

*A. Claim Construction*

In an *inter partes* review, the Board interprets claim terms in an unexpired patent according to the broadest reasonable construction in light of the specification of the patent in which they appear. 37 C.F.R. § 42.100(b); *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2142

(2016). Under that standard, and absent any special definitions, we give claim terms their ordinary and customary meaning, as would be understood by one of ordinary skill in the art at the time of the invention. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007). Additionally, any special definitions for claim terms must be set forth with reasonable clarity, deliberateness, and precision. *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994).

Petitioner proposed a special construction for several claim terms: “lead wires/wires for plating,” “extending from said wiring trace,” and “suspension body.” Pet. 21–25. Patent Owner stated it “is of the view that all the claim elements Petitioner discusses (and those it did not) can be afforded their plain and ordinary meaning.” Prelim. Resp. 18. The Board concluded in the Institution Decision that no claim terms required construction at that stage. Institution Dec. 10.

Patent Owner’s Response states: “Patent Owner agrees with the Board that the claim terms are understandable on their face and can be afforded their plain and ordinary meaning.” PO Resp. 9. Petitioner responds in its Reply: “In view of the arguments and issues raised in the Patent Owner’s Response and in view of the Board’s Decision to Institute, Petitioners contend that no claim terms require construction for this Reply.” Pet. Reply 1. Accordingly, we determine that no claim terms require construction. See *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999) (only terms which are in controversy need to be construed, and only to the extent necessary to resolve the controversy).

*B. Obviousness – Claims 1 and 4*

1. Obviousness – In General

A claim is unpatentable under 35 U.S.C. § 103(a) if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007).

The question of obviousness is resolved on the basis of underlying factual determinations, including (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) where in evidence, so-called secondary considerations, including commercial success, long-felt but unsolved needs, failure of others, and unexpected results. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966) (“the Graham factors”).

If the claimed subject matter cannot be fairly characterized as involving the simple substitution of one known element for another or the mere application of a known technique to a piece of prior art ready for the improvement, a holding of obviousness can be based on a showing that “there was an apparent reason to combine the known elements in the fashion claimed.” *KSR*, 550 U.S. at 418. Such a showing requires “some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” *Id.* (quoting *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)).

Showing that a reference “could” have been modified, however, does not demonstrate a motivation or rationale for making the modification or combination. *See Belden Inc. v. Berk-Tek LLC*, 805 F.3d 1064, 1073 (Fed. Cir. 2015) (“[O]bviousness concerns whether a skilled artisan not only *could*

*have made but would have been motivated to make the combinations or modifications of prior art to arrive at the claimed invention.”*); *InTouch Techs., Inc. v. VGO Commc’ns, Inc.*, 751 F.3d 1327, 1352 (Fed. Cir. 2014). Furthermore, a reference relied on must be considered as a whole. *In re Hedges*, 783 F.2d 1038, 1041 (Fed. Cir. 1986) (“It is impermissible within the framework of section 103 to pick and choose from any one reference only so much of it as will support a given position, to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one of ordinary skill in the art.” (citation and inner quotes omitted)).

## 2. Level of Skill

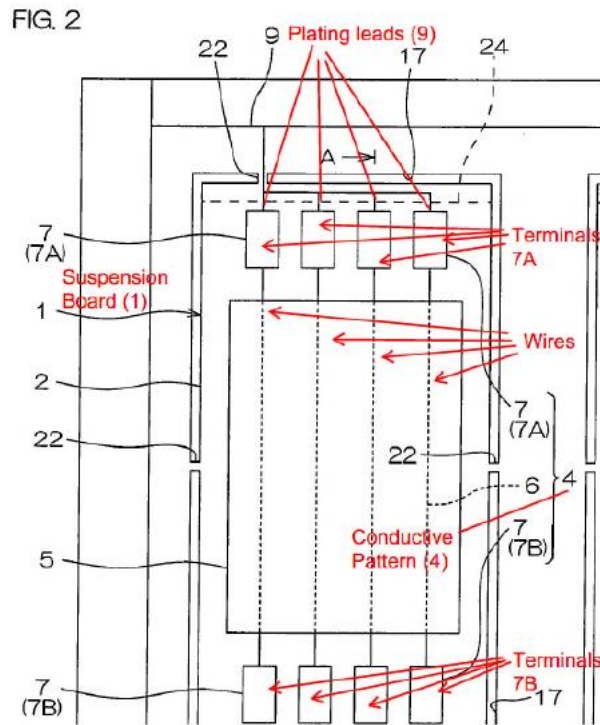
Petitioner contends a person of ordinary skill at the relevant time frame (August 2010 or September 2009) would have had “at least a Bachelor’s degree in electrical engineering or computer engineering, and five years of experience working in the design of circuit board design and resonant electrical interference of open circuits in the Hard Disk Drive (HDD) industry or a Master’s degree in electrical engineering or computer engineering, and two years of experience working in the design of circuit boards for the HDD industry, including circuit board design and resonant electrical interference of open circuits.” Pet. 19 (citing Coughlin I Decl. ¶ 30). Patent Owner does not contest this definition in its Preliminary Response or Response. Patent Owner’s expert, Dr. Tarnopolsky, however, states a minor disagreement: “While I agree that engineers working in the hard disk drive industry will have a general understanding of high-frequency signal transmission, it would be highly unusual for such an individual to dedicate years of their career working on ‘resonant electrical interference of open circuits.’” Tarnopolsky Decl. ¶ 65. For purposes of this Decision, we

adopt Petitioner’s formulation. However, we regard any differences with Dr. Tarnpolsky’s definition as immaterial, for our decision would be the same under either definition.

3. Claim 1 – Ishii and Zeng

Petitioner’s obviousness analysis for claim 1 relies on Ishii for all elements of the claim except for the claimed geometry of the plating leads (claim element [1d]). Pet. 32–39.

Ishii generally relates to a method for producing a circuit board while “preventing discoloration of a terminal portion” and “efficiently removing static electricity charged on the wired board.” Ex. 1007 ¶ 8. Ishii discusses the use of a plating lead that is connected to the circuit board’s conductive pattern to facilitate electrolytic plating. *Id.* ¶¶ 45–46. Once the circuit board is manufactured, perforated notches that traverse the portions where the plating lead is branched allow most of the branched leads and the entire “portion where the plating lead 9 is combined into one lead” to be removed. *Id.* ¶ 65. This separation is illustrated by dotted line 24 in Figure 2 of Ishii, presented here in a partial view annotated by Petitioner:



Pet. 35. Ex. 1007, Figure 2 (partial view annotated). Figure 2 of Ishii is an enlarged view of suspension board with circuit 1, showing plating leads 9, magnetic-head-side connecting terminals 7A, and external connecting terminal portions 7B. *Id.* ¶¶ 24, 40–41.

