

UNITED STATES PATENT AND TRADEMARK OFFICE

---

BEFORE THE PATENT TRIAL AND APPEAL BOARD

---

LUXSHARE PRECISION INDUSTRY CO., LTD.,  
Petitioner,

v.

BING XU PRECISION CO., LTD.,  
Patent Owner.

---

Case IPR2017-01657  
Patent 8,740,631 B2

---

Before DEBRA K. STEPHENS, BRYAN F. MOORE, and  
STACEY G. WHITE, *Administrative Patent Judges*.

MOORE, *Administrative Patent Judge*.

FINAL WRITTEN DECISION  
35 U.S.C § 318(a)

## I. INTRODUCTION

Luxshare Precision Industry Co., Ltd. (“Petitioner”) requested *inter partes* review of claims 1–2 of U.S. Patent No. 8,740,631 B2 (“the ‘631 patent,” Ex. 1001) pursuant to 35 U.S.C. §§ 311 *et seq.* Paper 1 (“Pet.”). Bing Xu Precision Co., Ltd. (“Patent Owner”) filed a Preliminary Response. Paper 12 (“Prelim. Resp.”). In a January 12, 2018 Institution Decision, we determined that Petitioner had a reasonable likelihood of prevailing only as to claim 1 of the ‘631 Patent as being unpatentable under 35 U.S.C. § 103(a) as obvious over Wu and Su. Paper 17, (“Inst. Dec.”). Accordingly, we instituted an *inter partes* review on that ground only pursuant to 37 C.F.R. § 42.108. Inst. Dec. 33.

Subsequent to the Supreme Court’s decision in *SAS Institute, Inc. v. Iancu*, 138 S. Ct. 1348 (2018), we issued an Order, on May 1, 2018, modifying our Institution Decision to institute review of all challenged claims (1–2) on all grounds asserted in the Petition and instructed the parties to confer regarding any need for further briefing and changes to the schedule for trial. Paper 22 (“SAS Order”). Neither party requested additional briefing on the newly added claims.

Patent Owner filed a Patent Owner Response (Paper 21, “PO Resp.”) to which Petitioner filed a Reply (Paper 31, “Pet. Reply”). Patent Owner also requested authorization to file and, receiving authorization, filed a Sur-Reply. Papers 35, 39 (PO Sur-Reply). Both parties requested a hearing for oral argument (Paper 45) and a prehearing conference (Paper 34), and a prehearing was held October 4, 2018 and a hearing was held on October 9, 2018. See Paper 47 (“Tr.”).

Patent Owner also filed a motion to exclude certain exhibits. Paper 41 (“Mot. to Ex.”). Petitioner filed an opposition. Paper 43 (“Mot. to Ex. Opp.”). Patent Owner also filed a reply. Paper 44 (“Mot. to Ex. Reply”).

As discussed below, upon consideration of the Petition and Patent Owner Response, the testimony of Dr. Pradeep Lall for Petitioner (Ex. 1002) and Dr. Michael G. Pecht for Patent Owner (Ex. 2002), we determine that Petitioner has established by preponderance of the evidence that claim 1 of the ‘631 Patent is unpatentable but not has not established the unpatentability of claim 2.

#### *A. Related Matters*

We are informed that the ‘631 Patent is presently the subject of the following: *Bing Xu Precision Co., Ltd. v. Acer Inc. and Acer America Corp.* Case No. 5:16-cv-02491-EJD (N.D. Cal.). See Pet. 2. Petitioner also has filed IPR petitions, which are currently pending, challenging related U.S. Patent Nos. 8,512,071 (IPR2017-01404) and 8,758,044 (IPR2017-01492).

#### *B. The ‘631 Patent*

The ‘631 Patent describes an electrical connector assembly having a flex flat cable (“FFC”) and a printed circuit board (“PCB”), which is vertically secured to an insulating housing of the connector assembly, and a plurality of contacts of the PCB are provided on a rear surface of the PCB. Ex. 1001, 1:5–11. The ‘631 patent describes a SATA (Serial Advanced Technology Attachment) connector. *Id.* Figure 3 of the ‘631 Patent is reproduced below.

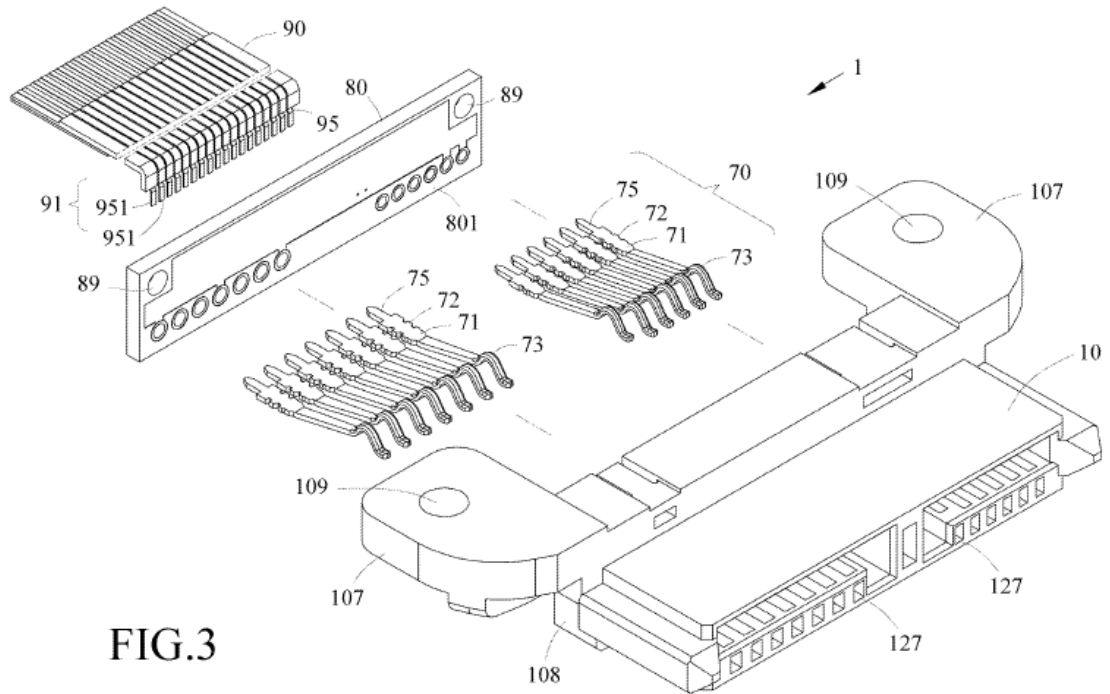


Figure 3A depicts an exploded view of the connector components. *Id.* at Fig. 3. The connector assembly includes FFC 90, PCB 80, terminals 70, and insulated housing 10. *Id.* Figure 6, reproduced below, shows a side view of the connector.

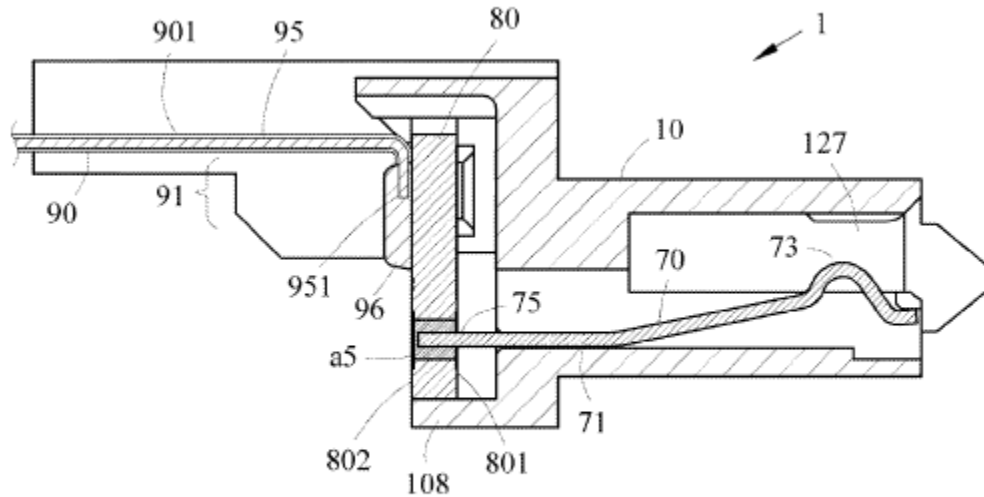


FIG.6

Figure 6, above, shows a side view of the connector illustrating an embodiment of the attachment of FFC 90 to the housing. *Id.* at Fig. 6.

### C. Illustrative Claim

Independent claim 1, reproduced below, is illustrative of the claimed subject matter:

1. An electrical connector assembly comprising:  
an insulating housing (10) comprising a plurality of terminal holes (127);  
a printed circuit board (PCB) (80) comprising a plurality of first, second, third, and fourth soldering holes (81, 82, 83, and 84) and a plurality of first, second, third, and fourth contacts (85, 86, 87, and 88) wherein the PCB (80) is vertically secured to a rear end (108) of the insulating housing (10), a front 10 surface (801) of the PCB (80) faces interior of the insulating housing (10), and a rear surface (802) of the PCB (80) is distal the rear end (108) of the insulating housing (10);

a plurality of terminals (70) fastened in the terminal holes (127) respectively, each terminal (70) comprising a mating portion (73) at one end fastened in one of the terminal holes (127), and a soldering portion (75) at the other end soldered in one of the first, second, third, and fourth soldering holes (81, 82, 83, 84);

a flex flat cable (FFC) (90) comprising a plurality of conductors (95) and an insulating layer (901) for enclosing substantial portions of the conductors (95);

wherein the first, second, third, and fourth contacts (85, 86, 87, and 88) are disposed on the rear surface (802) of the PCB (80), and exposed portion (951) of each conductor (95) at one end (91) of the FFC (90) is electrically connected to one of the first, second, third, and fourth contacts (85, 86, 87, and 88) of the PCB (80); and

an adhesive (96) coated on the conductors (95) at one end (91) of the FFC (90) to secure the FFC (90) to the PCB (80), wherein the adhesive (96) is AB adhesive, UV adhesive, hot melt type adhesive, quick dry adhesive, or any of other adhesives for fastening and protecting the FFC (90).

2. The electrical connector assembly of claim 1, wherein soldering holes (a1, a2, a3, a4, a5, a6, and a7) of the first soldering holes (81) on the rear surface (802) of the PCB (80) are electrically connected to contacts (b1, b2, b3, b4, b5, b6, and b7) of the first contacts (85) respectively, furthering comprising a ground member (803) disposed on the front surface (801) of the PCB (80), and at least three soldering holes (a1, a4, and a7) of the first soldering holes (81) are electrically connected to the ground member (803) respectively.

Ex. 1001, 8:4–28.

#### *D. Instituted Grounds of Unpatentability*

Petitioner asserts that claims 1 and 2 are unpatentable based on the following grounds (Pet. 27–72):

| Reference(s) | Basis | Claims challenged |
|--------------|-------|-------------------|
|--------------|-------|-------------------|

|                               |       |         |
|-------------------------------|-------|---------|
| Tseng <sup>1</sup>            | § 103 | 1 and 2 |
| Wu <sup>2</sup>               | § 103 | 1 and 2 |
| Wu and De Lollis <sup>3</sup> | § 103 | 1 and 2 |
| Su <sup>4</sup>               | § 103 | 1 and 2 |
| Wu and Su                     | § 103 | 1 and 2 |

## II. DISCUSSION

### A. *Level of Skill*

Petitioner asserts the level of skill includes, inter alia, “four years of experience or a Master’s degree with two years of experience in the field of mechanical engineering and/or electrical engineering.” Pet. 9 (citing Ex. 1002 ¶ 34). Patent Owner, through its declarant, asserts the level of skill would include a Bachelor’s degree (or the equivalent) in electrical engineering, and a few months of experience working with connectors. Ex. 2002 ¶ 40. Patent Owner also asserts, through its declarant, “[t]he prior art simply does not show technology so complex as to require a Master’s degree or extensive experience.” PO Resp. 6. We agree with Patent Owner that the level of skill is not particularly complex in this case.

Nevertheless, we find that nothing in the record suggests these alternative skill levels would lead to a different interpretation of the evidence necessary to resolve the issues in this case or affect the credibility of either expert. Thus, while for clarity we adopt Patent Owner’s articulation of the

---

<sup>1</sup> Taiwan Patent Pub. No. M413241U1, published Oct. 1, 2011 (“Tseng,” Ex. 1006, 1007 (translated version)).

<sup>2</sup> US Patent No. 7,563,108 B1, issued July 21, 2009 (“Wu,” Ex. 1003).

<sup>3</sup> De Lollis, THE USE OF ADHESIVES AND SEALANTS IN ELECTRONICS, PMP-1(3) IEEE TRANSACTIONS ON PARTS, MATERIALS AND PACKAGING (Dec. 1965) (“De Lollis, Ex. 1005).

<sup>4</sup> US Patent No. 7,803,009, issued Sept. 28, 2010 (“Su,” Ex. 1004).

