United States Court of Appeals for the Federal Circuit

ENERGY TRANSPORTATION GROUP, INC.,
Plaintiff-Cross Appellant,

v.

WILLIAM DEMANT HOLDING A/S, WDH INC., OTICON INC., OTICON A/S, BERNAFON AG, AND BERNAFON LLC,
Defendants-Appellants,

AND

WIDEX A/S AND WIDEX USA, INC.,
Defendants-Appellants.

2011-1487, -1488, -1489

Appeals from the United States District Court for the District of Delaware in Case No. 05-CV-0422, *Chief Judge* Gregory M. Sleet.

Decided: October 12, 2012

BRIAN M. BUROKER, Gibson, Dunn & Crutcher, LLP, of Washington, DC, argued for plaintiff-cross appellant. Of counsel on the brief were MAYA M. ECKSTEIN, Hunton & Williams LLP, of Richmond, Virginia; and YISUN SONG and DANIEL G. VIVARELLI, JR., of Washington, DC; and

MARTY STEINBERG, Hunton & Williams, LLP, of Miami, Florida.

ROBERT GREENE STERNE, Sterne, Kessler, Goldstein, & Fox, PLLC, of Washington, DC, argued for defendants-appellants, William Demant Holding A/S, et al. With him on the brief were JON E. WRIGHT, BRYON L. PICKARD and JENNIFER S. BISK.

WILLIAM H. MANDIR, Sughrue Mion, PLLC, of Washington, DC, argued for defendants-appellants, Widex A/S, et al. With him on the brief were DAVID J. CUSHING, CARL J. PELLEGRINI and JOHN B. SCHERLING. Of counsel were J. WARREN LYTLE, JR. and BRIAN KENNETH SHELTON.

Before RADER, *Chief Judge*, and PLAGER and LINN, *Circuit Judges*.

RADER, *Chief Judge*.

The United States District Court for the District of Delaware declined to order a new trial or relief from judgment after a jury found that Defendants-Appellants William Demant Holding A/S, WDH Inc., Oticon Inc., Oticon A/S, Bernafon AG, and Bernafon LLC (collectively "Demant") and Widex A/S and Widex USA, Inc. (collectively "Widex") infringed U.S. Patent No. 4,731,850 ("'850 Patent"). *Energy Transportation Group, Inc. v. Sonic Innovations, Inc.*, No. 05-422, 2011 U.S. Dist. LEXIS 60716 (D. Del. June 7, 2011). Demant and Widex (collectively "Defendants") appeal. Widex also appeals the district court's denial of its motion for JMOL of no willful infringement. Plaintiff-Cross Appellant Energy Transportation Group, Inc. ("ETG") cross-appeals the district court's grant of JMOL of noninfringement of U.S. Patent No. 4,879,749 ("'749 Patent") on the basis that prosecution

history estoppel barred the jury's finding of infringement under the doctrine of equivalents. After a review of the record, this court affirms.

I

The '749 Patent and the '850 Patent, the "ETG Patents," relate to technology for reducing acoustic feedback in a programmable digital hearing aid. All hearing aids have the same basic components: 1) a microphone that picks up sound and converts it to an electrical signal, 2) a speaker (also called a "receiver") that converts the electric signal back into sound waves, and 3) sound processing circuitry, such as amplifiers and filters, located between the microphone and speaker that adjusts the received sound to compensate for any hearing impairment. The path that sound travels from the microphone to the speaker is called the "transmission channel" or "forward path." Some of the amplified sound from the hearing aid speaker may also travel back to the microphone via an "acoustic feedback path." This unwanted sound then "feeds back to the input" of the hearing aid and is amplified along with all other sound arriving at the input microphone. The resulting vicious cycle of amplification causes the unbearable whistling sound known as "feedback."

The ETG Patents share a common specification with a priority date of June 1986. The specification describes a method of reducing feedback by creating an electrical feedback path and inserting a programmable filter in that path to mimic the effects of acoustic feedback on the phase and amplitude of a sound signal in the transmission channel. This electrical feedback signal then cancels the acoustic feedback signal. '850 Patent, col. 3, ll. 3–8. Claim 14 is representative of the asserted method claims of the '850 Patent, and reads:

> 14. A method of reducing acoustic feedback in a hearing aid comprising a microphone, a receiver fitted in an ear of a wearer of the aid, and a signal transmission channel interposed between said microphone and transducer, comprising the steps of
>
> **determining the effect on the amplitude and phase of a signal in said transmission channel** as a function of frequency of acoustic feedback between said receiver and microphone, and
>
> **inserting** between the input and output of said transmission channel a **programmable filter** programmed to equalize and reduce the effect of said acoustic feedback both in amplitude and phase on a signal in said transmission channel.

'850 Patent, col. 14, ll. 17–30 (emphases added). Asserted claim 19 of the '850 Patent is an independent device claim that requires a filter programmed to effect substantial reduction of acoustic feedback:

> 19. A hearing aid comprising at least one input microphone, an output receiver, a signal transmission channel interposed between said microphone and said receiver, and a **programmable delay line filter** interposed in a feedback path between the input and output of said transmission channel, said programmable filter being **programmed to effect substantial reduction** of acoustic feedback from said receiver to said microphone.

'850 Patent, col. 14, ll. 60–68 (emphases added).