Petitioner relies on Zeng for the claimed plating lead configuration missing from Ishii. Pet. 39–43. Zeng relates to an “integrated circuit package that can be physically and electrically connected to a printed wiring board.” Ex. 1006 ¶ 10. Zeng depicts “plating bars” with different characteristics. For instance, Zeng’s Figure 3 (reproduced below from page 41 of the Petition, with Petitioner’s annotations) shows plating bar or tail 140A having wide section 1400 nearest contact terminal 130 and narrow section 1410 extending from wide section 1400:

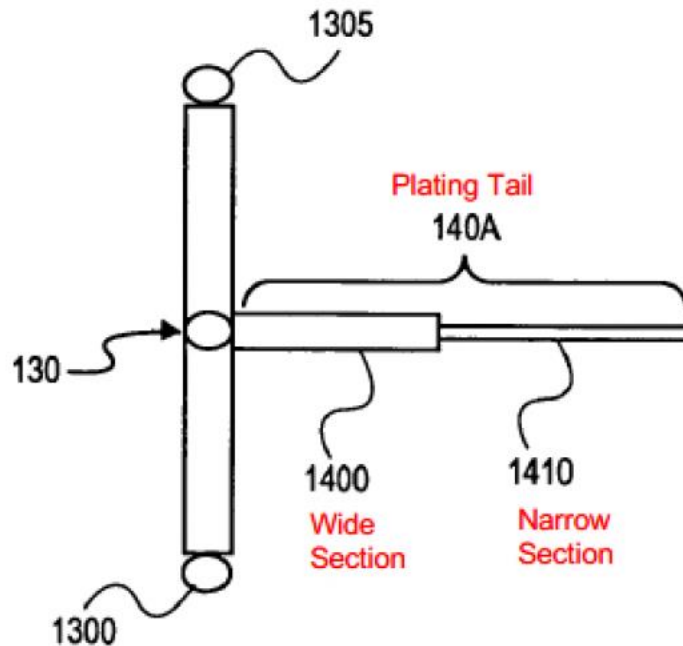


Figure 3 from Zeng shows plating bar 140A connected to a transmission line of a package substrate. Ex. 1006 ¶ 7. The figure above is annotated by Petitioner to show the configuration of the plating lead or tail. Pet. 41.

Zeng recognizes that plating bar resonance can interfere with electrical transmissions. Ex. 1006 ¶ 13. In describing the lead configuration of Figure 3, Zeng discloses this as one technique for shifting plating bar resonance. *Id.* ¶ 14 (“One technique for shifting plating bar resonant frequency to higher is to modify a characteristic impedance along the length of the plating bar.”).

Zeng presents two examples of plating bars or leads, designated 140A and 140B. *Id.* ¶ 13. In these examples, plating lead 140A is longer than plating lead 140B. *Id.* According to Zeng, “[r]epresentatively, plating bar 140A having a physical length of several millimeters presents concerns over resonance at frequencies of several gigahertz (GHz) compared to a plating

bar 140B having a representative physical length less than one millimeter.”  
*Id.*

We have considered Petitioner’s element-by-element analysis of claim 1 in light of the Ishii-Zeng combination. Pet. 33–42. For the reasons that follow, we are not persuaded that Petitioner has presented a sufficient rationale under *KSR* for combining the references. *See id.* 42–43.

Initially, Petitioner asserted that “[a] person of ordinary skill in the art would know that the open ended leads on the suspension board would be liable to cause resonant interference.” *Id.* at 42 (citing Coughlin I Decl. ¶ 116). Further, Petitioner asserted: “Thus, a person of ordinary skill in the art – wishing to reduce the resonant interference of Ishii’s plating leads – would combine these references to make a suspension board with plating leads that are wider closer to the terminals as in claim 1.” *Id.*

Patent Owner’s response focuses on the fact that, in Ishii, the plating leads are attached to “magnetic head-side connecting terminal portion 7A.” PO Resp. 13. Patent Owner presents a convincing argument, supported by credible expert testimony, that “[l]eaving any substantial portion of the plating lead in place after manufacturing—as would be necessary to graft Zeng’s leads onto Ishii—would have a significant, detrimental impact on the ability of the slider to maintain the proper flying attitude (and thus the hard disk drive to operate).” *Id.* at 14 (citing Tarnopolsky Decl. ¶¶ 93–94, 123–124; 133–134). We find that this consideration would have led a person of ordinary skill to conclude that, in removing the plating leads, one should endeavor to make the remaining stubs as short as possible. According to Zeng’s teaching, this would greatly reduce, if not eliminate, the need for a modified lead structure to avoid resonance problems. Tarnopolsky Decl.

¶¶ 135–137. As Dr. Tarnopolsky testifies, “Ishii’s plating leads are attached to the head-side terminal and are designed to be removed. One of ordinary skill in the art would recognize that this lead removal already eliminates detrimental signal reflections.” *Id.* ¶ 120. Moreover, we find that providing an additional lead structure on the head-side of Ishii’s board would have been avoided because it would lead to problems maintaining the proper flying attitude of the head. *Id.* ¶¶ 120–123, 126–129. Further, we determine that Zeng confirms that short leads are not susceptible to resonance problems. *See* discussion *supra*; *see also* Tarnopolsky Decl. ¶ 102; Tarnopolsky Dep. 142:23–143:1.

We have considered Petitioner’s responses and do not find them convincing. Pet. Reply 3–5. Petitioner argues, first, that Ishii’s Figure 2 “expressly teaches that a length of the plating lead is present after Ishii’s tearing along perforated notch line 24.” To illustrate this point, Petitioner presents an annotated portion of Ishii’s Figure 2:



Pet. Reply 2. The above figure is a portion of Ishii’s Figure 2, annotated by Petitioner to show magnetic-head-end terminals 7A, dotted tear line 24, and remainder of plating lead 9 of unspecified length. Petitioner argues: “What remains of plating lead 9 may still present a resonance problem in need of the solution of Zeng.” *Id.* at 3.