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

### *B. Expert Qualifications*

Petitioner asserts that Dr. Pecht is not a credible expert witness because he had difficulty remembering facts regarding his professional association with Dr. Lall and the circumstances under which he recommended Dr. Lall to Petitioner. Pet. Reply 1–3. Specifically, Petitioner asserts

Dr. Pecht’s selective memory regarding Dr. Lall, his belief that the claims of the ’631 Patent were obvious [based on phone conversations with counsel], and other topics regarding which an expert in this field should have knowledge—such as how FFCs were traditionally connected to PCBs ([Ex. 1021] at 78:4-82:9, 97:23-98:21)—make his testimony in this proceeding completely unreliable.

*Id.* at 2–3.

We find that his memory regarding his work with Dr. Lall or negotiations leading to his or Dr. Lall’s retention in this matter is irrelevant to his opinion on technical issues in this case. Additionally, we do not consider Petitioner’s assertions regarding uncorroborated phone conversations. Finally, in reviewing the deposition transcript, we find that Dr. Pecht’s inability to answer questions related to his personal knowledge of the pitch of connections prior to 2011 is not disqualifying. Ex. 1021, 78:4–82:9, 97:23–98:21. If we considered this part of his deposition, we would consider it in giving weight to his testimony regarding claim

limitations to pitch. Because we find claim 1 is not shown to be unpatentable, the issue of pitch is moot.

Federal Rules of Evidence (“FRE”) § 702 permits expert testimony if a witness is qualified, “by [his or her] knowledge, skill, experience, training, or education,” and if his or her testimony “will help the trier of fact to understand the evidence or to determine a fact at issue,” *inter alia*. In determining who is “qualified in the pertinent art” under FRE 702, we need not find a complete overlap between the witness’s technical qualifications and the problem confronting the inventor or the field of endeavor for a witness to qualify as an expert. *SEB S.A. v. Montgomery Ward & Co., Inc.*, 594 F.3d 1360, 1372–73 (Fed. Cir. 2010) (upholding admission of the testimony of an expert who admittedly lacked expertise in the design of the patented invention, but had experience with materials selected for use in the invention). Overall, we find Dr. Pecht qualified to testify.

### *C. Claim Construction*

In an *inter partes* review, we construe claim terms in an unexpired patent according to their broadest reasonable construction in light of the specification of the patent in which they appear. 37 C.F.R. § 42.100(b). Consistent with the broadest reasonable construction, claim terms are presumed to have their ordinary and customary meaning as understood by a person of ordinary skill in the art in the context of the entire patent disclosure. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007).

#### *1. FFC (flexible flat cable) – all claims*

All claims contain a limitation to “a flex flat cable (FFC) (90) comprising a plurality of conductors (95) and an insulating layer (901) for

enclosing substantial portions of the conductors (95).” Only Patent Owner offers a construction of this phrase.

*a. Patent Owner’s Construction*

Patent Owner urges that FFC be construed as “a cable with flat conductors that are arranged along the same plane and that arrangement is laminated with a pliable material.” PO Resp. 5. Patent Owner also suggests that the phrase “laminated with a pliable material” means a single layer of insulation. *Id.* at 8–11 (contrasting FFCs from traditional jacketed cables with at least two layers of insulation), 25 (“the FFC required by Claim 1 is not a traditional cable with individually wrapped round conductors.”)<sup>5</sup> Below, we examine Patent Owner’s arguments regarding its new construction.

*b. Patent Owner – “an insulating layer”*

*Specification*

Patent Owner asserts “the FFC required by Claim 1 is not a traditional cable with individually wrapped round conductors,” but rather has a single

---

<sup>5</sup> Petitioner acknowledges this claim construction argument in its Reply and presents extrinsic evidence that FFCs have a “jacket.” Pet. Reply 6–8. Petitioner, however, subsequently argues “[b]ecause even Patent Owner’s proposed construction of FFC does not include the negative limitation that a FFC cannot have a jacket, the latter argument fails (and, in any case, is completely unsupported by any intrinsic or extrinsic evidence).” *Id.* at 10. Petitioner also stated at the oral hearing that this claim construction position “appears to be a new argument,” but did not lodge any objection to this argument. To the extent Petitioner is asserting this argument was untimely presented we disagree. We determine this argument was properly presented in Patent Owner’s Response. Additionally, Petitioner did not move to exclude this argument and thus, has waived any argument regarding the timing of the argument.

layer of insulation. PO Resp. 25; PO Sur-Reply 5. Patent Owner argues that at least Figures 3 and 6 show the FFC bending at sharp angles that Patent Owner asserts “would not be possible with the round conductors, jackets, shields, and additional insulation in a traditional jacketed cable.” PO Resp. 11–13. Nevertheless, Petitioner asserts “it is improper to import features from a preferred embodiment [in the Figures].” Pet. Reply 3–4. Petitioner also argues that “Dr. Pecht necessarily admitted that a jacketed cable, which he asserts is the type of cable disclosed in Wu, can be flexible.” Pet. Reply 9–10 (citing Ex. 1021, 139:17–24).

To show the claims should be limited to a single insulating layer, Patent Owner relies on the claim’s recitation of “an” insulating layer and five separate passages from the Specification describing an FFC as “having *an* insulating layer for enclosing a substantial portions of the conductors.” PO Sur-Reply 4–5 (citing Ex. 1001, 2:1-3, 3:42-44, claims 1, 13, and 17 (emphasis added)).

Claims 1, 8, and 12, however, use the transitional phrase “comprising.” An indefinite article, such as “an,” in patent parlance means “one or more” in open-ended claims containing the transitional phrase “comprising.” *KCJ Corp. v. Kinetic Concepts, Inc.*, 223 F.3d 1351, 1356 (Fed. Cir. 2000). Therefore, we disagree that the claims are limited to a single insulating layer based solely on the use of the indefinite article “an.” Nevertheless, intrinsic evidence can indicate that a patentee intended to limit a claim to one and only one. See *TiVo, Inc. v. EchoStar Commc’ns Corp.*, 516 F.3d 1290, 1303–04 (Fed. Cir. 2008); *Insituform Techs., Inc. v. Cat Contracting, Inc.*, 99 F.3d 1098 (Fed. Cir. 1996); *N. Am. Vaccine, Inc. v. Am. Cyanamid Co.*, 7 F.3d 1571 (Fed. Cir. 1993)

“While the term ‘comprising’ in a claim preamble may create a presumption that a list of claim elements is nonexclusive, it ‘does not reach into each [limitation] to render every word and phrase therein open-ended.’” *Promega Corp. v. Life Techs. Corp.*, 773 F.3d 1338, 1350 (Fed. Cir. 2014) (quoting *Dippin' Dots, Inc. v. Mosey*, 476 F.3d 1337, 1343 (Fed. Cir. 2007)). We also determine that although the overall claim recites “comprising that the FFC limitation itself does not use the word “comprising” may suggest that limitation was meant to be closed ended. *TiVo*, 516 F.3d at 1304.

Patent Owner suggests that Petitioner’s declarant Dr. Lall “admits that the statement ‘having an insulating layer for enclosing a plurality of first conductors and a plurality of second conductors’ means that you have a single insulating layer for at least four separate conductors. Ex. 2026, 74:13–75:3, 78:23–79:21, 80:9–17.” PO Sur-Reply 5. Nevertheless, we are persuaded that a fair reading of the cited testimony is that Dr. Lall maintains that a “conductor” may be defined as wire that is individually insulated such that the “single” insulating layer could actually be a layer applied to at least 4 conductors, i.e. individually insulated wires by his definition. Ex. 2026, 74:13–75:3, 78:23–79:21, 80:9–86:6. He does admit that the “layer” mentioned in the Specification is a layer applied to uninsulated conductors. *Id.* at 84:9–19. Dr. Lall also admits that it is “possible” to make a wire as the FFC shown in “Figure 6 on [] page 21 of the 1404 Exhibit 1022.” *Id.* at 79:9–17. Page 21 of Exhibit 1022 of IPR2017-01404 shows an excerpt of Exhibit 2013 at Figure 6 which is a flat cable with flat rectangular conductors with a single laminated cover. Ex. 2013, 8.

The figures in the '631 Patent also show a single insulating layer 901, as depicted in Patent Owner's annotated and excerpted version of Figure 6 reproduced below. See PO Resp. 3.

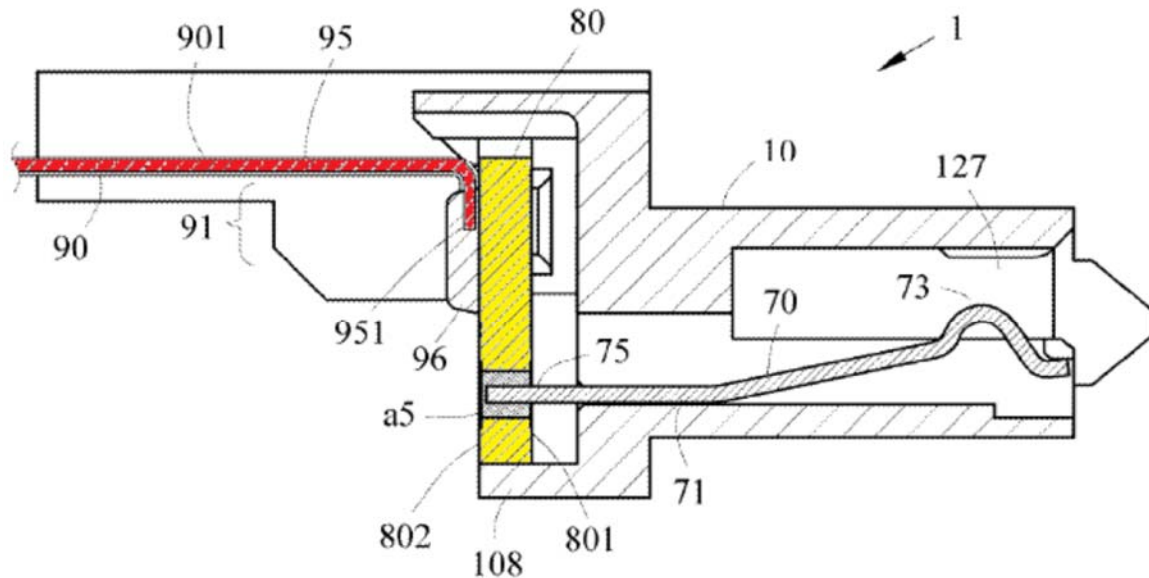


FIG.6

Patent Owner's annotated and excerpted version of Figure 6, above, of the '631 patent appears to show that the single insulating layer 901 encloses the conductors 95. Ex. 1001, Fig. 6. Patent Owner asserts that all embodiments show a single layer of insulation based on the Figures of the '631 patent. PO Sur-Reply 6.

We find the use of a single layer in the figure and the use of the phrase “an” insulating layer provides some support for construing “an insulating layer” as a single layer. Nevertheless, we do not find that lamination specifically is mentioned or suggested by the Specification.

#### *Extrinsic Evidence*

Patent Owner argues that two distinct but related types of flat cable existed at the time of the invention (i.e. either when the patent was filed or

issued)<sup>6</sup>: (a) ribbon cable, and (b) flexible flat cable (FFC). Figure 6 of Ex. 2013, reproduced below, illustrates these types of cables. PO Resp. 5–6.

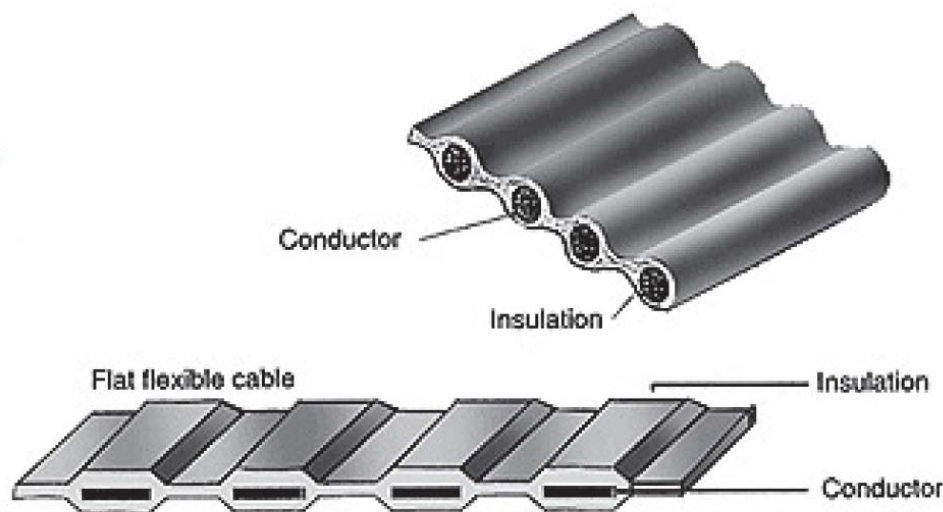


**FIGURE 6: Schematic illustration of (a) ribbon, and (b) FFC cable constructions.**

Figure 6, above illustrates a ribbon cable and an FFC. *Id.* at 6 (highlighting added by Patent Owner). Patent Owner asserts that ribbon cables are generally made up of round conductors that are constructed in a variety of ways, including extruded, laminated, and braided constructions. *Id.* at 5 (citing Ex. 2012 ¶ 39; Ex. 2013, 8, Fig. 6). In contrast, according to Patent

---

<sup>6</sup> The Federal Circuit has stated that “[o]ur decisions have not always been consistent as to whether the pertinent date [for dictionaries] is the filing date of the application or the issue date of the patent.” *Inverness Med. v. Princeton Biomeditech Corp.*, 309 F.3d 1365, 1370 n.1 (Fed. Cir. 2002) (citing *Tex. Digital Sys., Inc. v. Telegenix, Inc.*, 308 F.3d 1193, 1202–1203 (Fed. Cir. 2002) (pertinent date is issue date); *Schering Corp. v. Amgen, Inc.*, 222 F.3d 1347, 1353 (Fed. Cir. 2000) (pertinent date is filing date)). Given that the filing date is recent (2013) and there is no evidence presented that the definition of FFC has changed in a consistent way since the issuance of the patent, we consider all references presented by the parties from around the time of the filing of the patent application in this case until the present time including those with dates as late as 2018.