A "programmable delay line filter" is prior art that achieves customized amplification of different frequencies of sound by different amounts. Such a filter separates different sound frequencies and multiplies each by a

chosen weighting coefficient. Prior art hearing aids permit selection of these coefficients to amplify incoming sound to compensate for the particular wearer's hearing loss, as in a "forward path" filter. The ETG Patents use such a programmable filter to reduce acoustic feedback.

The ETG Patents describe a method of programming coefficients for the acoustic feedback filter with the use of a "host controller." '850 Patent, col. 6, ln. 55 – col. 7, ln. 3; col. 9, ln. 12 – col. 10, ln. 44. The patient is fitted with a hearing aid, which is connected to an external host controller at the audiologist's office. The host controller calculates optimum coefficients for cancellation of acoustic feedback. Then, according to the patents, those coefficients are programmed into the filter. The specification explains that, using "adaptive strategies," the filter can be reprogrammed with different sets of coefficients and compared to identify the most preferable frequency response for the wearer. *Id.* at col. 6, ll. 67–68; col. 9, ln. 56 – col. 10, ln. 15. In the example described in the specification, when the hearing aid is disconnected from the host controller and worn outside the audiologist's office, the coefficients for the filter cannot be recalculated.

The accused devices entered the market around 2001–2002 with an adaptive filter technology for feedback reduction. These devices repeatedly program the adaptive filter in the feedback path of the circuit with new coefficients to cancel and eliminate feedback. The accused devices accomplish this reprogramming feature with a Least Mean Squares ("LMS") optimization algorithm that recalculates and updates the coefficients in the delay line filter many times per second. The filters in the accused devices – "LMS adaptive filters" – constantly adjust to changes in feedback signal during normal hearing aid operation.

II

The asserted claims of the '850 Patent each recite "a programmable filter," a "programmable delay line filter," or a filter that is "programmed" to reduce acoustic feedback. The district court construed "programmed" to mean "provided with one or more values so as to produce a response." *Energy*, 2011 U.S. Dist. LEXIS 60716, at *27 n.9. Defendants assert the district court erred by not limiting "programmed" to require that the values in the claimed invention are "externally calculated" or are "fixed" to impart cancellation of acoustic feedback.

Claim construction is a question of law, which this court reviews without deference. *Cybor Corp. v. FAS Techs., Inc.*, 138 F.3d 1448, 1456 (Fed. Cir. 1998) (en banc). "[T]he words of a claim 'are generally given their ordinary and customary meaning' . . . that the term would have to a person of ordinary skill in the art in question at the time of the invention." *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–13 (Fed. Cir. 2005) (en banc) (quoting *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996)). "[T]he person of ordinary skill in the art is deemed to read the claim term not only in the context of the particular claim in which [it] appears, but in the context of the entire patent, including the specification." *Id.* at 1313. While claim terms are understood in light of the specification, a claim construction must not import limitations from the specification into the claims. *Id.* at 1323.

Nothing in the '850 Patent claims indicates the plain and ordinary meaning of "programmed" should be limited to external or fixed programming. The claims do not specify where the programming occurs, how frequently it occurs, or what structure provides the programming. Rather, the asserted claims recite "a filter . . . pro-

grammed to equalize and reduce the effect of . . . acoustic feedback both in amplitude and phase," or a "filter . . . programmed to effect substantial reduction of acoustic feedback." '850 Patent, col. 14, ll. 3–67. Indeed, Defendants' expert Dr. Morely admitted that at the time of the invention, "one of ordinary skill in the art would have known that any filter . . . could have been an adaptive filter or a fixed filter." J.A. 991. Thus, the language of the claims supports the district court's decision to refrain from limiting the term "programmed" to require fixed or external operation.

Moreover, the specification gives no reason to construe the claims to require that an external computer calculate the values programmed into the filter. *See Innova/Pure Water, Inc. v. Safari Water Filtration Sys.*, 381 F.3d 1111, 1117 (Fed. Cir. 2004) ("[E]ven where a patent describes only a single embodiment, claims will not be read restrictively unless the patentee has demonstrated a clear intention to limit the claim scope using words or expressions of manifest exclusion or restriction.") (internal quotations omitted). The embodiment described in the specification, which utilized an external computer connected to the hearing aid to calculate coefficients for the programmable filter, reflects the size and complexity of computers at the time of the patent application in 1986. As Dr. Levitt, the lead inventor, explained, "the separation of components was really dictated by the technology of the period. Conceptually, you could have them all together." J.A. 666. The ordinary meaning of "programmable," as it would have been understood by one of skill in the art at the time of the invention, does not limit where the provided values originate. This court will not import such an artificial temporally-dictated limitation on the term "programmable."

The specification clearly contemplates that an adap-

tive filter would fit within the meaning of "programmable." The patent trumpets "the novel means employed for effecting **automatic adjustment of the programmable filter** to optimum parameter values as the speech level, room reverberation and type of background noise change." '850 Patent, col. 11, ll. 51–57 (emphasis added). Although this statement apparently refers to the programmable filter located in the forward path rather than the feedback path, there is no reason to construe the term "programmable" differently when used to describe a filter in the feedback path. *See Phillips*, 415 F.3d at 1314 (noting "claim terms are normally used consistently throughout the patent").