Petitioner provides no persuasive support for this statement. Neither the figure itself nor its description in Ishii provides dimensions. When a reference does not disclose that the drawings are to scale and is silent as to dimensions, arguments based on measurement of the drawing features are of little value. *Hockerson-Halberstadt, Inc. v. Avia Group Int'l*, 222 F.3d 951, 956 (Fed. Cir. 2000). Without such information, we are not persuaded by Petitioner's argument that the length of the plating lead that remains in Ishii would present a resonance problem. The evidence supports the opposite conclusion. According to Dr. Tarnopolsky, "[o]ne of ordinary skill in the art would understand that no circuit portions should remain dangling beyond the heads-side terminals 7A [of Ishii]. . . . Any remnants of the plating leads 9, except for micrometric-length elements, attached to the head side terminals would interfere with the flying attitude of the slider." Tarnopolsky Decl. ¶ 93. Further, "[o]ne of ordinary skill in the art would recognize that this lead removal already eliminates detrimental signal reflections." *Id.* ¶ 120.

Petitioner goes on to argue that a person of ordinary skill "would be motivated to connect the plating leads [in Ishii] to the non-head (preamp) side of the circuit board, and then change their dimensions (as disclosed in Zeng) to avoid interference, rather than undergoing the expensive process of removing them from the head side." Pet. Reply 3–4. Petitioner argues that changing Ishii's circuit patterns "requires a few mouse clicks" on design software. *Id.* at 4–5. In support of this assertion, Petitioner relies on expert testimony from Dr. Coughlin. Coughlin II Decl. ¶¶ 57–59. Dr. Coughlin testifies that connecting Ishii's plating leads to the non-head side terminals of Ishii would be a "simple design change." *Id.* ¶ 57. However, he provides us with no details or persuasive evidence to support this statement. He

further testifies that such a redesign “would take very minimal effort.” *Id.* ¶ 59. But again, he provides no persuasive evidence or details to support this conclusion.

We are not convinced by this conclusory testimony from Dr. Coughlin. We have broad discretion to assign weight to be accorded witness testimony. *In re American Academy of Sci. Tech. Ctr.*, 367 F.3d 1359, 1368 (Fed. Cir. 2004); *Velandier v. Garner*, 348 F.3d 1359, 1370–71 (Fed. Cir. 2003). We give little weight to an expert opinion that does not disclose the underlying facts or data on which the opinion is based. 37 C.F.R. § 42.65.

Beyond those considerations, however, Petitioner’s rationale for combining Ishii and Zeng fails for other reasons. Petitioner’s newest argument, in its Reply, apparently embraces Patent Owner’s assertion that a skilled artisan practicing the teachings of Ishii would have endeavored to remove as much as possible of the plating leads. Pet. Reply 4. This, however, only reinforces Patent Owner’s argument, supported by Dr. Tarnopolsky’s testimony, that there would have been no reason to combine the references because interference due to resonance was already avoided. *See supra*.

Moreover, as confirmed by Dr. Coughlin’s testimony, Petitioner’s argument would require a redesign of Ishii to change the location of the plating leads. Such hindsight reconstructions of prior art to prove obviousness have been rejected by the Federal Circuit. *See, e.g., Panduit Corp. v. Dennison Mfg. Co.*, 810 F.2d 1561, 1572 (Fed. Cir. 1987) (“In viewing the prior art, the district court improperly treated all cable ties as virtually interchangeable (after hearing all about Caveney’s inventions and

then viewing the ease with which creative defense counsel reconstructed the prior art at his easel).”).

For the foregoing reasons, we are persuaded that Petitioner has failed to demonstrate that claim 1 would have been obvious over Ishii and Zeng.<sup>2</sup>

#### 4. Claim 4 – Ishii, Chou, and Kuzawinski

Petitioner contends Ishii describes all of the elements of claim 4, except for a cover layer over the plating leads (recited in element [4c]) – which is taught by Chou – and the claimed geometry of the plating leads (claim element [4d]) – which is taught by Kuzawinski. Pet. 52–62.

Chou discloses that a conventional circuit board may include an insulating protective layer formed on the surfaces of the electroplating conductive wires. Ex. 1008 ¶ 6.

Kuzawinski is titled “Plating Tail Design for IC Packages.” The patent addresses the field of packaging integrated circuits (ICs). Ex. 1005, 1:5–7. Kuzawinski recognizes the electrical interference problem created by plating tails:

In high-frequency (high-speed) circuits, there can be a significant problem resulting from plating tails, in that the signal can reflect off the end of the tail or a step in the tail and then interfere with an IC, e.g. by canceling the desired signal.

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<sup>2</sup> Patent Owner does not address the “Graham Factors,” except in a footnote. PO Resp. 19 n.2. Patent Owner asserts there was “industry praise” for its flexures, “some of which embody the claimed subject matter.” However, this assertion is not supported by any evidence establishing a nexus with the claimed invention. Likewise, a cited 2016 press release (Ex. 2003), recognizing Patent Owner as a “top 100 global innovator,” does not refer to any specific products. Moreover, Patent Owner establishes no nexus between the cited SEC disclosure documents (Ex. 2004, 2005) relating to Petitioner’s financial performance and the merits of Patent Owner’s invention.

*Id.* at 1:21–25. Kuzawinski further recognizes that “[a] common solution to this problem is to remove all or most of the tail.” *Id.* at 1:26–27.

Kuzawinski describes the invention disclosed as an alternative solution, involving “the alteration of a transverse dimension of a plating tail to alter its characteristic impedance.” *Id.* at 1:47–49.