Owner, FFC cables are generally constructed by laminating flat conductors with a flexible polymer backing using a number of technologies. *Id.*

Patent Owner further asserts that Ex. 2013 shows various round jacketed cables that are not labeled as flat flexible cables. PO Resp. 6–7 (citing Ex. 2012 ¶ 40; Ex. 2013, Fig. 1). Patent Owner additionally presents an industry catalog that appears to show “flat” cables that are ribbon cables with round conductors and “flat flex” cables with flat conductors. PO Resp. 7 (citing Ex. 2012 ¶ 41; Ex. 2010, 23). Patent Owner asserts, based on the catalog, that the structure of an FFC typically comprises a flat and flexible insulation. *Id.*

Patent Owner asserts that jacketed cables including a jacketed SATA cable “has a primary insulation that surrounds the conductor, a shield that wraps around the primary insulation for additional protection, and a jacket that wraps around the conductor and the shield.” PO Resp. 9–11 (citing Ex. 2012 ¶ 43; Ex. 2013, 5; Ex. 2015, Fig. 1. Figure 1 of Exhibit 2011, reproduced below, shows a jacketed SATA cable.

**Figure 1: Details of the Inside of a SATA Cable**

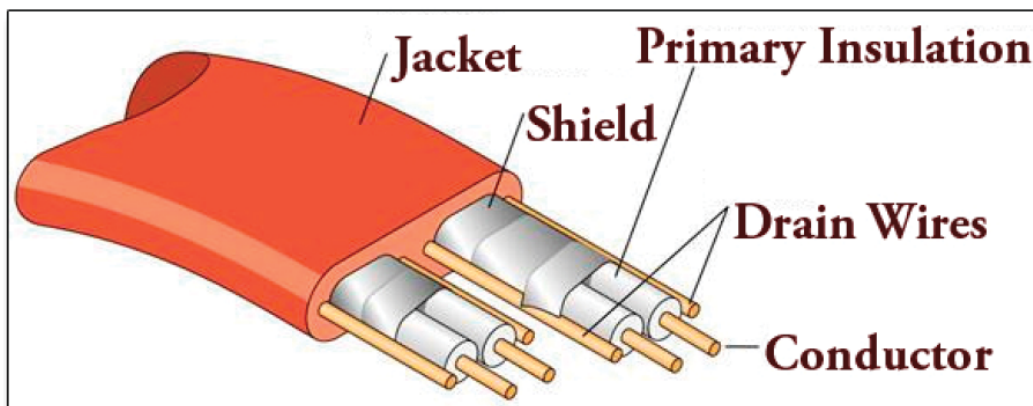


Figure 1 of Exhibit 2015, above, shows the shield and jacket of a jacketed SATA cable.

Patent Owner further asserts that there are several differences between an FFC and a jacketed cable. According to Patent Owner, jacketed cable cannot be bent at sharp angles<sup>7</sup>, takes up more space and adds weight, and is more burdensome to terminate when wanting to gain access to the conductors because the jackets, sleeves, and additional insulation need to be stripped. PO Resp. 10–11 (citing Ex. 2012 ¶ 46; Ex. 2016, 1; Ex. 2017, 12; Ex. 2018, 3). In contrast, according to Patent Owner, FFCs do not possess the drawbacks of jackets, sleeves, and additional insulation; are small, light, flexible, and have a low profile; and can be creased, punched, and folded at extreme angles. *Id.*

Patent Owner asserts that one of Petitioner’s exhibits, a WellPCB blog post (Ex. 1013), depicts a normal round cable and then says an FFC “may be used instead of the normal round cables.” PO Sur-Reply 7. According to Patent Owner, a picture shown on page one of the blog post is the “normal round cable” that is being distinguished from the more FFC shown on page 2 of the blog post. *Id.* Patent Owner points out the blog post also states, “[t]he wires [of an FFC] are not wrapped around several times and so they are lighter and flexible.” *Id.*

Petitioner asserts that the blog post refers to the jacketed round cable as the FFC. Pet. Reply 6. The first page of the blog post (Ex. 1013) is reproduced below:

---

<sup>7</sup> Petitioner argues that Patent Owner is improperly reading a limitation to bending at a sharp angle into the claim. Pet. Reply 4. We disagree. Patent Owner uses its reference to bending at a sharp angle as evidence that their construction is consistent with the Specification and the purpose of the invention, rather than explicitly construing the claim to require the ability to bend at a sharp angle. PO Resp. 11–14; PO Sur-Reply 6.

## Flat Flex Cable-Simple Useful Technology It's Here



### Abstract

FFC (flat flex cable) refers to electrical cable that are flat and flexible. It may also refer to thin cables found in high-density electronics such as the cell phones and laptops. Flat flexible printed circuits, therefore, refers to components built using straight connectors. On the other hand, flat flexible miniature cable consists of a flexible film base that comes with multiple of metallic conductors bonded on the surface of the base. Stiffeners are then used to reinforce the end of the cable. This is critical in that it makes insertion easier and helps to provide strain relief.



A flat flex cable may be used instead of the normal round cables because they are easy to manage and can suitably be deployed in areas that require flexibility. They take less space and offer better EMI suppression in addition to eliminating wire coupling problems. The wires are protected and are not wrapped around several times and so they are lighter and flexible.

Page 1 of Exhibit 1013 shows 3 jacketed round cables in a shield consistent with the traditional SATA cable. The image appears to show round wires that appear to be “wrapped around several times,” but the image is consistent with Exhibits 1014, 1015, and 1016 which refer to similar images as “flat flexible cables” or “flat cables.” Petitioner’s declarant asserts credibly that the phrase “wrapped around” refers to a traditional twisted pair in which the wire is wrapped around itself. Ex. 2026, 60:15–62:6. We cannot determine whether the text of Exhibit 1013 suggests that the image shown on page 1 is an example of normal round cables or of an FFC, nor do we have any dimensions or a cross-section and, thus, do not rely on page 1 of Exhibit 1013.

Based on the arguments and evidence above, on balance, we find that the extrinsic evidence is consistent with a finding that the ’631 patent intended to claim a FFC that is distinguished from a normal jacketed cable in

that it has a single layer of insulation. The extrinsic evidence also suggests using lamination to form the insulation layer of the FFC.

*c. Patent Owner – FFC*

*Specification*

Petitioner states “[n]one of the claims of the ’631 Patent refer to any shape of any *conductor* . . . [and] nothing in the [text of] specification describes the *conductors* of an FFC as being flat, or as being “laminated with a pliable material.” Pet. Reply 3. Nevertheless, we find that the figures of the ’631 Specification do show flat (rectangular) conductors. Ex. 1001, Fig. 3.

Patent Owner emphasizes that the figures of the ’631 Patent depict only flat conductors in the FFC 90. PO Sur-Reply 5. Additionally, the ’631 Patent does not disclose or depict round conductors anywhere. *Id.* According to Patent Owner, that is because the inventor understood that an FFC by definition only included flat conductors. *Id.* Additionally, the figures all depict the same FFC cable, even where the figures are directed to multiple embodiments of the invention. *Id.* Thus, flat conductors are not a

preferred embodiment but appear to be the only embodiment shown as far as can be seen in the figures.<sup>8</sup> *Id.*

We agree that all embodiments shown in the figures have the same FFC cable with a single insulating layer and what appear to be flat conductors. Ex. 1001, Figs. 1–3, 6–9. However, our reviewing court has repeatedly held that it is “‘not enough that the only embodiments, or all of the embodiments, contain a particular limitation’ to limit claims beyond their plain meaning.” *Unwired Planet, LLC v. Apple Inc.*, 829 F.3d 1353, 1359 (Fed. Cir. 2016).

---

<sup>8</sup> Petitioner does not provide a intrinsic evidence showing that the figures are accurate or drawn to scale. *Cf. Nystrom v. Trex Co.*, 424 F.3d 1136, 1149 (Fed. Cir. 2005) (“[U]nstant assumptions in prior art patent drawings cannot be the basis for challenging the validity of claims reciting specific dimensions not disclosed directly in such prior art.”); *see Hockerson-Halberstadt, Inc. v. Avia Grp. Int’l., Inc.*, 222 F.3d 951, 956 (Fed. Cir. 2000) (“[P]atent drawings do not define the precise proportions of the elements and may not be relied on to show particular sizes if the specification is completely silent on the issue.”). But this “does not mean that things patent drawings show clearly are to be disregarded.” *In re Mraz*, 455 F.2d 1069, 1072 (CCPA 1972). Rather, drawings can be relied upon for what they reasonably disclose and suggest to one of ordinary skill in the art. *See In re Aslanian*, 590 F.2d 911, 914 (CCPA 1979).

*Extrinsic Evidence*

Figure 6 of Exhibit 2013, reproduced below, illustrates ribbon and FFC cables. Ex. 2013, 8.

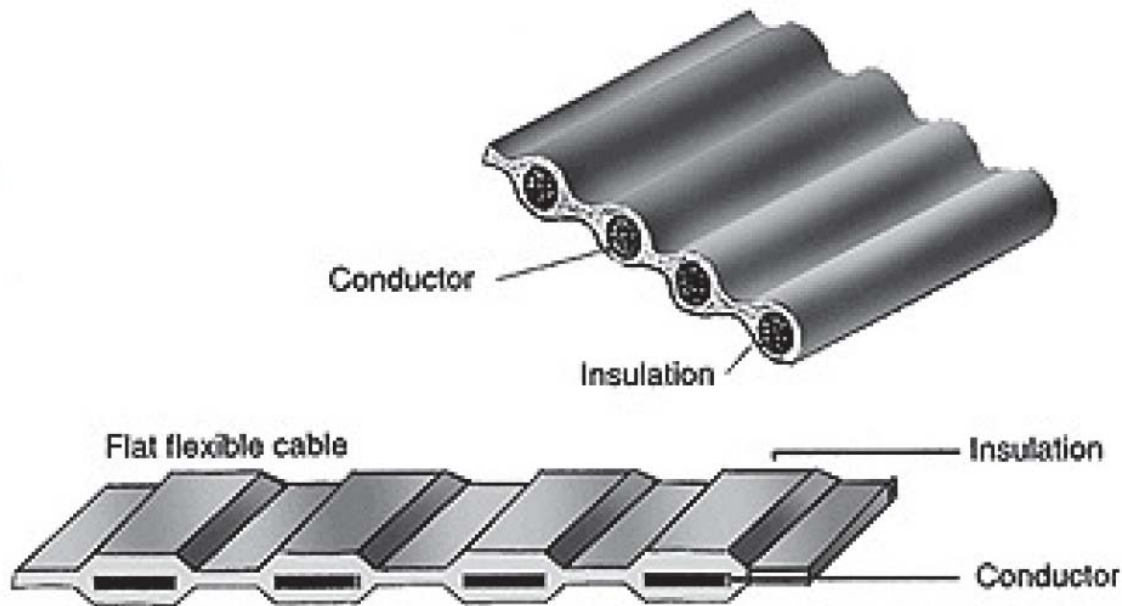


**FIGURE 6: Schematic illustration of (a) ribbon, and (b) FFC cable constructions.**

Figure 6, above, illustrates a ribbon cable and an FFC. *Id.* (highlighting added by Patent Owner). Notably, the conductor in the FFC is shown as flat and rectangular.

Patent Owner asserts the extrinsic evidence shows the term “FFC” is a term of art that has a specific meaning in the industry which is “a type of cable made of flat conductors arranged in parallel along the same plane and laminated between layers of pliable material.” PO Resp. 11 (citing Ex. 2012 ¶ 47–49; Ex. 2019, 5). Patent Owner further points to a technical paper dated April 2016 which defines a “flat flexible cables” as “an extremely thin cable in which multiple rectangular conductors are laminated within an insulation material.” *Id.* (citing Ex. 2019, 5).