The specification also describes "re-programming the hearing aid to minimize acoustic feedback." '850 Patent, col. 6, ll. 67–68. The patent teaches a specific "paired comparison technique" that can be "repeated iteratively until the optimum set of electroacoustic characteristics is found" for feedback cancellation. *Id.* at col. 9, ln. 56 – col. 10, ln. 15. These disclosures teach adjustment of the programmable filter in the feedback path in response to a particular acoustic environment. In other words, the specification does not envision a filter with permanently "fixed" coefficients. In sum, the record in this case amply supports the district court's construction of "programmed," which is consistent with the plain meaning of the term and its usage in the specification. For these reasons, this court affirms the trial court's claim construction.

III

This court reviews the grant or denial of a motion for JMOL or for a new trial under the law of the regional circuit. *Revolution Eyewear, Inc. v. Aspex Eyewear, Inc.*, 563 F.3d 1358, 1370 (Fed. Cir. 2009). The Third Circuit

conducts "a plenary review of the decisions of a district court concerning judgment as a matter of law and determine[s] whether 'viewing the evidence in the light most favorable to the nonmovant . . . , there is insufficient evidence from which a jury reasonably could' reach the conclusions that it did." *Rinehimer v. Cemcolift, lnc.*, 292 F.3d 375, 383 (3d Cir. 2002) (quoting *Lightning Lube, Inc. v. Witco Corp.*, 4 F.3d 1153, 1166 (3d Cir. 1993)). The Third Circuit reviews a denial of a motion for new trial for abuse of discretion. *ld.* at 383–84.

This court affirms the district court's denial of Defendants' motions for JMOL of invalidity and no infringement under the doctrine of equivalents for the '850 Patent. This court evaluates written description, anticipation, infringement, and willfulness in turn.

A. Written Description

Defendants argue that under the district court's claim construction, the claims lack adequate written description because the specification only describes external calculation of coefficients that are fixed during normal operation of the hearing aid. Compliance with the written description requirement is a question of fact, and this court reviews the jury's determination for substantial evidence. *Centocor Ortho Biotech, lnc. v. Abbott Labs.*, 636 F.3d 1341, 1347 (Fed. Cir. 2011). Having reviewed the record, this court concludes that substantial evidence supports the jury's determination that the '850 Patent is not invalid for lack of written description.

To satisfy the written description requirement, the specification must "reasonably convey[ ] to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date." *Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010) (en banc). As discussed above, the specification supports the

district court's claim construction, and provides adequate written description to support the full scope of the claims as construed. Inventor Dr. Levitt testified that the '850 Patent explicitly indicates to one skilled in the art that the hearing aid of the invention is "adaptive." *See, e.g.*, J.A. 666 (explaining statement in the '850 Patent's Abstract that the hearing aid "adjust[s] automatically to the optimum set of parameter values" conveys that invention "was an adaptive hearing aid"). Defendants' expert Dr. Morley admitted that a person of ordinary skill in the art would have understood that the programmable filter in the '850 Patent could be an adaptive filter. Dr. Dowling, an expert hired by Defendants, stated in a Declaration introduced as evidence at trial that it was his view that "the ETG filter can be adaptive for feedback cancellation," and that "[no]body but a red faced liar could . . . say the '850 [Patent] does not contemplate adaptive filtering." J.A. 1911 (first alteration in original).

Thus, this record contained substantial evidence from which the jury could conclude that the '850 Patent conveys to one skilled in the art that the inventors were in possession of a programmable hearing aid that could use adaptive filtering for feedback cancellation at the time of filing. This court therefore affirms the district court's denial of JMOL that the '850 Patent is invalid for lack of written description.

B. Anticipation

The jury found Defendants did not prove by clear and convincing evidence that any of the asserted claims of the ETG Patents are invalid for anticipation or obviousness. On appeal, Defendants assert Claim 19 of the '850 Patent is invalid for anticipation by U.S. Patent No. 4,783,818, issued November 8, 1988, to Graupe et al. ("Graupe"). Defendants did not argue at the district court that the

Graupe prior art anticipates Claims 13, 14, or 16 of the '850 Patent, or that Graupe alone renders the claims obvious. Thus, this court only addresses anticipation of Claim 19. Anticipation is a question of fact; therefore this court reviews the jury's findings for substantial evidence. *Minn. Mining & Mfg. Co. v. Chemque, lnc.*, 303 F.3d 1294, 1301 (Fed. Cir. 2002).

Because it was filed October 17, 1985, Graupe is prior art to the ETG Patents under 35 U.S.C. § 102(e). Graupe discloses a hearing aid that periodically enters an "identification mode" during which the amplifier is disconnected and a test signal is supplied to the speaker and run through an identification circuit to calculate new filter coefficients to reduce feedback. On cross examination, ETG's expert, Mr. Matzen, agreed that "Graupe '818 has everything that is shown here in Claim 19." J.A. 1100.

This court interprets Mr. Matzen's statement as an admission that Graupe discloses every structural element in Claim 19, but not as an admission of anticipation. On cross and redirect, Mr. Matzen clarified that Graupe does not consider the effect of acoustic feedback on a signal in the transmission channel and therefore does not disclose a filter that is "programmed to effect **substantial reduction** of acoustic feedback." '850 Patent, col. 14, ll. 66–67 (emphasis added). Therefore, Mr. Matzen, in fact, testified that Graupe does not disclose an important claimed feature of the '850 Patent.