Kuzawinski describes two separate embodiments. In one, the substrate has multiple layers, illustrated in Figure 1 following:

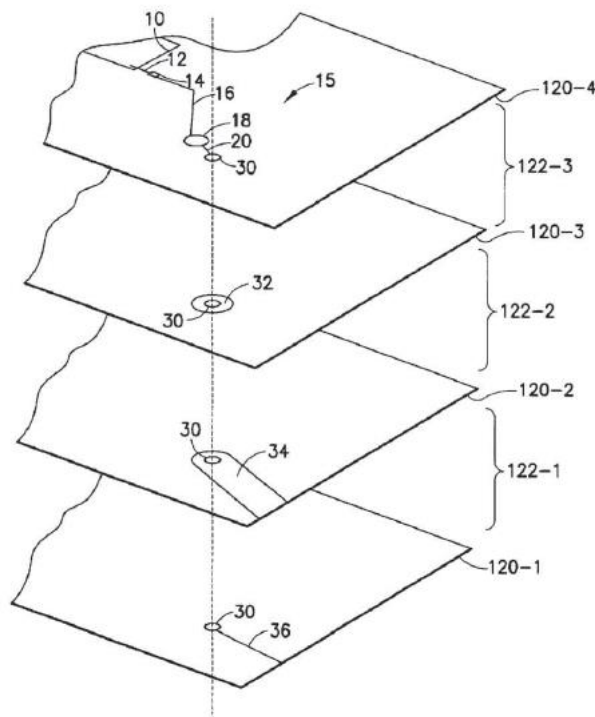


FIG.1

Ex. 1005, Fig. 1. Figure 1 of Kuzawinski is an exploded view of a substrate for supporting IC 10 having multiple layers. The Figure shows contact pad 18, signal trace 15, stub 20, and plating tail 36. Via 30 connects plating tail 36 to stub 20, which, in turn, is connected to pad 18. *Id.* at 2:5–15.

Kuzawinski explains that plating tail 36 has a characteristic impedance at the operating frequency of the signals carried by trace 15 that is determined by the cross section of the tail and the thickness 122-1 of the dielectric between tail 36 and the adjacent plane 120-2. *Id.* To avoid interference, the impedance of tail 36 is changed from the impedance used elsewhere in the apparatus (for example 50 ohms) to a value that is sufficiently different that the signal will be reflected as though it were an open circuit (i.e., the portion of the signal that travels down via 30 will be reflected back with the same polarity and a reduced amplitude). *Id.* at 2:25–31. One way of accomplishing this is to set the transverse dimensions of tail 36 by increasing the width substantially from the standard trace width. *Id.* at 2:59–62.

In the second Kuzawinski embodiment, depicted in Figure 2 and described as “alternative,” the substrate has plating tail 36 removed before the two layers are bonded together to form a substrate. *Id.* at 3:11–17.

Claim 4 of the ’870 patent requires that “each of said plurality of lead wires for plating has a uniform width along a length extending from each first electrode pad to an edge of the suspension body.” Patent Owner responds that this feature is not disclosed in the three cited references. PO Resp. 20. In addition, Patent Owner contends that Petitioner has not provided a sufficient “articulated reasoning” why the teachings of the three references would have been combined. *Id.* at 22. Patent Owner states: “For the same reasons explained above [with respect to claim 1], one of ordinary skill in the art would not be motivated to depart from Ishii’s explicit teachings and instead modify Ishii to include plating leads to include the

additional structural features required by claim 4.” *Id.* at 23. Specifically, Patent Owner asserts:

As explained above in connection with claim 1, Ishii’s plating leads are attached to the head-side terminals of its circuit board. (Ex. 1007, Ishii at ¶ [0046].) And, Ishii removes nearly the entire length of its leads after plating. (*See id.* at ¶ [0065].) One of ordinary skill in the art would understand that this lead removal was both purposeful and necessary, as long leads located near the head could render a hard disk drive non-operational. (*See* Ex. 2002, Tarnopolsky Dec. at ¶ 154.)

*Id.* at 22–23.

For the reasons similar to those discussed *supra* in connection with claim 1, we determine that Petitioner has not demonstrated by a preponderance of the evidence that a person of ordinary skill would have modified Ishii’s plating leads in accordance with Kuzawinski’s teachings. As Patent Owner points out, Kuzawinski, like Ishii, first describes addressing the interference problem by removing the plating lead. *See* Ex. 1005 at 1:26–27 (“A common solution to this problem is to remove all or most of the tail.”); *see also* the description of the Figure 2 embodiment at 3:11–13 (“Referring to FIG. 2, there is shown an alternative embodiment, in which plating tail 36 is removed.”). Accordingly, for the reasons discussed, we credit Dr. Tarnopolsky’s opinion that “since Ishii’s plating leads are removed (or are so short so as to not cause an interference problem), a person of ordinary skill in the art would not consider Ishii’s plating leads to be in need of any modification.” Tanopolsky Decl. ¶ 147. Moreover, we agree with Patent Owner’s expert that adding any additional structure to Ishii’s head-side terminals would have required extensive redesign, which consideration Petitioner has not addressed adequately. *See* discussion *supra*.

Petitioner’s response on this issue is not persuasive. *See* Pet. Reply 6–7. Patent Owner contends that Kuzawinski, by discussing removing the plating leads, “serves to confirm that one of ordinary skill in the art would have no reason to modify Ishii.” PO Resp. 23. Petitioner responds to this argument by asserting that Kuzawinski discloses other techniques specifically addressing electrical interference issues that do not require removing the plating leads. Pet. Reply 6. Petitioner’s rebuttal does not adequately address Patent Owner’s argument. Patent Owner does not assert that merely because Kuzawinski identifies a “common solution” (i.e., removing the plating tails), the teachings of Kuzawinski and Ishii would not have been combined. *Id.* Patent Owner relies also on the argument that modifying Ishii’s leads would result in interference with the operation of the slider, and “could render a hard disk drive non-operational.” PO Resp. 23. *See Innogenetics, N.V. v. Abbott Labs.*, 512 F.3d 1363, 1373 (Fed. Cir. 2008) (“[K]nowledge of a problem and motivation to solve it are entirely different from motivation to combine particular references . . .”).

For the foregoing reasons we determine that Petitioner has failed to demonstrate by a preponderance of the evidence that claim 4 would have been obvious to a person of ordinary skill over Ishii, Kuzawinski, and Chou.

*E. Motion to Amend*

1. Patent Owner’s Motion

Patent Owner’s Motion to Amend proposes a single new claim (claim 5) as a substitute for claim 2, which is cancelled by Patent Owner. Mot. To Amend 2–3. Claim 5 follows:

5. A printed circuit board comprising:  
a suspension body;

an insulating layer with an edge formed on said suspension body;  
a wiring trace formed on said insulating layer;  
a terminal provided at a portion of said wiring trace; and  
a lead wire for plating with an edge formed on said insulating layer and extending from said wiring trace~~[[,]]~~; and  
a cover insulating layer with an edge provided to cover said lead wire for plating;  
wherein said lead wire for plating includes:  
a first linear portion extending from said wiring trace and having a first width; and  
a second linear portion extending from said first linear portion and having a second width that is different from said first width,  
wherein said first width is smaller than said second width; and wherein the edges of the insulating layer, the lead wire for plating, and the cover insulating layer are all flush with each other.