Additionally, Patent Owner, citing to evidence introduced by Petitioner, states “a webpage from the Digi-key website . . . (Ex. 1013), . . . Digi-key website’s glossary also explains that ‘FFC cables are a series of single flat conductor wires placed parallel to each other and molded together.’” PO Sur-Reply 7 (citing Ex. 2025, 10).

Petitioner states that:

Taken as a whole, however, the extrinsic evidence plainly shows that there is no commonly-used specific definition of “flexible flat cable” within the cable industry, and certainly not the unduly narrow definition set out by Patent Owner. Instead, the term is used broadly to indicate cables of varying degree of flatness, varying degrees of flexibility and which include a wide variety of conductor types, including round conductors. (See also Dr. Lall’s Reply Declaration, Ex. 1018, ¶¶33-41.)

Pet. Reply 8. While we agree that it appears that the industry has used the term flexible flat cable in a broader way than urged by Patent Owner, Patent Owner has shown that some in the industry had a specific definition of “flat flexible cable” that is consistent with figures in the Specification.

In addition to Exhibit 1013, Petitioner provides three web pages that purport to refer to jacketed round wires with a shield as “flat flex cable” and “flat flexible cable.” Pet. Reply 6–8. Exhibits 1014 and 1015 are web pages offering a product for sale and Exhibit 1016 is a catalog of cables for sale.

Petitioner also introduced Exhibits 1025–1029, which are patents, each dated no later than 1994, that allegedly show round conductors. See *generally*, Exs. 1025–1029. Given the early date of these references, we assign less weight to this evidence. We acknowledge that the record shows that the term “flat cable” has evolved over time, to at least 2013, such that flat cables “have their history from ribbon cables,” but “flat cables” are described more broadly as coming in various forms as a generally flatter and

more flexible alternative to round cables (Ex. 2004, 1). Additionally, Exhibits 1025–1029 were not discussed in the briefing by the parties and were only introduced at Dr. Lall’s deposition by Petitioner’s counsel. Thus, we have given them very little weight.

“[A] word that has an ordinary meaning encompassing two relevant alternatives may be construed to encompass both alternatives,” (*Inverness Med. Switzerland v. Warner Lambert Co.*, 309 F.3d 1373, 1379 (Fed. Cir. 2002)), however, the court must interpret the term to encompass meanings consistent with the intrinsic evidence. *Texas Digital Sys., Inc.*, 308 F.3d at 1203 (citing *Renishaw PLC v. Marposs Societa’ per Azioni*, 158 F.3d 1243, 1250 (Fed. Cir. 1998)).

For the reasons above, we agree with Patent Owner that the extrinsic evidence suggests that one of ordinary skill in the art would have known that the term FFC has at least one meaning, among others, that is limited to flat conductors as opposed to just a flat cable which may have round conductors.

#### *d. Analysis*

This case presents the unusual situation where the claim language is ambiguous and vague, the extrinsic evidence presents alternately a broad and a narrow interpretation of the claim term, and the intrinsic evidence provides a consistent view as to the claim term in the figures, but not an explicit disavowal of any scope of the claim. We acknowledge “there is sometimes a fine line between reading a claim in light of the specification, and reading a limitation into the claim from the specification.” *Bell Atl. Network Servs., Inc. v. Covad Commc’ns Grp., Inc.*, 262 F.3d 1258, 1270 (Fed. Cir. 2001) (quotation omitted). “Generally, there is a ‘heavy presumption’ in favor of the ordinary meaning of claim language as understood by one of ordinary

skill in the art. This presumption is overcome: (1) where the patentee has chosen to be his own lexicographer, or (2) where a claim term deprives the claim of clarity such that there is “no means by which the scope of the claim may be ascertained from the language used.” *Bell Atlantic*, 262 F.3d at 1268 (citing *Johnson Worldwide Assocs., Inc.*, 175 F.3d at 989–90).

As to flat conductors, we further find that the specification does not provide explicit lexicography as to what FFC means. The ‘631 Patent also does not explicitly disavow round conductors. The Federal Circuit has stated:

Where the specification makes clear that the invention does not include a particular feature, that feature is deemed to be outside the reach of the claims of the patent, even though the language of the claims, read without reference to the specification, might be considered broad enough to encompass the feature in question.

*SciMed Life Sys., Inc. v. Advanced Cardiovascular Sys., Inc.*, 242 F.3d 1337, 1341 (Fed. Cir. 2001). In this case, however, there is not express statement that the “present” invention or “the” invention is flat conductors as in *SciMed*, nor is there an explicit statement disavowing round conductors.

Nevertheless, “a claim term may be clearly redefined without an explicit statement of redefinition.” *See Bell Atlantic*, 262 F.3d at 1268 (Fed. Cir. 2001); *AIA Eng’g Ltd. v. Magotteaux Int’l S/A*, 657 F.3d 1264, 1278 (Fed. Cir. 2011) (“[t]he specification need not reveal such a definition explicitly,” but may do so “by implication.”) (quoting *Astrazeneca LP v. Apotex, Inc.*, 633 F.3d 1042, 1051–52 (Fed.Cir.2010)); *Columbia Univ.*, 811 F.3d at 1364. An implied redefinition must be clear and unmistakable. *Columbia Univ.*, 811 F.3d at 1364 (Fed. Cir. 2016). A disavowal of scope can be found when the specification describes a feature as “this invention”

or “the present invention”). *Honeywell Int’l, Inc. v. ITT Indus., Inc.*, 452 F.3d 1312, 1318 (Fed. Cir. 2006).

Here, Petitioner provides a broad construction that is consistent with industry sales websites (Exs. 1014, 1015, and 1016) and a dictionary definition of “flat” (Pet. Reply 10), but is broader than the drawings in the Specification and certain extrinsic definitions.

Petitioner’s construction is consistent with the explicit words of the claim outside of the term “FFC” but does not define “FFC” itself. Petitioner relies on extrinsic references to show that a round insulated cable which is then further insulated in a flat insulator with at least 3 other round insulated cables can meet the claim language. See Exs. 1014, 1015, and 1016. Nevertheless, “it is improper to read the term to encompass a broader definition simply because it may be found in a dictionary, treatise, or other extrinsic source.” *Power Integrations, Inc. v. Fairchild Semiconductor Int’l, Inc.*, 711 F.3d 1348, 1362 (Fed. Cir. 2013) (citing *Nystrom v. TREX Co.*, 424 F.3d 1136, 1145 (Fed.Cir.2005)).

Patent Owner proposes a construction that is consistent with the drawings, and at least two dictionary or glossary definitions of the term. As detailed above, our decision as to the construction of FFC, at least as to the shape of the conductors, is guided by both the intrinsic and extrinsic record.

As additional support, every embodiment disclosed in the figures of Specification appears to include a flat conductor and a single layer of insulation. We understand that “it is ‘not enough that the only embodiments, or all of the embodiments, contain a particular limitation’ to limit claims beyond their plain meaning.” *Unwired Planet*, 829 F.3d at 1359 (Fed. Cir. 2016) (internal citation omitted). Here, we are not reading a limitation into

the claims. Instead, we must determine if a requirement is implicit in the claim limitation—that the “FFC” language is limited to flat conductors or that “an insulation layer” is limited to a single layer as shown in the drawings and defined in some extrinsic sources. *See Microsoft Corp. v. Proxyconn, Inc.*, 789 F.3d 1292, 1298 (Fed. Cir. 2015), overruled on other grounds by *Aqua Prod., Inc. v. Matal*, 872 F.3d 1290 (Fed. Cir. 2017) (“Even under the broadest reasonable interpretation, the Board’s construction ‘cannot be divorced from the specification and the record evidence.’”).

Finally, the extrinsic evidence shows that various cable configurations are called “flat flexible cables.” Petitioner’s declarant asserts “[i]t’s not a term of art . . . it’s used loosely to represent a number of different types of cables.” Ex. 2026, 68:15–18. As detailed above, Petitioner introduced references that show that companies referred to relatively flat cables with a layer of insulation surrounding individually insulated conductors as FFCs.

Nevertheless, the use of the generic term FFC does not necessarily provide clarity as to the bounds of the invention because the industry appears to have several definitions of what an FFC or flat flexible cable is and the Specification does not explicitly define the term. To clarify the definition, Patent Owner points to an exhibit, Exhibit 2013, dated in the year 2000, which contrasts a ribbon cable with round conductors individually insulated and laid parallel and further insulated with a so-called FFC with flat conductors with a single insulator. PO Resp. 8–9 (citing Ex. 2013, Fig. 6). Patent Owner also points to an exhibit, dated in 2018, which is part of a webpage relied on by Petitioner, which defines a “flat flexible” connector as “FFC cables are a series of single flat conductor wires placed parallel to each

other and molded together.” PO Sur-Reply 7 (citing Ex. 2025, 10). Patent Owner further points to a technical paper dated April 2016, a few years after the patent issued, which defines a “flat flexible cable” as “an extremely thin cable in which multiple rectangular conductors are laminated within an insulation material.” PO Resp. 11 (citing Ex. 2019, 5).

We are mindful of the “broadest reasonable construction” we are applying in this IPR. As our reviewing courts confirmed in *Cutsforth, Inc. v. Motivepower, Inc.*, 643 Fed. Appx. 1008 (Fed. Cir. 2016) (nonprecedential), “[w]hile claims are given their broadest reasonable interpretation in IPR proceedings, claim interpretation still ‘must be reasonable in light of the claims and specification.’” (quoting *PPC Broadband, Inc. v. Corning Optical Commc’ns RF, LLC*, 815 F.3d 747, 755 (Fed. Cir. 2016)); see also *SAS Inst., Inc. v. ComplementSoft, LLC.*, 825 F.3d 1341, 1343 (Fed. Cir. 2016) (“While we have endorsed the Board’s use of the broadest reasonable interpretation standard in IPR proceedings, we also take care to not read ‘reasonable’ out of the standard. This is to say that ‘[e]ven under the broadest reasonable interpretation, the Board’s construction cannot be divorced from the specification and the record evidence, and must be consistent with the one that those skilled in the art would reach.’” (quoting *Microsoft*, 789 F.3d at 1298 (internal quotation marks omitted) (first quoting *In re NTP, Inc.*, 654 F.3d 1279, 1288 (Fed. Cir. 2011); and then quoting *In re Cortright*, 165 F.3d 1353, 1358 (Fed. Cir. 1999))).

e. *Conclusion*

In summary, we find that “FFC” is a term used in the industry that has multiple meanings, the patentee used FFC in a consistent way in the figures of the Specification requiring flat conductors and a single insulated cover,

and the extrinsic evidence supports a finding that one of ordinary skill would have understood that meaning. Nevertheless, an implied redefinition must be it must be clear and unmistakable. *Columbia Univ.*, 811 F.3d at 1364 (Fed. Cir. 2016). As to flat conductors, we are not convinced that the apparent consistent use in the figures clearly and unmistakably redefines a FFC as allegedly defined in the extrinsic references cited by Patent Owner.

As to “an insulation layer,” we are not convinced that the use of the indefinite article “an” and consistent use in the figures clearly and unmistakably limit an insulated layer to a single insulated layer, as allegedly defined in the extrinsic references cited by Patent Owner. We also recognize, as Petitioner notes, that lamination as a way of constructing the cable is not mentioned in the Specification. Pet. Reply 4. Thus, we construe the term “FFC” or “an insulation layer” as explicitly recited in the claim and do not limit the claims to a single layer of insulation or flat conductors.<sup>9</sup>

*1. ground member*

Claim 2 recites “a ground member (803) disposed on the front surface (801) of the PCB (80), and at least three soldering holes (a1, a4, and a7) of the first soldering holes (81) are electrically connected to the ground member (803) respectively.” Petitioner asserts “[u]nder the BRI standard, in the context of the specification of the ’631 Patent and its claims, the term

---

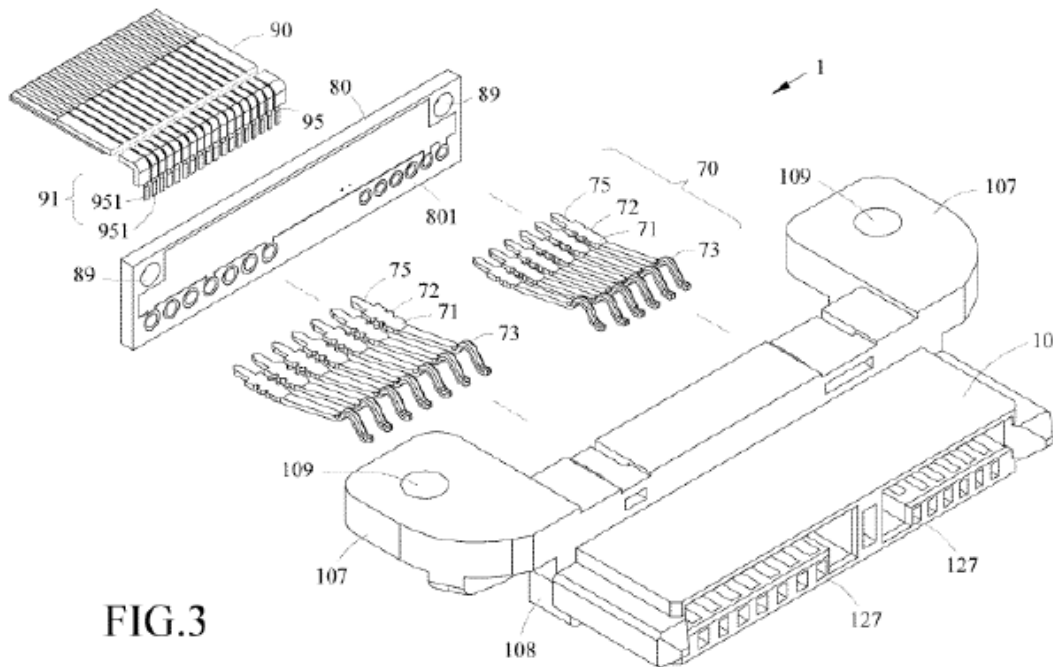
<sup>9</sup> We acknowledge that this construction is different than our construction of the same term in related patents in IPR2017-01404 and IPR2017-01492. Nevertheless, a term used in multiple, related patents should be construed in the same way *unless* there is evidence that a different meaning was intended for a particular patent. *Jonsson v. Stanley Works*, 903 F.2d 812, 818 (Fed.Cir.1990). Unlike here, the other two patents specifically call for a unitary construction as to “an insulating layer” in the Specification and distinguish over a patent with individually insulated round conductors.