In response, Defendants argue that this court should presume that Graupe achieved a "substantial reduction" of acoustic feedback because it claimed to "cancel[ ] the effects of . . . acoustic feedback." Graupe, col. 10, ll. 52–53. Indeed, an accused infringer enjoys a presumption that allegedly anticipating material in a prior art patent is enabled. *Impax Labs., Inc. v. Aventis Pharms., Inc.*,

468 F.3d 1366, 1382 (Fed. Cir. 2006). Even if "cancelling . . . acoustic feedback" was enabled, however, the record does not show that "cancellation" or "reduction" of feedback, as disclosed by Graupe, is the same as the "substantial reduction" claimed in the '850 Patent. The comparison of cancellation with substantial reduction was a fact question for the jury, which made the implicit finding that Graupe does not disclose "substantial reduction" of acoustic feedback.

Indeed the record supports the jury's finding. To be specific, Mr. Matzen testified that Graupe would not achieve substantial reduction of feedback because the Graupe system calculates the wrong filter coefficients. Graupe disconnects the amplifier during identification mode. Therefore, the Graupe system does not have a "transmission channel" when calculating the filter coefficients. This means Graupe cannot account for the effect of acoustic feedback on a signal in the transmission channel. Mr. Matzen testified that Graupe's failure to account for the effect of the signal through the transmission channel results in "so much error" that "it would not be able to really effect substantial reduction of acoustic feedback." J.A. 1085.

On appeal, Defendants argue that acoustic feedback originates from the speaker, not the transmission channel. Both the '850 Patent and Graupe calculate coefficients using a test signal that drives the speaker, so both methods must result in the same amount of feedback reduction. Defendants complain that Mr. Matzen did not explain a reason why it mattered that a signal passed through the amplifier and the rest of the transmission channel before reaching the speaker.

Again consulting the record, this court notes that Defendants did not present these arguments now before this

court on appeal to the jury during the trial. Mr. Matzen testified that it is critical to consider a test signal that has passed through the transmission channel in order to obtain substantial feedback reduction. Defendants' expert, Dr. Soli, did not testify to the contrary. Dr. Soli only explained Graupe's method for calculating coefficients and transferring them to a programmable filter. He then agreed, without elaboration, that the Graupe process would "reduce the effect of acoustic feedback in both amplitude and phase." J.A. 1021. Defendants have not pointed to any discussion by Dr. Soli of the importance (or lack thereof) of determining filter coefficients based on a signal that passed through the entire transmission channel.

In sum, the jury assessed the credibility of both sides' experts, and was entitled to credit Mr. Matzen's testimony that Graupe does not disclose substantial reduction of feedback as required by Claim 19 of the '850 Patent. Accordingly, this court affirms the district court's denial of JMOL on anticipation.

C. Infringement

The jury found no literal infringement of method claims 13, 14, and 16 of the '850 Patent, but found both Widex and Demant infringed those claims under the doctrine of equivalents. The district court denied Defendants' motions for JMOL of no infringement under the doctrine of equivalents. This court affirms.

"A device that does not literally infringe a claim may nonetheless infringe under the doctrine of equivalents if every element in the claim is literally or equivalently present in the accused device." *Sage Prods., Inc. v. Devon Indus., Inc.*, 126 F.3d 1420, 1423 (Fed. Cir. 1997). One way that a patentee may prove that a particular claim element is met under the doctrine of equivalents is by

showing that "the accused product performs substantially the same function in substantially the same way with substantially the same result" as claimed in the patent. *Crown Packaging Tech., Inc. v. Rexam Bev. Can Co.*, 559 F.3d 1308, 1312 (Fed. Cir. 2009); *see Warner-Jenkinson Co. v. Hilton Davis Chem. Co.*, 520 U.S. 17, 39–40 (1997).

The jury's verdict form required only a yes/no response to the question whether each Defendant's products infringed each of the asserted claims literally or under the doctrine of equivalents. For this reason, it is not possible to determine which limitation or limitations of method Claims 13, 14, and 16 the jury found were met only by equivalents. This court finds the jury had substantial evidence from which to conclude that Defendants' products meet each of the disputed limitations (the "determining" step, the "inserting" step, and the "programmable filter" / "filter therein programmed"), either literally or under the doctrine of equivalents.

ETG's infringement expert, Mr. Brown, analyzed Defendants' technical documents and demonstrated the presence of each claim limitation or its equivalent in the accused products. Dr. Gloster, ETG's source code expert, confirmed this testimony. Specifically, Mr. Brown presented sufficient linking testimony to demonstrate the accused devices perform the step of "determining the effect on the amplitude and phase of a signal in said transmission channel," as required by Claims 13, 14, and 16. Although the LMS adaptive filters in the accused devices do not operate by measuring the amplitude or phase of the acoustic feedback, the claims do not require measurement. Mr. Brown testified that "the coefficients of the [LMS adaptive] filter define phase and amplitude" because the coefficients program the filter to respond to the effect of feedback on phase and amplitude of a signal. J.A. 763. Mr. Brown also opined that the LMS algorithm

of the accused devices performs the same function ("determine the effect on amplitude and phase of the signal transmission"), in the same way (by "calculating the coefficients"), with the same result of cancelling acoustic feedback (i.e., "[the] output of that filter being the effect of the acoustic feedback in the external channel") as the asserted claims. J.A. 736–37. The jury thus had substantial evidence from which to conclude Defendants' products perform the equivalent of the "determining" step.