*Id.* at 3 (additions to claim 2 underscored; deletions bracketed). Patent Owner asserts that the proposed substitute claim is not broader than the original claim, and that no new matter has been added. *Id.* at 2–7. Patent Owner also asserts that the amendments made to the proposed substitute claim “are directly responsive to the grounds at issue in this IPR proceeding, and serve to distinguish the claim from both the prior art discussed in the Board’s institution decision, and any other art known to Patent Owner.” *Id.* at 8. Petitioner’s opposition does not challenge these assertions. We determine that these predicates to considering a motion to amend are satisfied. *See* 37 C.F.R. § 42.121.

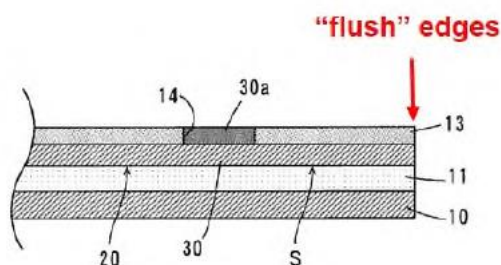
We find also that Patent Owner, as required by 37 C.F.R. § 42.121, has shown written description support for claim 5. Mot. To Amend 3–7.

Patent Owner has added the following limitations to claim 2 to distinguish claim 5 from Ohsawa, the reference relied on by Petitioner in its challenge to claim 2: (1) claim 5 requires a “cover insulating layer” that “cover[s] said lead wire for plating;” and (2) the “insulating layer,” “lead wire for plating,” and “cover insulating layer” must all have “edges” that are “flush with each other.” *Id.*

Patent Owner relies on Figure 7 of the '870 patent (reproduced *supra*) to support the recitation that the lead wire for plating has first and second linear portions having first and second widths, respectively. Mot. To Amend 6. Further, Patent Owner relies on Figure 7 to support the recitation that the first portion's width is “smaller” than that of the second portion. *Id.*; see also discussion of Fig. 7 *supra*.

Patent Owner relies on Figures 2 and 7 of the '870 patent and the accompanying text as supporting the recitation that “the edges of the insulating layer, the lead wire for plating, and the cover insulating layer are all flush with each other.” *Id.* at 7. Figure 2 (annotated by Patent Owner) follows:

FIG. 2



Mot. To Amend 9. This figure above corresponds to Figure 2 of the '870 patent, annotated by Patent Owner to show “flush” edges for base insulating

layer 11, cover insulating layer 13, and lead wire for plating S. *Id.*

Referring to Figure 4(e), reproduced *infra*, the '870 patent describes the formation of these edges as follows:

After the plating layer 30a is formed, the support substrate 50, the base insulating layer 11, the lead wires S for plating and the cover insulating layer 13 *are cut off at the one-dot and dash line Z1*. In this manner, the suspension board 1 having the suspension body 10 is completed.

Ex. 1001, 8:16–21 (emphasis added).

Patent Owner also relies on Figure 2 as well as Figure 4 and accompanying text as disclosing the claimed cover insulating layer. Mot. To Amend 7.

## 2. Petitioner's Opposition

### *a. Alleged Lack of Written Description*

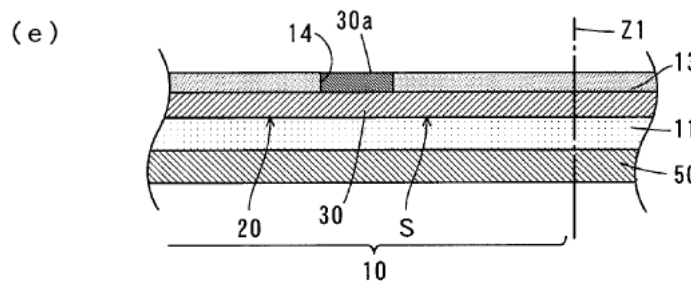
Petitioner opposes the motion on a number of grounds. Petitioner's principal argument is that Patent Owner fails to provide written description support for claim 5. Mot. Amend Opp. 3–12. Petitioner contends that the “flush edges” limitation in claim 5 is not supported by the original disclosure. *Id.* at 3. Similarly, Petitioner contends the “lead wire . . . extending from said wiring trace” present in original claim 2 is not supported. *Id.* at 9. In addition, Petitioner contends the “edge formed on” limitation added in claim 5 is not supported. *Id.* at 11. We discuss these in turn.

### *flush edges*

Petitioner's opposition to the motion proposes two new claim constructions directed to this limitation in claim 5. First, Petitioner proposes, as a construction for the term “edge,” “the intersection of two surfaces.” Mot. Amend Opp. 2. Next, Petitioner proposes, as a construction

for the term “all flush with each other,” in relation to the lead wire for plating and insulating layers, that the end surfaces “be perfectly aligned.” *Id.* Later in its opposition, Petitioner explains that “flush” means that the edges coincide within 0.5 to 1.5 microns. *Id.* at 3.

We do not adopt Petitioner’s constructions. As Patent Owner points out in its reply, Petitioner’s “edge” construction is contradicted by the ’870 patent. Mot. Amend Reply 1–2. For example, Figure 2 of the ’870 patent, reproduced *supra*, indicates to a person of ordinary skill that the “edges” referred to in claim 5 are the surfaces formed by cutting along line Z1 in Figure 4 (e), depicted below:



Ex. 1001, Fig. 4(e). Figure 4(e) shows suspension body 10 having base insulating layer 11, cover insulating layer 13, and lead wire for plating S on support substrate 50. After the suspension board is completed, support substrate 50, base insulating layer 11, lead wire S for plating, and cover insulating layer 13 are cut off at the one-dot and dash line Z1. In this manner, the suspension board having suspension body 10 is completed. *Id.* at 8:16–21. We find no support in this description for Petitioner’s proposed construction of “edge” as “the intersection of two surfaces.”

Likewise, we reject Petitioner’s proposal to qualify the term “flush” to require “perfect” alignment. Mot. Amend Opp. 2. The plain meaning of the

term as used in claim 5 is discernable from the figures of the '870 patent reproduced above and their description in the specification. Ex. 1001, Figs. 2, 4(e); 8:12–21. We see no basis in the '870 patent to require that the end surfaces be “perfectly aligned.” Referring to Figure 4(e), the specification describes the layers as being “cut off at the one-dot and dash line Z1” during the manufacturing process. Ex. 1001, 8:19. We also credit Dr.