#### D. Asserted Prior Art

1. Tseng (Ex. 1006, 1007 (translation))

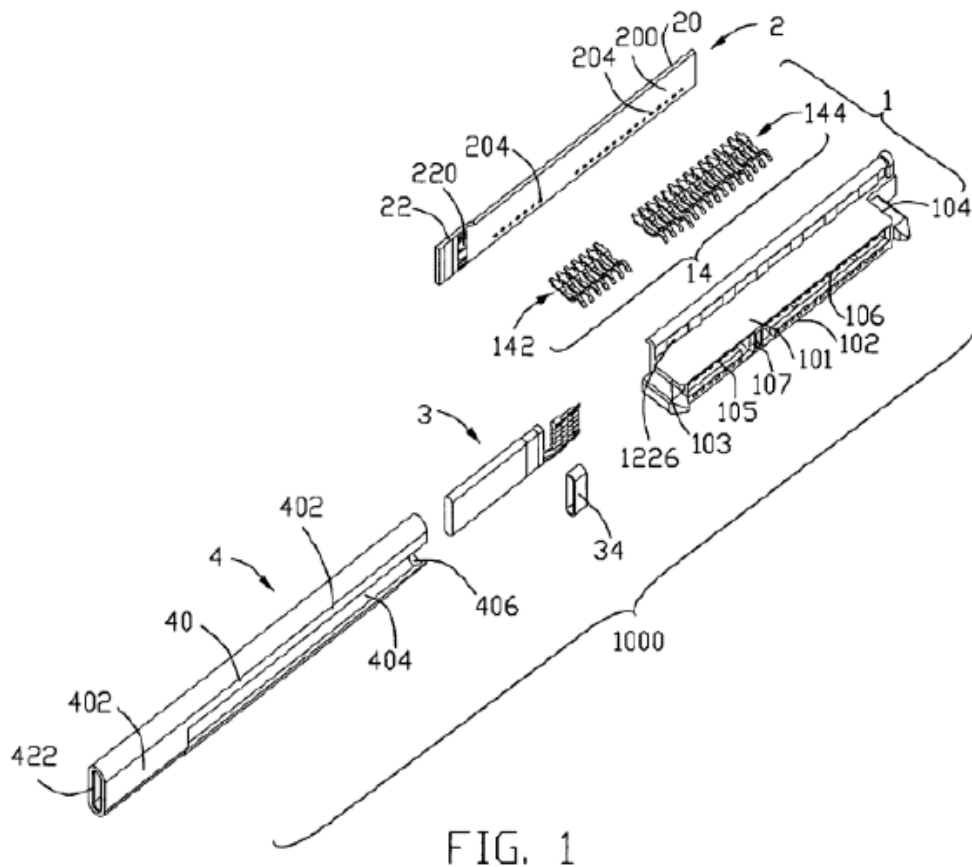
Tseng describes an insulating housing comprising a plurality of terminal holes. Ex. 1007, 9. Figure 3 of Tseng is reproduced below.



As illustrated in Figure 3 of Tseng, above, Tseng includes “insulating housing 10, a plurality of power terminals 20, a plurality of data terminals 30, a PCB 40, and an FFC (flex (or flexible) flat cable) 50.” *Id.* at 9.

## 2. *Wu (Ex. 1003)*

Wu describes a cable assembly with a cable that extends laterally in a direction perpendicular to the insulated housing. Ex. 1003, 3:36-39. Figure 1 of Wu is reproduced below.



As illustrated in Figure 1 of Wu, above, the cable of Wu enters the connector on the side, and the wires of the cable are soldered to the conductive pads 220 of the connection portion 22. *Id.* at 3:36-39, Fig. 1.

### 3. *De Lollis* (Ex. 1005)

De Lollis is an article that discusses some of the resin compounds available for use with electronics. Ex. 1005. Those adhesives include epoxies, nylon epoxies, phenolics, polysulfides, epoxy polyamide or

polyurethane conformal coatings, silicone resins, polyurethanes, heat-activated thermoplastic, or thermosetting adhesives. *Id.*

4. *Su (Ex. 1004)*

Su discloses a plug connector with wiring cables (wires 32) that connect to a PCB board 61. Ex. 1004. Figure 3 of Su is reproduced below.

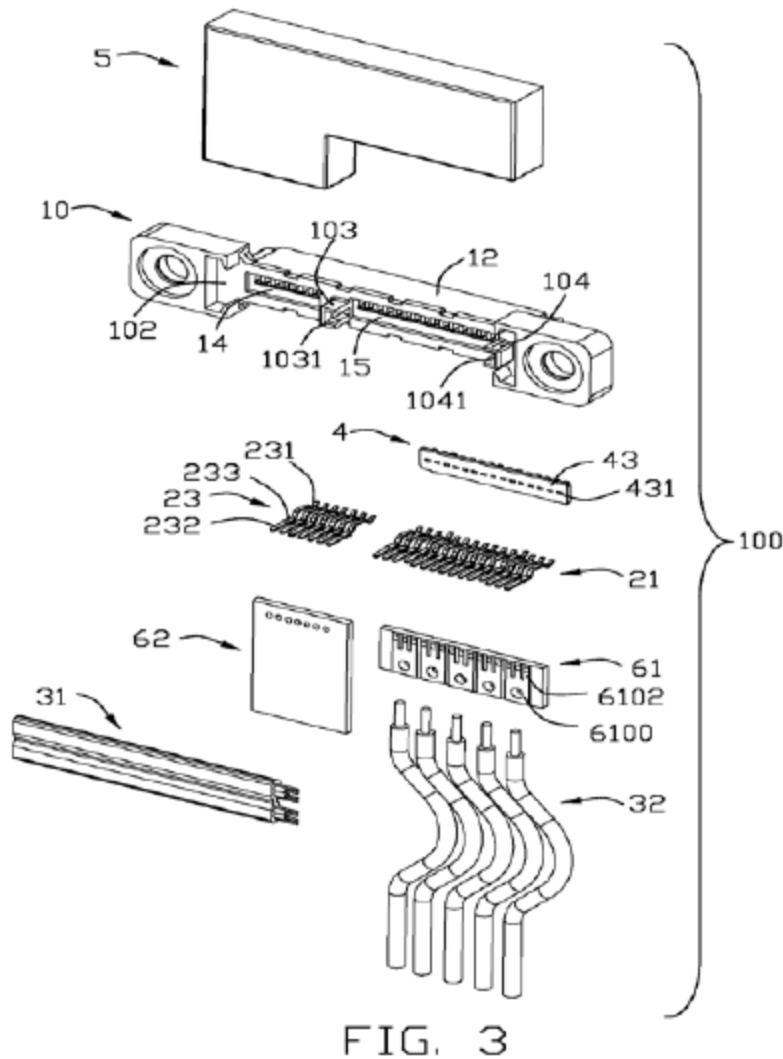


Figure 3, above, shows the components of the connector disclosed in Su.

*E. Asserted Anticipation and Obviousness over Tseng*

Petitioner contends claims 1 and 2 are unpatentable under 35 U.S.C. § 103(a) as obvious over Tseng. Pet. 14–27. Petitioner explains how Tseng allegedly describes all of the claim limitations. *Id.* (citing Ex. 1002).

*1. Analysis*

Claim 1 recites “the first, second, third, and fourth contacts (85, 86, 87, and 88) are disposed on the rear surface (802) of the PCB 15 (80), and exposed portion (951) of each conductor (95) at one end (91) of the FFC (90) is electrically connected to one of the first, second, third, and fourth contacts (85, 86, 87, and 88) of the PCB (80)” (“Rear Surface Limitation”).

Petitioner asserts that “[a]lthough Tseng does not explicitly disclose contacts located on the rear surface of the PCB, locating the contacts on the rear surface of the PCB would have been obvious to a” person of ordinary skill in the art. Pet. 25. In particular, Petitioner asserts:

The first reason that the ’631 Patent locates the contacts for soldering the FFC on the rear surface is to promote ease of assembly and inspection. (See Ex. 1001 at 1:39-43.) The second reason is that adhesive can easily be applied to where the PCB and the soldering contacts are soldered after soldering.

Pet. 25 (citing Ex. 1001, 1:44-48.). Reliance on those statements by Petitioner suggests employing hindsight to piece together the device as claimed. “The inventor’s own path itself never leads to a conclusion of obviousness; that is hindsight. What matters is the path that the person of ordinary skill in the art would have followed, as evidenced by the pertinent prior art.” *Otsuka Pharm. Co., v. Sandoz, Inc.*, 678 F.3d 1280, 1296 (Fed. Cir. 2012).

Petitioner goes on to note that “Tseng also provides a design for easy assembly and inspection and easy application of the adhesive coating” by providing an “injection hole” for inspection. Pet. 25 (citing Ex. 1002 ¶ 67); see Ex. 1007 (Tseng), 13 (“An injecting hole 61 is formed on the cover 60 so that a person may inspect whether the first bending portion 51 is fastened or not by seeing through the injecting hole 61.”). Nevertheless, this shows, at best, that the Tseng inventors had a solution to the problem of ease of assembly and inspection. Finally, Petitioner states:

It would be obvious for a POSA to vary this by shifting the soldering location for the FFC to the rear surface, as long as the soldering location is still accessible and available for inspection and application of adhesive. (Ex. 1002 at ¶ 67.) A POSA would have been motivated by Tseng, Wu, Su, and the well-known desire for ease-of-access, to place the soldering locations on the rear of the PCB because that orientation would provide quicker access and monitoring capability than the reverse orientation, as the face of the PCB is facing and obscured by the insulated housing.

Pet. 26. Petitioner’s declarant makes similar assertions without any further citation to specific textual support. Ex. 1002 ¶ 67.

Arguments made in the Preliminary Response and not repeated in the Patent Owner Response typically are deemed waived. See Paper 18, 3. However, we waive that restriction due to the circumstances surrounding the application of the SAS decision to the proceeding, and the parties’ choice not to brief the newly added grounds when given the opportunity to do so, we rely on arguments in the Preliminary Response for consistency of the *inter partes* review.<sup>10</sup>

---

<sup>10</sup> Patent Owner asserts:

Patent Owner asserts that Tseng does not disclose a two sided metalized PCB to allow the contacts of the FFC to be attached on the rear of the PCB. Prelim. Resp. 33; PO Sur-Reply 22. Patent Owner also relies on its declarant to assert that “[t]he complexity involved in designing and manufacturing connections on both the front and rear of a PCB cannot be underestimated.” *Id.* at 34 (citing Ex. 2002 ¶ 84).

We agree that Petitioner does not explain the implications of a two sided metalized PCB to one of ordinary skill in the art or why a person of ordinary skill would modify Tseng in that particular way. In other words, Petitioner fails to “explain why a person of ordinary skill in the art would have combined elements from specific references in the way the claimed invention does.” *ActiveVideo Networks, Inc. v. Verizon Comms, Inc.* 694 F.3d 1312, 1328 (Fed. Cir. 2012); *see also Hyundai Motor Co. v. Blitzsafe Texas, LLC*, Case IPR2016–01476, slip op. at 32 (PTAB Jan. 24, 2017) (Paper 12) (“A determination of obviousness cannot be reached where the record lacks ‘explanation as to how or why the references would be combined to produce the claimed invention.’ *quoting Trivascular, Inc. v. Samuels*, 812 F.3d 1056, 1066 (Fed. Cir. 2016)).