This case is closely analogous to *Hughes Aircraft Co. v. United States*, 140 F.3d 1470 (Fed. Cir. 1998), in which this court found infringement under the doctrine of equivalents where advances in computer technology occurring after the patents issued allowed changes in the nature and location of claimed calculations. *Hughes* involved an apparatus to control the orientation of satellites using commands from a ground control station. The claims expressly required that the satellite provide the ground station with data sufficient to calculate an "instantaneous spin angle" ("ISA") position. *Id.* at 1472. The ground crew would then make the necessary calculations and send a signal to the satellite to adjust its position. Due to vast reduction in the size and vast improvement in the capacity of computer components, the accused devices were able to calculate the ISA position onboard the satellite. The accused satellites transferred different information to the ground station because the onboard computer calculated ISA position. Despite this "missing limitation" from the claims, the after arising technology still permitted the ground crew to control the satellite. *Id.* at 1475. The result was an insubstantial change in the way the satellites performed the claimed function. *Id.*

In this case as well, advances in computer technology allowed the accused devices to relocate calculation and programming of filter coefficients from an external host

controller into the hearing aid itself. The accused devices "determin[e] the effect on the amplitude and phase" of acoustic feedback using onboard calculations. '850 Patent, col. 14, ll. 8–10. While the improvement in technology allows Defendants' products to constantly recalculate filter coefficients using electronics located on the hearing aid, the accused devices nonetheless perform the same function in substantially the same way, with substantially the same result claimed by the '850 Patent, thus providing substantial evidence for the jury's infringement verdict.

ETG also presented testimony to support a finding that the accused devices perform the step of "inserting . . . an electrical feedback path having a filter therein programmed" *subsequent to* the "determining step," as required by the district court's claim construction. '850 Patent, col. 14, ll. 8–16; *Energy*, 2011 U.S. Dist. LEXIS 60716, at *48. Mr. Brown testified that in electrical terms, every time a new set of coefficients is supplied to the filter, a new filter is "inserted." Thus, the jury could conclude that the "determining" and "inserting" steps occur repeatedly, in order, when the accused devices are in use.

The district court did not make a contrary finding by holding there was substantial evidence to support the jury's finding of no literal infringement of Claims 13, 14, and 16. The district court noted the jury could have concluded that the "determining" step is not literally met because the equations used to calculate the coefficients for the LMS filter do not directly address phase or amplitude. *See Energy*, 2011 U.S. Dist. LEXIS 60716, at *46–47. Alternatively, the record contained substantial evidence from which the jury could have concluded that the "inserting" step is performed only when the filter is built into the hearing aid at the time of manufacture, and therefore the

accused devices do not literally perform the "inserting" and "determining" steps in the order required by the court's claim construction. *Id.* at *48–49. The district court did not find the "inserting" step is performed at the time of manufacture; it found only that there was substantial evidence from which the jury could have reached that conclusion.

Defendants argue that their devices cannot be found to infringe under the doctrine of equivalents because, if the claims are "expanded" to cover the adaptive filters in the accused devices, then the claims would also extend to the prior art Graupe patent. *See Wilson Sporting Goods Co. v. David Geoffrey & Assoc.*, 904 F.2d 677, 684 (Fed. Cir. 1990) (*overruled in part on other grounds by Cardinal Chem. Co. v. Morton Int'l*, 508 U.S. 83 (1993)) ("[A] patentee should not be able to obtain, under the doctrine of equivalents, coverage which he could not lawfully have obtained from the PTO by literal claims."). An accused infringer seeking to avoid infringement under the doctrine of equivalents on this basis bears the burden of "presenting prior art which shows that the asserted range of equivalence would encompass the prior art," but the patentee bears the ultimate burden of persuasion to show that its claims do not cover the prior art. *Streamfeeder, LLC v. Sure-Feed Sys., Inc.*, 175 F.3d 974, 984 (Fed. Cir. 1999).

Defendants have not presented prior art that bars finding the accused devices infringe Claims 13, 14, and 16 under the doctrine of equivalents. Adaptive filters are within the literal scope of the claims. This court has rejected Defendants' claim construction arguments seeking to limit the scope of the term "programmable" to filters with fixed or externally-calculated coefficients. The jury found Claim 19 of the '850 Patent literally infringed. The jury therefore found the adaptive filters in the ac-

cused devices literally meet the claimed limitation of a "programmable filter." '850 Patent, col. 14, ln. 65. There was no reason to resort to the doctrine of equivalents for this limitation. When the jury found the claims not invalid, it rejected Defendants' expert's testimony that if the claims cover adaptive filters then they are anticipated by Graupe.