Tarnopolsky’s testimony that the layers are flush if they are in “spacial coincidence within manufacturing tolerances.” Tarnopolsky Dep. 88:5-10. Dr. Tarnopolsky also testified that the term “flush” does not require an edge that forms a perfect “mathematical line.” *Id.* at 89:23-90:7. Instead, it is open to “a certain – what is called surface roughness to those edges.” *Id.* Taken in context, the fact that Dr. Tarnopolsky may have mentioned “.0.5 microns to 1.5 microns” in his testimony does not persuade us that the claims should be so limited. See Mot. Amend Opp. 3. He specifically testified this is only a “general[ly] reasonable order of magnitude,” and he was “not committing myself under oath” to those numbers. Tarnopolsky Dep. 88:18–25. Moreover, Petitioner’s manufacturing expert, Mr. Erpelding, agreed one of skill would recognize that perfect layer alignment within 1.5 microns was not achievable and would not be expected.

Erpelding Dep. 76:19-77:25, 96:23-97:14

Petitioner’s argument that claim 5 lacks proper written description support fails because it relies on these constructions, which we do not adopt. Thus, Petitioner argues that the Motion to Amend “should have established the original disclosure disclosed the presence of: (i) end surfaces perpendicular to the layers, (ii) positioned relative to each other within the manufacturing tolerances of 1.5 microns or less, (iii) for the entire thickness

of the edges.” Mot. Amend Opp. 4. We disagree. There are no such requirements in the claims or specification, only in Petitioner’s rejected constructions.

Nor are we persuaded by Petitioner’s argument based on the description of Figure 2 as a “schematic.” *Id.* at 6. Petitioner contends that Figure 2 “cannot be relied on as illustrating where the respective edges of those micron-scale layers are disposed in relation to each other.” *Id.* The cases Petitioner relies on, including *Hockerson-Halberstadt, supra*, address a different situation, where patent drawings are relied on to show “quantitative relationships.” *Hockerson*, 222 F.3d at 956. Only under Petitioner’s rejected construction of “flush” do quantitative relationships become relevant to its argument. More on point is *Koito Mfg. Co. v. Turn-Key-Tech, LLC*, 381 F.3d 1142, 1154–55 (Fed. Cir. 2004). In *Koito*, involving a method for injection molding a plastic product, the Federal Circuit affirmed a district court’s finding that a claim limitation calling for a flow channel “significantly thicker and wider” than the adjacent mold cavity was supported by the patent drawings. As the Court observed:

Terms need not be used in haec verba, however. . . . Instead, we have explained that the written description requirement can be satisfied by “words, structures, *figures, diagrams*, formulas, etc.”

381 F.3d 1154 (citations omitted) (emphasis original).

*lead wire for plating*

We are likewise unconvinced by Petitioner’s argument that the recitation “said lead wire for plating” includes “a first linear portion extending from said wiring trace” is unsupported. Mot. Amend Opp. 9. This recitation was present in original claim 2. The ’870 patent’s

specification (Ex. 1001, 2:1–4) and original application (Ex. 2001 at 13 ¶ 9) provide support. Mot. Amend Reply 4–5.

*formed on*

Finally, we are unconvinced by Petitioner’s argument based on the use of the term “formed on” to describe the creation of the edge on the insulating layer. Mot. Amend Opp. 11–12. We do not consider the term “formed” to require any particular manufacturing steps that would exclude the cutting process illustrated in Figure 4(e), discussed *supra*. See Mot. Amend Reply 5.

*b. Alleged Lack of Enablement*

We find no merit in Petitioner’s argument that claim 5 is not enabled by the specification. Mot. Amend Opp. 12–17. Claim 5 is not directed to a manufacturing process. Thus, Petitioner’s arguments that the specification must provide detailed instructions on how the layers are cut off or how the edges are formed is unconvincing. A patent need not teach, and preferably omits, what is well known in the art. *Hybritech, Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 1384 (Fed. Cir. 1986). Petitioner’s manufacturing expert, Mr. Erpelding, admitted that cutting techniques that could have been used were available during the relevant time period. Erpelding Dep. 18:13–19:19, 23:8–16; 94:8–95:5.

Petitioner’s related argument, that “conventional shearing is not intended to provide perfectly flush edges,” is likewise unavailing. Mot. Amend Opp. 15–16. As discussed *supra*, the claim does not require that the layers be “perfectly flush.” Thus, Petitioner’s lengthy discussion of the “shortcomings of commonly known techniques” for cutting (*id.* at 16–17) is not persuasive because it is based on two false premises: first, that the claim

is directed to a manufacturing process, and second, that it requires “perfectly flush edges.” *Id.* at 15.

*c. Alleged Indefiniteness*

Petitioner’s indefiniteness argument fails for similar reasons. According to Petitioner, “a skilled artisan would have no idea how ‘perfect’ flush must be and what tolerances (if any) the claim encompasses.” Mot. Amend Opp. 18. This argument is premised on the claim construction we did not adopt, namely, that the claim requires “perfectly flush” (or at least some precise mathematically defined) tolerances. As discussed *supra*, that is not a proper construction. Petitioner recognizes that in determining what is “flush,” “mathematical precision is not required.” *Id.* Thus, we find that the figures (especially Figures 2 and 4(e)) of the ’870 patent and their description in the specification provide sufficient notice of the scope of the term “flush.” See, e.g., *Orthokinetics, Inc. v. Safety Travel Chairs, Inc.*, 806 F.2d 1565, 1576 (Fed. Cir. 1986) (determining qualitative claim language requiring a wheel chair to be “so dimensioned as to be insertable” through a particular space is adequately clear and definite).

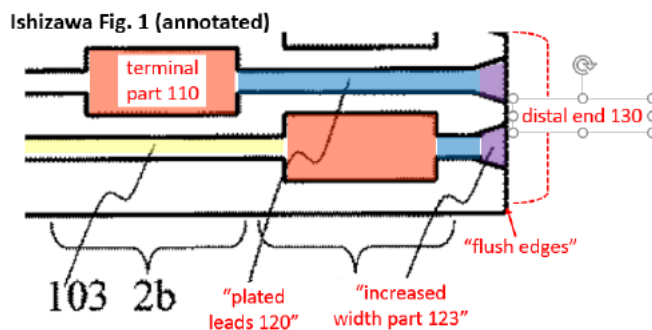
Similarly, we find no merit in Petitioner’s argument that “a covering layer with an edge provided to cover said lead wire for plating” is indefinite because it purportedly requires “the ‘edge’ to ‘cover said lead wire for plating.’” Mot. Amend Opp. 17–18. We agree with Patent Owner that it is the covering layer, not the edge, that must “cover said lead wire for plating.” Mot. Amend Reply 8. We find nothing about this aspect of claim 5 that is unclear.