Additionally, Petitioner’s rationale for the modification, i.e. ease of access, is particularly generic. Specifically, neither Petitioner nor its

---

Luxshare also completely ignores Bing Xu’s arguments from the Patent Owner’s Preliminary Response (Paper 12) for Grounds 1-4. Because Luxshare did not address Grounds 1-4 in its reply and chose not to ask for additional briefing to respond to Bing Xu’s POPR arguments relating to Grounds 1-4, the Board should reject Grounds 1-4 for at least the reasons cited in the institution decision.

PO Sur-Reply 21.

declarant explains why a general need for ease-of-access would lead to moving the contacts to the rear of the PCB when, as Petitioner admits, access is already available, besides asserting the reasons for seeking the benefits described in the '631 patent—a reason tainted by hindsight. *See W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1553 (Fed. Cir. 1983) (“To imbue one of ordinary skill in the art with knowledge of the invention in suit, when no prior art reference or references of record convey or suggest that knowledge, is to fall victim to the insidious effect of a hindsight syndrome wherein that which only the inventor taught is used against its teacher.”)

Thus, absent impermissible hindsight reconstruction, we are not persuaded that Petitioner has provided a sufficient rationale for modifying Tseng as proposed in the Petition. Accordingly, Petitioner has not shown there is a reasonable likelihood of prevailing in establishing the unpatentability of claims 1 and 2 the '631 Patent as obvious over Tseng.

*F. Asserted Obviousness over Wu and/or Wu and De Lollis*

Petitioner contends claims 1 and 2 are unpatentable under 35 U.S.C. § 103(a) as obvious over Wu and/or Wu and De Lollis. Pet. 29–46. Petitioner explains how Wu alone or in combination with De Lollis allegedly describes all of the claim limitations. *Id.* (citing Ex. 1002).

Figure 1 of Wu is reproduced below.

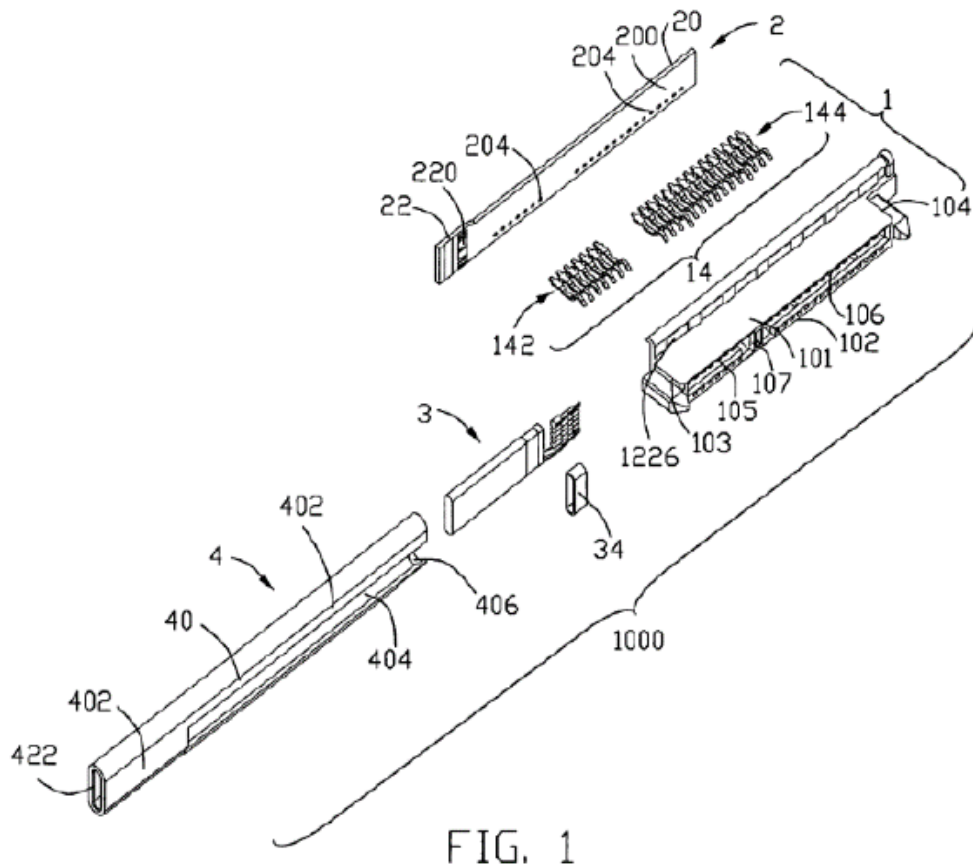


Figure 1 of Wu shows that conductive pad 220 is positioned on the front surface of the PCB in relation to housing 101. Ex. 1003, Fig. 1.

As to the Rear Surface Limitation, Petitioner asserts that “[a]lthough Wu does not explicitly disclose contacts located on the rear surface of the PCB, locating the contacts on the rear surface of the PCB would have been obvious to a” person of ordinary skill in the art. Pet. 39. Petitioner presents mostly the same arguments for why this limitation would have been obvious as presented for Tseng above. *Id.* at 39–41.

Petitioner also argues that “[p]rior to sliding the cover on to complete the assembly, the portion where the wire 32 is soldered onto the conductive pads 220 on the PCB 2 can be exposed.” *Id.* at 40. Thus, according to

Petitioner, placing this portion on the rear of the PCB as claimed will expose that portion after the cover is slid into place. *Id.*

Patent Owner argues that placing the portion on the front of the PCB as Wu does is done for a reason “so that all soldering can be accomplished in a single phase.” Prelim. Resp. 44; PO Sur-Reply 22. Thus, according to Patent Owner, Petitioner has not accounted for why one of ordinary skill would move the contacts to the rear of the PCB and change the access and assembly that Wu intended. *Id.*

We agree that Petitioner has not explained sufficiently how and why one of ordinary skill in the art would modify Wu to achieve the claimed invention. De Lollis does not remedy the deficiency of this ground as to the Rear Surface Limitation. Thus, for the reasons above, Petitioner has not shown the unpatentability of claims 1 and 2 of the ’631 Patent as obvious over Wu and/or Wu combined with De Lollis by a preponderance of the evidence.

#### *G. Asserted Obviousness over Wu and Su*

Petitioner contends claims 1 and 2 are unpatentable under 35 U.S.C. § 103(a) as obvious over the combination of Su and Wu. Pet. 46–65. Petitioner explains how the combination of Su and Wu describes all of the claim limitations. *Id.* (citing Ex. 1002). As noted above, during prosecution of the original application the Examiner found Su disclosed each element of claim 1 except the Adhesive Limitation. Ex. 2001, 37–41. We take this finding into consideration in rendering our decision and rely primarily on Petitioner’s contentions regarding Su.

Claim 1 recites an insulating housing (10) comprising a plurality of terminal holes (127). Petitioner contends that Su teaches this limitation.

Pet. 48–49, 61. For example, as Petitioner explains, Su teaches “insulating housing 10 and the passageways 126 as the terminal holes.” *Id.* (citing Ex. 1004, 2:45–57, 2:65–3:9, 3:16–21; Figs. 2, 3).

Claim 1 also recites “a printed circuit board (PCB) (80) comprising a plurality of first, second, third, and fourth soldering holes (81, 82, 83, and 84) and a plurality of first, second, third, and fourth contacts (85, 86, 87, and 88) wherein the PCB (80) is vertically secured to a rear end (108) of the insulating housing (10), a front 10 surface (801) of the PCB (80) faces interior of the insulating housing (10), and a rear surface (802) of the PCB (80) is distal the rear end (108) of the insulating housing (10).” Petitioner contends that Su teaches this limitation. Pet. 52–53, 61 (citing 3:53–57, 62–66, 4:45–57, 5:29–31; Ex. 1002 ¶¶ 127–28). As Petitioner explains, “Su has at least the same number of connection contacts (terminals in the language

of the '631 Patent) and, as such, must have just as many corresponding soldering holes.” *Id.* at 52. Figures 3 and 4 of Su are reproduced below.