Moreover, Defendants admit that Graupe does not meet the "determining the effect . . . of a signal in said transmission channel" limitation of Claims 13, 14, and 16. '850 Patent, col. 14, ll. 8-23; Demant Opening Br. at 52 ("Graupe does not determine the effect of the signal through the transmission channel"). In effect, Defendants thus admit that Graupe does not anticipate Claims 13, 14, or 16 regardless of whether the accused devices meet *other limitations* of those claims only under the doctrine of equivalents. Moreover, on appeal, Defendants do not present any combination of references that would render Claim 13, 14 or 16 obvious in view of Graupe. In sum, the record shows that Defendants have not shown that the asserted range of equivalents would read on the prior art.

D. Willfulness

Widex appeals the district court's denial of JMOL of no willful infringement. The district court denied ETG's motions for enhanced damages and for attorney's fees, however, and ETG has not appealed that decision. *See Energy*, 2011 U.S. Dist. LEXIS 60716, at *52-59. Because no consequences flow from the district court's decision regarding willful infringement, this court does not reach the issue.

IV

Defendants also seek a new trial on damages. This court rejects Defendants' challenges to the admission of

the report from the German Federal Cartel Office ("Cartel Report"), the use of the 25 percent rule of thumb by ETG's damages expert, the amount of the damages award, and the award of pre-judgment interest.

A. The Cartel Report

This court applies regional circuit law to evidentiary issues. The Third Circuit requires a party challenging the district court's evidentiary ruling to demonstrate that the district court acted irrationally and arbitrarily. *In re Paoli R.R. Yard PCB Litig.*, 113 F.3d 444, 453 (3d Cir. 1997).

Defendants argue that the trial court should have excluded the Cartel Report under Federal Rule of Evidence 403 because it was unduly prejudicial. The district court admitted the Cartel Report into evidence and permitted ETG's damages expert to discuss the report in response to Defendants' presentation of royalty rates from certain license agreements offered by the Hearing Instrument Manufacturers Patent Partnership ("HIMPP"). HIMPP is an industry group that pools patents needed for development of programmable and digital hearing aids. HIMPP licenses all of its patents for a flat 3% royalty on the price of each hearing aid covered by one or more of the approximately 250 patents in the HIMPP patent pool. Defendants' damages expert used the HIMPP rates as part of the basis for his opinion that a reasonable royalty for access to the ETG patents would be in the range of 0.25 to 0.5%. ETG responded that the HIMPP royalty rates are low, industry-friendly rates and not probative of market rates for the ETG patents. As support, ETG cited the Cartel Report's findings that the hearing aid market is highly concentrated and the industry enjoys "exceedingly high profit margins" due to a lack of competition.

The district court instructed that ETG would not be permitted use the Cartel Report to "engage in hyperbolic statements or . . . inflammatory language" characterizing the Defendants' activities as collusive. J.A. 1295. This instruction helped limit the potential for undue prejudice at trial. Indeed, Defendants did not object during trial to the manner in which ETG used the Cartel Report.

After the trial in this case, on April 20, 2010, a German appellate court overturned the Cartel Report's ultimate conclusion that an "oligopoly" existed and stated that "no restrictions on competition ensue from [HIMPP]" and similar industry consortia. J.A. 2164. The German court, however, "based its decision on the extensive investigations conducted by the Federal Cartel Office into prevailing market conditions," and those underlying facts were not disturbed by the appellate court. J.A. 2160; *see Energy*, 2011 U.S. Dist. LEXIS 60716, at *67. ETG relied on the facts presented in the Cartel Report regarding the hearing aid market and industry structure—not the legal conclusion that the market was an oligopoly—to make its case that the HIMPP licenses did not represent arms-length transactions and that HIMPP royalties did not represent prevailing market rates. ETG also relied on the high profit margins on hearing aids evidenced in the Cartel Report to argue for damages at a higher royalty rate than that suggested by Defendants. These facts were clearly relevant to the determination of a reasonable royalty rate for the ETG patents. Defendants have not shown that the district court acted irrationally or arbitrarily in finding that the probative value of the Cartel Report outweighed any potential prejudice.

B. The 25 Percent Rule

A party challenging a jury's verdict on damages "must show that the award is, in view of all the evidence, either

so outrageously high or so outrageously low as to be unsupportable as an estimation of a reasonable royalty." *Rite-Hite Corp. v. Kelley Co.*, 56 F.3d 1538, 1554 (Fed. Cir. 1995) (en banc) (quoting *Lindemann Maschinenfabrik GmbH v. Am. Hoist & Derrick Co.*, 895 F. 2d 1403, 1406 (Fed. Cir. 1990)). In general, this court upholds a jury's damages award "unless 'grossly excessive or monstrous,' clearly not supported by the evidence, or based only on speculation or guesswork." *Oiness v. Walgreen Co.*, 88 F.3d 1025, 1031 (Fed. Cir. 1996) (quoting *Brooktree Corp. v. Adv. Micro Devices, Inc.*, 977 F.2d 1555, 1580 (Fed. Cir. 1992)).