### 3. Patentability of Claim 5

Petitioner challenges the patentability of claim 5 under 35 U.S.C. § 103(a) on two separate grounds: (1) obviousness over Ishizawa and Chou; and (2) obviousness over Ohsawa and Ishii.

#### *a. Ishizawa and Chou*

Ishizawa (Ex. 1020) is a Japanese Patent Publication<sup>3</sup> titled “Flexible Printed Circuit Board.” According to Petitioner, “Ishizawa discloses the standard circuit board elements recited in Claim 5.” Mot. Amend Opp. 20. Specifically, Petitioner contends Ishizawa discloses lead wires for plating that extend from the wiring trace “wherein said first width is smaller than said second width.” *Id.* at 21. To illustrate this, Petitioner provides the following annotated figure from Ishizawa:



*Id.* Ishizawa’s Figure 1 is annotated by Petitioner to show plating leads 120 having increased width and flush edges.

Petitioner recognizes that while Ishizawa describes a cover layer, the edge of Ishizawa’s “cover film 150” (i.e. cover layer) is not flush with the edges of substrate and plated leads 120, because ““cover film 150”” does not extend as far as plated leads 120.” *Id.* Thus, Petitioner relies on Chou for this limitation. *Id.* (“Chou’s ‘insulating protection layer 14’ (i.e. Claim 5’s

<sup>3</sup> No. 2008-282831, published November 20, 2008.

cover layer) does extend to and cover Chou’s ‘electroplating conductive wires 11’ (i.e. Claim 5’s lead wire for plating)’).

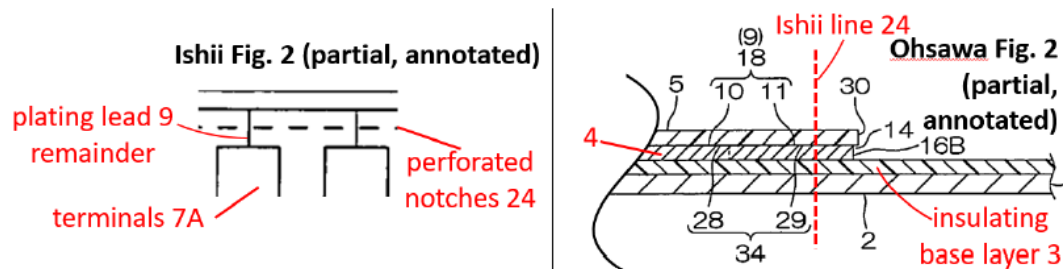
We are not persuaded that this combination of Ishizawa and Chou is sufficient to demonstrate that claim 5 would have been obvious. As Patent Owner points out, Ishizawa’s board is designed to be inserted into a connector in another device. Mot. Amend Reply 8 (citing Ex. 1020 ¶ [0008]). Thus, leaving the terminals uncovered facilitates this use of the board. *Id.* (citing Tarnopolsky Decl. ¶¶ 176–179). We therefore credit Dr. Tarnopolsky’s testimony that extending cover film 150 to cover the terminals “would create a physical impediment to insertion” and therefore “would render it inoperable for its intended purpose.” Tarnopolsky Decl. ¶¶ 178, 179. We find, therefore, that Petitioner has not shown that a person of ordinary skill would have modified Ishizawa to cover the terminals as in Chou.

We note also that neither Ishizawa nor Chou recognizes that having plating leads that increase in width would solve the resonance problem addressed by the ’870 patent. In Ishizawa, the plating leads increase in width to avoid “debonding.” Mot. Amend Reply 9–10 (citing Ex. 1020 ¶¶ 8–9). For this further reason, Petitioner’s obviousness challenge based on the combination of Ishizawa and Chou is not persuasive.

*b. Ohsawa and Ishii*

Ohsawa was first cited in Petitioner’s anticipation challenge to claim 2. Pet. 25–32. In our Institution Decision, we concluded, as to claim 2, “each claim element is present in Ohsawa and arranged as in the claim.” Institution Dec. 11. Petitioner argues that by cancelling claim 2, Patent Owner “effectively concedes Ohsawa discloses all but the newly added ‘all

flush' limitation. Mot. Amend Opp. 22. To meet that new limitation, Petitioner relies on Ishii. *Id.* To illustrate the effect of making this combination, Petitioner provides, side-by-side, these annotated figures from Ishii and Ohsawa:



*Id.* at 23. Here, Petitioner provides a partial view from Ishii's Figure 2, annotated to show terminals 7A, plating lead remainders 9, and perforated notches 24, juxtaposed with Ohsawa's Figure 2, annotated to show insulating base layer 3 and "Ishii line 24." According to Petitioner, "[a]pplying Ishii's tear along perforated notch line 24 to Ohsawa's board, as depicted above, results in flush edges across Ohsawa's cover layer 5, plating lead 9, and base layer 3." *Id.*

*c. Patent Owner's § 103(c) Challenge to Ohsawa*

Patent Owner responds that under pre-AIA 35 U.S.C. § 103(c) Ohsawa is "not available as prior art." Mot. Amend Reply 10. Under that provision,

Subject matter developed by another person, which qualifies as prior art only under one or more of subsections (e), (f) and (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the claimed invention was made, owned by the same person or subject to an obligation of assignment to the same person.

35 U.S.C. § 103(c). According to Patent Owner, the '870 patent and Ohsawa “were subject to an obligation of assignment to [Patent Owner] as of the '870 patent’s date of invention (*i.e.*, its filing date).” Mot. Amend Reply 10. To support this argument, Patent Owner relies on a brief declaration of its employee, Toshiko Naito. Naito Decl. ¶¶ 3–6.