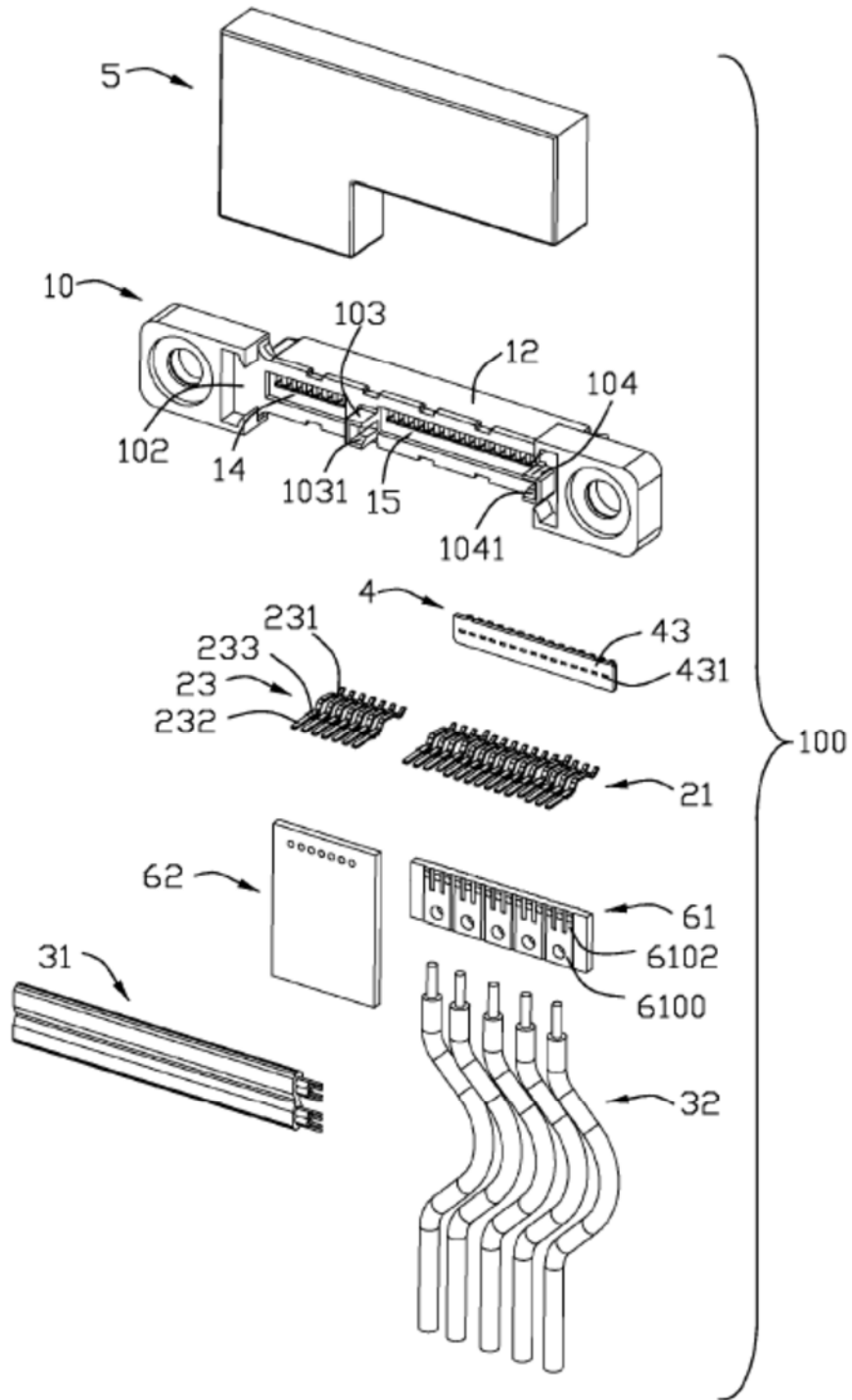


FIG. 3

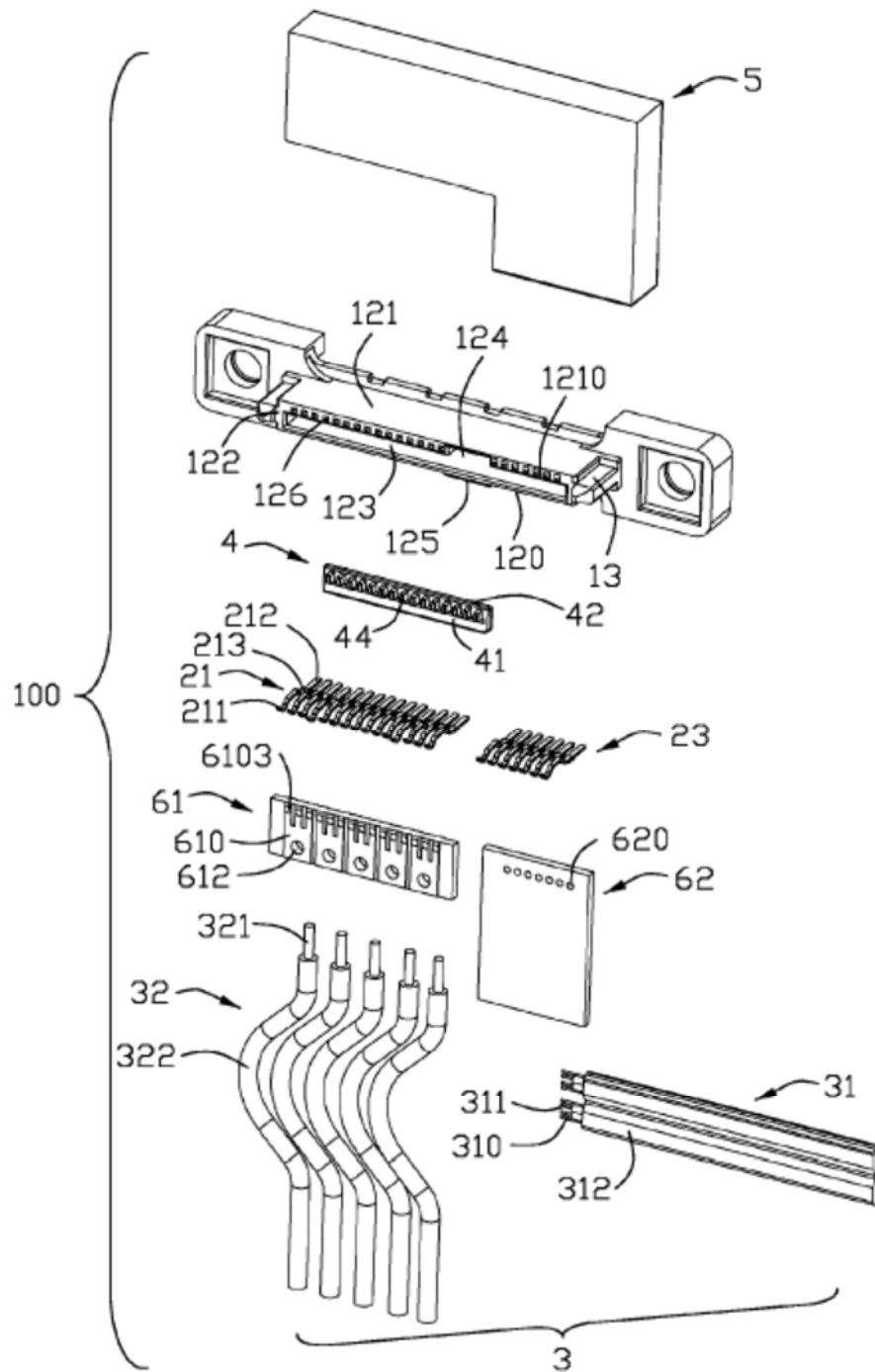


FIG. 4

Figures 3 and 4 of Su, above, show an exploded view of the Su device from the front and rear perspective showing the claimed connections.

Claim 1 also recites “a plurality of terminals (70) fastened in the terminal holes (127) respectively, each terminal (70) comprising a mating portion (73) at one end fastened in one of the terminal holes (127), and a soldering portion (75) at the other end soldered in one of the first, second, third, and fourth soldering holes (81, 82, 83, 84).” Petitioner relies on the first contact 21, which comprises a curved contacting portion 211 and a tail portion 212 extending rearwardly and flatly, and a retention portion 213 to meet this limitation. Pet. 53–54, 62 (citing Ex. 1004, 3:19–21, 23–27, 4:50–54, Fig. 4.)

Claim 1 further recites “a flex flat cable (FFC) (90) comprising a plurality of conductors (95) and an insulating layer (901) for enclosing substantial portions of the conductors (95).” Petitioner contends that Su teaches this limitation. Pet. 54, 61. As Petitioner explains, wires 3 (cable 31 and 32) are flexible and flat. *Id.* (citing Ex. 1004, 3:48–54; Ex. 1002,

¶¶ 134–36). For example, Figure 9 is reproduced below, shows the cable of Su.

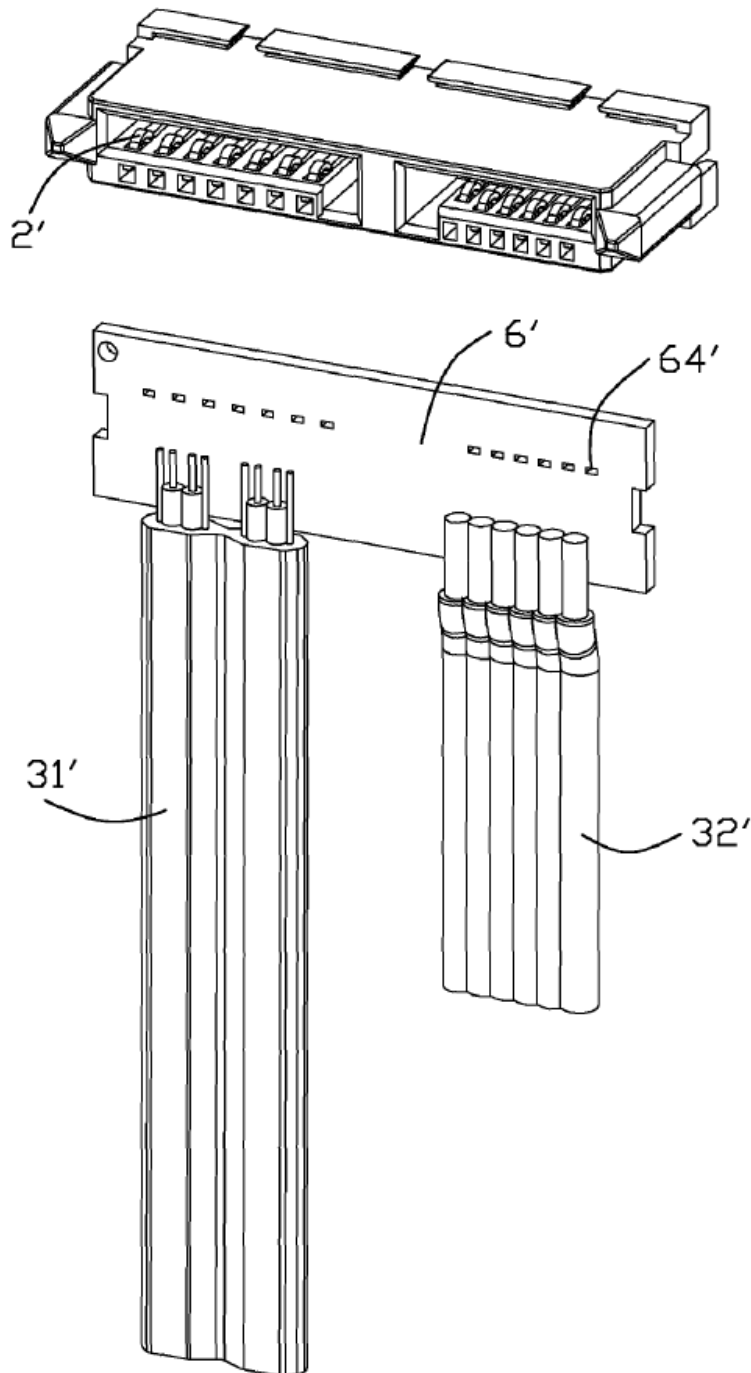


FIG. 9

Figure 9 of Su, above, shows that the cables 32' of Su are flat and cables 31', although not required by our construction, appear to be molded together.

Patent Owner asserts that “[t]he cable in Wu is a traditional jacketed cable with round wires that are individually insulated and then further wrapped in a jacket that cannot bend at the angles shown by the ’631 Patent. *Id.* ¶¶ 43–45, 55.” PO Resp. 20. Additionally, Patent Owner argues “[t]he wires 31 and 32 of Su are clearly individually insulated with round conductors [and jacketed]” and thus, do not meet its construction of FFC. *Id.* at 28–29.

Our construction, however, does not exclude traditional cables wrapped in a jacket if they are flat and flexible. Figures 3 and 4 of Su reproduced a above, show that the cables 32 of Su are flexible with an apparent bend. Patent Owner contends that Su splits the cable into two groups 31 and 32 and the claim requires a single FFC. *Id.* at 27. Our construction does not require the cable to be molded together as one wire; nevertheless, Petitioner also relies on Wu, which teaches a cable molded together. Ex. 1003, Fig. 1.

Claim 1 also recites “wherein the first, second, third, and fourth contacts (85, 86, 87, and 88) are disposed on the rear surface (802) of the PCB (80), and exposed portion (951) of each conductor (95) at one end (91) of the FFC (90) is electrically connected to one of the first, second, third, and fourth contacts (85, 86, 87, and 88) of the PCB (80).” Petitioner



wherein the adhesive (96) is AB adhesive, UV adhesive, hot melt type adhesive, quick dry adhesive, or any of other adhesives for fastening and protecting the FFC (90)” (“adhesive limitation”). Petitioner argues that the combination of Su and Wu teach this limitation. Pet. 54. For purposes of this decision and based on Petitioner’s citations to specific prior art disclosures and supporting evidence, we are persuaded that Petitioner sets forth sufficient articulated reasoning with rational underpinning to support the legal conclusion that it would have been obvious to modify the teachings of Su with Wu teachings to include an adhesive. Pet. 63–64. For example, Petitioner asserts:

Both Wu and Su were driven by the same design incentives of improving ease of assembly while maintaining robustness and reliability in the design of SATA compliant connectors. See Sections VI. A. and VI. C. A [person of ordinary skill in the art] engaged in the design of SATA compliant connectors therefore would have had reason to combine Wu with Su because the increased spectrum of possible design variations disclosed by Wu and Su would have been helpful to determine how to best meet the two design incentives. (Ex. 1002 at ¶ 154.) . . . .

Wu teaches the use of adhesives applied to fasten and secure components. See *supra* at Section VI. A. 1. What Wu does not teach is the application of adhesives to the position where the FFC is soldered to the soldering contacts. However, a POSA referencing Wu in combination with Su would have then been motivated to apply adhesives to where the FFC is soldered to the soldering contacts.

More specifically, Wu discloses that glue is applied to the cavity portion 1222 and grooves 1226 of the base portion 12 to ensure that cover 4 and the connector 1 are securely joined together. (Ex. 1003 at 3:31-33, Fig. 2.) Su uses an over-molded cover to protect the soldered contacts where the FFC conductors are soldered to the contacts. Wu and Su both therefore demonstrate that they were concerned with reinforcing and

securing components together. It would have then been a small and obvious step for a POSA referencing Wu to apply the motivation from Su to take the adhesive of Wu and apply it to the location of protection of Su (i.e., contacts where FFC conductors are soldered).

*Id.* at 60, 63–64.

We are mindful to avoid hindsight reasoning because “[t]he inventor's own path itself never leads to a conclusion of obviousness; that is hindsight. What matters is the path that the person of ordinary skill in the art would have followed, as evidenced by the pertinent prior art.” *Otsuka Pharm. Co., Ltd. v. Sandoz, Inc.*, 678 F.3d 1280, 1296 (Fed. Cir. 2012).

Patent Owner correctly asserts that neither Wu nor Su use an adhesive to secure or protect an electrical connection. PO Resp. 31. Wu does disclose the use of glue (or a rivet or screw) to ensure that cover 4 (made of plastic or other insulated material, Ex. 1003, 3:9-10) and connector 1 are combined reliably. *Id.* at 31. Patent Owner asserts “Using an adhesive to fasten plastic components is much less sophisticated a process than using an adhesive to secure electrical connections between 19 conductors in an FFC and 19 contacts on the PCB, as required in Claim 1.” PO Resp. 32 (citing Ex. 2012 ¶ 71). We agree and thus, do not rely on the disclosure in Wu of using adhesive on plastic components.

Petitioner relies on its declarant who testifies that “a [person of ordinary skill in the art] would readily recognize that adhesive can be applied to other locations such as the soldering location,” where the FFC meets the PCB. Thus, Petitioner asserts that adhesive limitation was well known in the art based on the testimony of its declarant. Petitioner’s reliance on the testimony of its declarant to support the unpatentability of a claim limitation must be supported by a reference or by other evidence. 37

C.F.R. § 42.65(a), “[e]xpert testimony that does not disclose the underlying facts or data on which the opinion is based is entitled to little or no weight.” Here, Petitioner’s expert has cited to Tseng as a prior art reference that discloses using an adhesive to “fasten or protect” the connection between and FFC and a PCB.

Patent Owner argues that “the FFC must be aligned perfectly so that each of the 19 conductors and 19 contacts makes an electrical connection.” PO Resp. 32 (citing Ex. 2012 ¶ 71). According to Petitioner, the claim contemplates soldering the FFC to create an electrical connection and using the adhesive to fasten and protect the connection. Ex. 1002 ¶ 66; Ex. 1018 ¶ 64. We agree that the contacts of the FFC are soldered to the PCB so the adhesive does not provide an “electrical” connection but rather simply “fastens” the components together. Thus, the concern about making an “electrical connection” is lessened.