Defendants seek a new trial on damages because ETG's expert, Mr. Musika, used the 25 percent rule of thumb in his analysis of a reasonable royalty rate. This court has held that "the 25 percent rule of thumb is a fundamentally flawed tool for determining a baseline royalty rate in a hypothetical negotiation. Evidence relying on the 25 percent rule of thumb is thus inadmissible under *Daubert* and the Federal Rules of Evidence, because it fails to tie a reasonable royalty base to the facts of the case at issue." *Uniloc USA, Inc. v. Microsoft Corp.*, 632 F.3d 1292, 1315 (Fed. Cir. 2011). This court does not depart from the counsel and holding of *Uniloc.*

In this case, however, Mr. Musika's references to the 25 percent "rule" (which is no longer a "rule") did not irretrievably damage the reasonableness of his method and result in arriving at recommended royalty rates. For instance, Mr. Musika relied more prominently on other factors, such as separately determining that the infringing products garner a 9.2% premium on operating profits over non-infringing devices. Mr. Musika included this figure as the top end of a range of possible royalties the parties would have considered in a hypothetical negotiation. Mr. Musika then considered other admissible fac-

tors to show that the royalty was reasonable in light of the unique relationship of the parties, the nature of the invention, and the nature of the industry. *See Georgia-Pacific Corp. v. U.S. Plywood Corp.*, 318 F. Supp. 1116 (S.D.N.Y. 1970). Once again, this court does not endorse *Georgia-Pacific* as setting forth a test for royalty calculations, but only as a list of admissible factors informing a reliable economic analysis.

Mr. Musika further performed an entirely separate analysis of a reasonable royalty using the method set forth in *TWM Mfg. Co. v. Dura Corp.*, 789 F.2d 895 (Fed. Cir. 1986). This analysis compared the average expected profit margin on the infringing products, as set forth in Defendants' expert reports, to the industry average expected profit margin. Mr. Musika testified this analysis showed the infringing products garnered a 6.4% increase in expected profit margin based on the technology in the ETG Patents. Mr. Musika's suggested reasonable royalty rates were thus tied to the benefit accorded by the patents at issue. Thus, this case is not like *Uniloc*, where the plaintiff's expert did not offer acceptable alternative methods to support his damages calculation. *Cf. Uniloc*, 632 F.3d at 1318. ETG's expert provided an entirely separate damages analysis that supported the jury's verdict.

The jury did not adopt either expert's damages analysis wholesale, but awarded lump sum damages that equate to effective royalty rates in the range of 4–5%. Thus, this court perceives that the record supports the jury's award with substantial evidence based on Mr. Musika's *TWR* analysis and discussion of the premium on operating profits enjoyed by the accused products. Defendants have not shown the award is outrageous or grossly excessive. The district court did not err in denying a new trial.

C. The Damages Amount

Defendants seek remittitur or a new trial because the jury's damages award was presumably calculated on a royalty base that includes sales under the '749 Patent. The district court granted JMOL that the '749 Patent is not infringed under the doctrine of equivalents. As discussed below, this court affirms that ruling. The '749 Patent expired in November 2006—about four months later than the '850 Patent, which expired in June 2006. Both parties' experts agreed at trial that if the '749 Patent was found not infringed, the sales base should not include sales that occurred after the '850 Patent expired. For example, the jury was presented with a sales base for Demant through November 2006 of $417 million, compared to only $357 million through expiration of the '850 Patent in June 2006. Because the jury found both patents infringed, it presumably used the larger sales base in calculating its damages figures. Defendants suggest that this court can grant relief by simply determining the effective royalty rate granted by the jury and multiplying it by the undisputed lower sales base for products sold before the '850 Patent expired.

Defendants waived this argument by not asking the district court to reduce the damages award in the event it granted their motion for JMOL of noninfringement of the '749 Patent. Defendants presented an alternate sales base to the jury in the event it found only the '850 Patent infringed, and could have made the same argument to the district court in their post-trial motions for JMOL and remittitur. Defendants also did not file a motion for reconsideration with the district court after their motion for JMOL of noninfringement of the '749 Patent was granted. This court will not consider arguments raised for the first time on appeal.

Even if Defendants had not waived this argument, this court cannot "correct" a damages figure by extrapolating a royalty rate from the jury's lump sum damages award and multiplying that royalty rate by a revised sales base. "Except in those cases in which it is apparent as a matter of law that certain identifiable sums included in the verdict should not have been there, the court may not arbitrarily reduce the amount of damages, for to do so would deprive the parties of their constitutional right to a jury." 11 Charles Alan Wright, Arthur R. Miller & Mary Kay Kane, *Federal Practice & Procedure* § 2815 (2d ed. Supp. 2012). An "identifiable sum" typically must be separately listed on the jury verdict form. *Garrett v. Faust*, 183 F.2d 625 (3d Cir. 1950) (verdict form separately listed damages resulting from misrepresentation, and district court appropriately deducted that amount from final award because there was insufficient evidence of misrepresentation); *Cornell University v. Hewlett-Packard Co.*, 609 F. Supp. 2d 279 (N.D.N.Y. 2009) (Rader, J. by designation) (reducing damages by multiplying "jury's uncontroverted royalty rate of 0.8 percent" by legally correct royalty base).

Here, the verdict form only required the jury to award a lump sum damages figure for each Defendant. The jury was not asked to allocate the damages awarded over the two patents at issue and was not required to specify a reasonable royalty rate. There is thus no clearly identifiable sum in the verdict that is allocable to the non-infringed '749 Patent. While Defendants could have sought remittitur from the district court, this court cannot simply adjust the jury's damages award under the circumstances of this case.