We have reviewed Mr. Naito’s testimony and do not find it reliable to establish that the patents were subject to an obligation of assignment. While he claims to have “personal knowledge” of the facts, the evidence does not support his assertion. He has held his current position with Patent Owner as “General Manager of the Business IP Strategy Department” only since July 1, 2017. Naito Decl. ¶¶ 1–2. His testimony is based entirely on his review of records, and his “understanding of [Patent Owner’s] policies.” *Id.* ¶ 6. He provides no documentary evidence to support his conclusions, including any documentary proof of the policies he refers to or the inventors’ obligations under those policies.<sup>4</sup>

Moreover, he relies on Japanese law (Article 35 of the Patent Act of Japan) with no explanation of the cited statute or indication of his legal qualifications to testify on its meaning. *Id.* ¶ 4. Mr. Naito’s cross-examination reveals that his investigation of corporate records was not directed to the proper date. Mr. Naito testifies he used a date “a little bit prior” to the filing date. Naito Dep. 20:18–21:7. The plain language of the statute, however, requires that there be an obligation to assign on the date the invention was made, not the date of filing. See 35 U.S.C § 103(c), quoted *supra*.

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<sup>4</sup> When asked at his deposition, he refused to produce those documents. Naito Dep. 31:14–32:16.

For these reasons, we do not find Mr. Naito's testimony credible. Consequently, Patent Owner's § 103(c) challenge to Ohsawa is unsupported and fails.

*d. Patentability of Claim 5 Over Ohsawa and Ishii*

After reviewing the record, we are not persuaded that a person of ordinary skill would have combined Ohsawa and Ishii to provide a flush edge, as asserted by Patent Owner. As Patent Owner points out, there are no embodiments in Ohsawa where the plating lead is flush with the edges of the surrounding insulation layers. Mot. Amend Reply 15. According to Petitioner, "[a person of ordinary skill] would be motivated to create this combination because Ohsawa's boards would need to be separated and have their plating leads severed (e.g. Ishii line 24) before the boards can function as components in a hard disk drive." Mot. Amend Opp. 23. Petitioner's only support for this assertion is testimony from Dr. Coughlin that merely repeats the quoted statement, without further explanation. *See Coughlin II Decl.* ¶ 34. Dr. Coughlin testifies that "Ishii discloses one such technique" that would result in layers with flush ends. But Petitioner and Dr. Coughlin fail to provide a persuasive rationale for applying the particular cutting technique of Ishii to Ohsawa. Dr. Coughlin admitted on cross-examination that Ohsawa does not disclose where to make the cut. *Coughlin II Dep.* 115:25–116:9. Moreover, he testified that Ishii does not locate the cut, either. *Id.* at 117:17–21 ("Q. Now, there's nothing about Ishii that would require positioning that line 24 at exactly that point where you've put it here; is that right? A. There's no reason why you couldn't put it there either."). We conclude that Petitioner provides no persuasive rationale for the exact placement of the cut line in Ohsawa, other than impermissible hindsight.

*e. Summary*

After reviewing the entire record, we determine Petitioner has not shown that the subject matter of claim 5 would have been obvious over Ishizawa and Chou or Ohsawa and Ishii.

#### IV. OTHER MATTERS

*A. Motion to Exclude*

Petitioner has filed a Motion to Exclude Evidence. (Paper 45, “Mot. to Exclude”). Patent Owner has filed an Opposition (Paper 47, “Mot. Opp.”) and Petitioner has filed a Reply (Paper 49, “Mot. Reply”). Petitioner’s Motion seeks to exclude several categories of documents and testimony including Petitioner’s financial disclosure filings (Ex. 2004 and 2005), certain testimony from Toshiaki Naito (Ex. 2007) and A. David Erpelding (Ex. 2009), and certain patents and publications cited by Patent Owner (Exs. 2010–2012).

1. Financial Disclosure Documents (Ex. 2004 and Ex. 2005)

These documents (a Form 10-K and proxy statement filed by Petitioner with the SEC) were submitted by Patent Owner as evidence of “industry praise.” PO Resp. 19 n.2. According to Patent Owner, the documents demonstrate that while Patent Owner has had success, Petitioner has experienced yearly losses and has approved a merger in an attempt to become profitable. *Id.* Petitioner wants the documents excluded under Federal Rule of Evidence 402 (Relevance). For reasons discussed *supra*, we do not rely on these documents. We therefore deny the motion as moot.

## 2. Naito Testimony

Mr. Naito's testimony is discussed *supra*. Petitioner seeks to have portions of Mr. Naito's declaration excluded on various grounds, including Federal Rules of Evidence 701 (improper opinion testimony from a fact witness) and 602 (lack of personal knowledge). Mot. to Exclude 3–8. We have reviewed these objections and determine that they go more to the weight of Mr. Naito's testimony than its admissibility. Petitioner has cross-examined Mr. Naito on his declaration and submitted his deposition transcript. Ex. 1019. We therefore deny the motion.

## 3. Erpelding Testimony

Petitioner seeks to exclude portions of Mr. Erpelding's testimony relied on by Patent Owner in support of its construction of the term “flush” in claim 5. Mot. to Exclude 8–9. Petitioner objects to the testimony as “not relevant.” *Id.* at 8. As Patent Owner points out, Mr. Erpelding is Petitioner's own expert. The statements from his cross-examination Petitioner seeks to exclude relate to a claim construction advanced by Petitioner. *See supra*. We are not persuaded that Mr. Erpelding's testimony is irrelevant and therefore deny the motion.

## 4. Exhibits 2010–2012

Exhibits 2010 and 2011 are patent documents filed by Petitioner. Petitioner relies on them to support its construction of “flush.” Mot. Amend Reply 3. Exhibit 2012 is a patent to Mr. Erpelding. He was questioned about all three exhibits at his deposition. Erpelding Dep. 29:16–19; 79:15–17; 87:22–25. Petitioner objects to them as not relevant. Mot. to Exclude 9–10. We do not rely on these exhibits. We therefore deny this motion as moot.

*B. Motion for Observations*

Patent Owner has filed a Motion for Observations concerning the cross-examination of Dr. Coughlin on his second declaration. Paper 42. Petitioner has filed a reply to those observations. Paper 48. We grant the motion and have considered the observations and reply.

V. ORDER

It is, therefore,

ORDERED that Petitioner has not proved by a preponderance of the evidence that claims 1 and 4 of U.S. Patent No. 8,895,870 B2 are unpatentable;

FURTHER ORDERED that Patent Owner's Motion to Amend is granted;

FURTHER ORDERED that claim 2 of the '870 patent be cancelled and claim 5 be added to the patent;

FURTHER ORDERED that Petitioner's Motion to Exclude Evidence 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.

Case IPR2017-01421  
Patent No. 8,895,870 B2

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