Patent Owner asserts that connecting Wu’s round conductors would not create a reliable connection because the round shape would make an “awkward surface connection.” PO Resp. 32–33; *see also* PO Sur-Reply 15–16 (relying on its construction to show using adhesive “would be a terrible thing to do) (citing Ex. 1017, 94:21–95:12). As explained above, the connection is soldered to create a connection. Additionally, as explained above, we do not find that the claims are limited to flat conductors, nor does the Specification discuss advantages of using adhesive on flat conductors.

Finally, Patent Owner asserts that the goal of Wu is to simplify manufacturing and reduce an additional steps of manufacture. PO Resp. 33 (citing Ex. 1003, 1:54–56; Ex. 2012 ¶ 72). Patent Owner asserts adding the adhesive would frustrate that goal and would be “overkill” because Wu

already uses a metal ring crimped to the jacket for strain relief. *Id.* Nevertheless, Patent Owner has not shown that Wu discourages and thus, teaches away from using adhesive to fasten the soldered connection to the FFC. Petitioner asserts that one of ordinary skill would understand the tradeoffs in using the adhesive even if it added a fabrication step. Pet. Reply. 16.

Upon review of the parties' evidence and argument, we find, on the complete record, that Petitioner presents an articulated reason with a rational underpinning to justify the combination of the teachings of Wu and Su and modification of that combination, and the legal conclusion of obviousness. *See KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007). Additionally, for the reasons above, Petitioner has shown a reasonable likelihood of success in showing claim 1 would have been obvious over Su and Wu.

Claim 2 recites “soldering holes (a1, a2, a3, a4, a5, a6, and a7) of the first soldering holes (81) on the rear surface (802) of the PCB (80) are electrically connected to contacts (b1, b2, b3, b4, b5, b6, and b7) of the first contacts (85) respectively, furthering comprising a ground member (803) disposed on the front surface (801) of the PCB (80), and at least three soldering holes (a1, a4, and a7) of the first soldering holes (81) are electrically connected to the ground member (803) respectively.” Petitioner contends that Su teaches this limitation. Pet. 54, 61.

As to the second portion of claim 2, Petitioner asserts “Su inherently discloses a ground member by its nature as a SATA connector” and its recognition of the necessity of a ground. Pet. 58–59. In an obviousness context similar to anticipation a party must

meet a high standard in order to rely on inherency to establish the existence of a claim limitation in the prior art in an obviousness

analysis—the limitation at issue necessarily must be present, or the natural result of the combination of elements explicitly disclosed by the prior art.

*PAR Pharm., Inc. v. TWI Pharm., Inc.*, 773 F.3d 1186, 1195–96 (Fed. Cir. 2014).

Petitioner relies on its declarant to show “[p]lacing the electrical ground on the surface of the PCB as opposed to a ground plane in a lower layer of the PCB is a mere design choice.” *Id.* at 59 (citing Ex. 1002 ¶ 152). A mere design choice, which does not need to be shown explicitly in the prior art, is generally a minor and obvious choice that solves no stated problem. *In re Gal*, 980 F.2d 717, 719–20 (Fed. Cir. 1992) (finding of “obvious design choice” precluded where the claimed structure and the function it performs are different from the prior art). Thus, “design changes that [do] not ‘result in a difference in function or give unexpected results’ [are] ‘no more than obvious variations consistent with the principles known in th[e] art’ of the patent at issue in [the] case” are obvious design choices. *TRW Auto. US LLC v. Magna Elec. Inc.*, Case IPR2014- 00251, slip op at 6 (PTAB July 31, 2014) (Paper 18) (quoting *In re Rice*, 341 F.2d 309, 314 (CCPA 1965)).

As to inherency, Petitioner has not shown that a “ground member” connected as claimed would *necessarily* be present. Petitioner argues that the ground is required for a SATA connector but has not shown that the ’631 patent is limited to a SATA connector. Pet. Reply 16–17. As to design choice, the number of connections including those connected to the “ground member,” are stated as a benefit of the invention. Ex. 1001, 4:7–12 (“The number of the contacts of the second contacts 86 is greater than that of the soldering holes of the second soldering holes 82 so that a maximum current

flowing through the second soldering holes 82 can be increased.”). Wu does not provide any teaching or suggestion to modify the construction. Thus, Petitioner has not made a sufficient argument that a “ground member” arranged as claimed, is “inherent” or a “mere design choice.”

In its Reply, Petitioner cites to U.S. Patent No. 4,871,319 (“the ’319 patent”) which shows a similar but different arrangement of connections on a ground. Pet. Reply 17–18. We acknowledge that the ’319 patent was introduced on reply to gap fill a missing limitation that could have and should have been introduced in the Petition as part of a ground of obviousness. Therefore, we give the ’319 patent very little weight. Patent Owner asserts

[t]he ’631 Patent discloses this very specific arrangement “so that a maximum current flowing through the second soldering holes 82 can be increased” and “[n]one of Luxshare’s prior art, including the . . . new exhibits [such as the ’319 Patent), disclose this specific arrangement for a SATA connector or disclose, teach, or suggest any arrangement so that a maximum current can be increased for the second soldering holes 82.

PO Sur-Reply 18–19 (citing Ex. 1001, 4:9–11). Thus, Petitioner has not shown by a preponderance of the evidence that claim would have been obvious over the combination of Wu and Su.

For the reasons above, we are persuaded by Petitioner’s contentions regarding claim 1 but not claim 2. For the reasons above, Petitioner has shown there is a reasonable likelihood of prevailing in establishing that claim 1 of the ’631 Patent would have been obvious over Wu and Su.

### III. MOTION TO EXCLUDE

Patent Owner has filed Motions to Exclude certain of Petitioner’s evidence under 37 C.F.R. § 42.64. Mot. to Ex.. Patent Owner’s arguments

regarding striking the Reply due to arguments regarding grounds added due to SAS (Mot. to Ex. 12–13) were not authorized by the Board and we will not address them here. Paper 42.

Patent Owner moved to exclude Exhibits 1010, 1011, and 1021 as irrelevant. Mot. to Ex. 5–7. Exhibits 1010, 1011, and 1021 are introduced by Petitioner to show Dr. Pecht should be relied on as an expert. We considered these Exhibits and did not find that this affected his reliability as an expert for purpose of this IPR. Thus, the motion to exclude is moot as to Exhibits 1010, 1011, 1021.

Patent Owner moves to exclude Exhibits 1018–19, 1022–1024 as untimely. *Id.* at 4. Petitioner introduced Exhibits 1018–19, 1022–1024 to show ground plates were known in the art. “A reply may only respond to arguments raised in the corresponding opposition or patent owner response.” 37 C.F.R. § 42.23(b). We find that they are proper reply evidence, responding to Patent Owner’s claim construction arguments in its response. Thus, the motion to exclude is moot as to Exhibits 1018–19, 1022–1024 on the basis of their use on the issue of ground plates.

Patent Owner also moves to exclude Exhibits 1012–1016 1019–1024, and 1025–1031 for various reasons not related to ground plates. *Id.* at 7–11. Petitioner introduced Exhibits 1012–1016 1019–1024, and 1025–1031 to show an FFC is limited to flat conductors, we find that the intrinsic evidence does not allow us to limit the claim to the extrinsic evidence in those Exhibits so those references did not ultimately effect the decision. To the extent it can be argued they affected the decision, we address the merits of the motion to exclude below.

Patent Owner asserts Exhibits 1012–1016 are unauthenticated web pages and are hearsay because they are introduced for the truth of the matter asserted. Mot. to Ex. 8. We find the indicia on the web pages and the fact that they are not offered to prove the existence of a fact on a particular date, is sufficient to rely on these web pages as authenticated. See Fed. R. Evid. 901(b)(4). As to hearsay, they are offered for what they describe, i.e. companies websites showed cables with round conductors and called them “flat” cables, not for any assertion of truth. Cf. Fed. R. Evid. 807(c); *Joy Techs., Inc. v. Manbeck*, 751 F.Supp. 225, 233 n.2 (D.D.C. 1990), *aff’d*, 959 F.2d 226 (Fed. Cir. 1992); see also *Ultratec, Inc. v. Sorenson Commc’ns, Inc.*, No. 13-CV-346-BBC, 2014 WL 4829173, at \*7 (W.D. Wis. Sept. 29, 2014) (finding “publications [that may] contain factual information showing what products or features were available in the mid–1990s” are not hearsay.)

The issue of whether the dates of the Exhibits are relevant to the “time of the invention” goes to the weight afforded the Exhibits not to excluding them. See Mot to Ex. 7. Thus, the motion to exclude is denied as to Exhibits 1012–1016.

Patent Owner asserts Exhibits 1019–1024 are untimely as introduced in the Reply. Mot. to Ex. 8–9. “A reply may only respond to arguments raised in the corresponding opposition or patent owner response.” 37 C.F.R. § 42.23(b). We find that they are proper reply evidence, responding to Patent Owner’s claim construction arguments in its response. Thus, the motion to exclude is denied as to Exhibits 1019–1024.

Patent Owner asserts that Exhibits 1025–1031 are untimely because they were presented at the deposition of Petitioner’s declarant after the Reply had been filed. Mot. to Ex. 10–11. We agree that the timing of these

exhibits is prejudicial to Patent Owner. For that reason, we use our discretion to give them very little weight rather than exclude them. Thus, the motion to exclude is denied as to Exhibits 1025–1031.

Exhibit 1018 is a reply declaration of Dr. Lall. Patent Owner argues that “Dr. Lall is not an expert in the relevant field of SATA connectors and thus lacks the requisite scientific, technical, or other specialized knowledge that will help the Board understand the evidence or to determine a fact in issue as required by FRE 702.” Mot. to Ex. 9. In determining who is “qualified in the pertinent art” under FRE 702, we need not find a complete overlap between the witness’s technical qualifications and the problem confronting the inventor or the field of endeavor, such as SATA connectors specifically, for a witness to qualify as an expert. *SEB*, 594 F.3d at 1372–73. Petitioner argues Dr. Lall

provided his extensive experience regarding semiconductor packaging and connector technology in his Opening Declaration, including listing a number of publications, the first of which is a chapter on connectors (again, that he co-authored with Patent Owner’s expert). (Ex. 1002 at ¶¶7-19.) Dr. Lall’s CV, which he stated “gives further details about [his] experience, expertise, and publications” (Ex. 1002 at ¶24), also lists two prior art U.S. patents that he invented and that directly concern connector technology. (Ex. 1002 at p. 102, citing U.S. Patent No. 5,742,484 (Ex. 1025) and 5,928,001 (Ex. 1026).)

Mot. to Ex. Opp. 13. Overall, we find Dr. Lall qualified to testify.

Patent Owner argues that under FRE 702 and 703 “Dr. Lall’s testimony about the obviousness to combine Wu with Su is conclusory and is not based on sufficient facts or data. *See* Ex. 1018 (lacks any statement about combining Wu with Su).” Petitioner correctly asserts “Dr. Lall cites to his Original Declaration, which explains why he believes the combination

of Wu and Su renders Claim 2 obvious. (Ex. 1018 at ¶67.)” Thus, we deny the motion to exclude as to Exhibit 1018.

Patent Owner also asserts that “Petitioner argues for the first time that Tseng discloses the use of adhesives to fasten the FFC to the PCB.” Mot. to Ex. 4. Nevertheless, Patent Owner does not request that any exhibits be excluded for this reason nor did it argue that it wanted authorization to file a motion to strike on this issue. Mot. to Ex. 4; Paper 42 (requesting to file a motion to strike directed only to “portions of the reply that exceed the scope of the response.”) Therefore, this issue is not properly presented in the motion to exclude. Also, we disagree that this argument was not presented in the Petition. Petitioner argues this point in the Petition, albeit in regard to a different ground than the ground it is relied on in the Reply. Pet. 27 (“Tseng discloses the use of adhesive to fasten the soldered joining portions of the first conductors 55 and the first contacts 45 (and the soldered joining portions of the second conductors 56 and the second contacts 46) for added 5 protection. (Ex. 1007 at p. 14.)”)

#### IV. CONCLUSION

For the foregoing reasons, we determine that the information presented establishes by preponderance of the evidence that claim 1 of the ‘631 Patent is unpatentable but, has not established that claim 2 is unpatentable.

V. ORDER

Accordingly, it is:

ORDERED that that Petitioner has shown by a preponderance of the evidence that claim 1 of the '631 patent are unpatentable but Petitioner has shown by a preponderance of the evidence that claim 2 of the '631 patent are unpatentable; 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; and

FURTHER ORDERED that Patent Owner's Motion to Exclude is denied as to 1012–1016 and 1018–1024, 1025–1031 and as to all other exhibits is dismissed as moot.

IPR2017-01657  
Patent 8,740,631 B2

PETITIONER:

Robert C.F. Pérez  
Brock Weber  
PILLSBURY WINSTROP SHAW PITTMAN LLP  
robert.perez@pillsburylaw.com  
brock.weber@pillsburylaw.com

PATENT OWNER:

Tammy J. Dunn  
Peter C. Schechter  
OSHA LIANG LLP  
dunn@oshaliang.com  
schechter@oshaliang.com