This court also considered Defendants' other arguments regarding the amount of the damages award. In sum, Defendants have not shown that the jury's award is

"outrageously high" or unsupported by the evidence. *Rite-Hite Corp.*, 56 F.3d at 1554.

D. Pre-Judgment Interest

Widex challenges the district court's decision to award pre-judgment interest despite ETG's alleged delays in filing suit. The award of pre-judgment interest is "the rule, not the exception." *Sanofi-Aventis v. Apotex, Inc.*, 659 F.3d 1171, 1177 (Fed. Cir. 2011). This court reviews the trial court's decision to award pre-judgment interest for abuse of discretion. *General Motors Corp. v. Devex Corp.*, 461 U.S. 648, 657 (1983). Widex has not cited any cases of this court reversing a district court's decision not to award pre-judgment interest. The district court did not abuse its discretion in this case by following the standard rule of awarding pre-judgment interest.

V

ETG cross-appeals the district court's grant of JMOL of noninfringement of the '749 Patent under the doctrine of equivalents. The district court found prosecution history estoppel bars assertion of equivalents in this case. *Energy*, 2011 U.S. Dist. LEXIS 60716, at *41–44. Whether prosecution history estoppel applies is a legal question which this court reviews without deference. *Glaxo Wellcome, Inc. v. Impax Labs., Inc.*, 356 F.3d 1348, 1351 (Fed. Cir. 2004). This court affirms the judgment of noninfringement of the '749 Patent.

ETG asserted Claims 1 and 2 of the '749 Patent. Claim 1 is representative and reads:

> 1. A host controller for producing data from a computer for a programmable hearing aid to cancel acoustic feedback comprising

> **means for** receiving signals from the hearing aid and **measuring phase and amplitude**,
>
> means for receiving signals from the hearing aid indicative of the summation of acoustic feedback and acoustic feedback cancellation signals, and
>
> means controlled by the computer for adjusting the phase and amplitude necessary to eliminate acoustic feedback and produce a null summation.

Claim 1 derives from application claim 33, which was entered during prosecution after a similar claim was rejected in view of prior art. *See Office Action dated Oct. 17, 1989 in U.S. App. No. 07/155,374.* The rejected claim recited "means for receiving signals indicative of the frequency gain and feedback characteristics." *Preliminary Amendment dated Feb. 12, 1988 in U.S. App. No. 07/155,374*, Claim 24. This limitation was replaced in the new claims by "means for receiving signals from the hearing aid and **measuring phase and amplitude**." Similar language relating to the "null summation" technique for cancellation of acoustic feedback was also added. The applicant explained the new claims as follows:

> The claims as amended relate to a host controller for producing the data necessary to cancel acoustic feedback in a hearing aid. The cancellation of acoustic feedback is achieved by generating test signals which are transmitted to the hearing aid and by summing the acoustic feedback signal with an adjusted phase shift and amplitude signal to produce an acoustic feedback cancellation signal.

Amendment dated March 23, 1989 in U.S. App. No. 07/155,374, at 3. Thus, it appears the applicant nar-

rowed the claimed method of cancelling feedback from one requiring only modifying frequency gain and unspecified "feedback characteristics" to one specifically requiring *measurement of phase and amplitude*.

ETG argues its reason for entering the new claims was to cover a different concept—"null summation"—as opposed to receiving signals "indicative of frequency gain and feedback characteristics" as recited in the rejected claims. However, the "summation" concept was presented in application claims 25–31. *See, e.g.*, *Preliminary Amendment dated Feb. 12, 1988 in U.S. App. No. 07/155,374*, Claim 25 (requiring means for generating a "feedback cancellation voltage" for "summation" with a "feedback voltage" to "cancel feedback"). The examiner had rejected the summation claims for failure to comply with the written description requirement. *See Office Action dated Oct. 17, 1989 in U.S. App. No. 07/155,374*, at 2. Application claim 33 addressed the examiner's § 112 rejection by clarifying how and where summation occurs.

ETG has not overcome the presumption that the narrowing amendment was made to secure the patent. *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.*, 535 U.S. 722, 739 (2002). The prosecution history in this case shows that the claim limitation at issue was added in response to a rejection of closely related claims, and provides no other explanation for the limitation. *Honeywell Int'l v. Hamilton Sundstrand Corp.*, 523 F.3d 1304, 1315–16 (Fed. Cir. 2008) ("If the prosecution history reveals no reason for the narrowing amendment, the presumption is not rebutted. . . . Silence does not overcome the presumption.") (internal citation omitted). This court requires a strong showing – not present on this record – to satisfy the "very narrow" exception to prosecution history estoppel for amendments only tangentially

related to the equivalent in question. *Cross Med. Prods. v. Medtronic, Inc.*, 480 F.3d 1335, 1342 (Fed. Cir. 2007).

ETG's argument that it did not relinquish equivalents that involve "determining"—rather than "measuring"—phase and amplitude, also fails. Prosecution history estoppel bars application of the doctrine of equivalents even where the applicant surrendered more claim scope than was necessary to overcome a rejection. *See Norian Corp. v. Stryker Corp.*, 432 F.3d 1356, 1361–62 (Fed. Cir. 2005) (holding patentees are restricted by prosecution history estoppel to "the scope of what they ultimately claim"). Moreover, the difference between the phrase "determining the effect of phase and amplitude" and "measuring phase and amplitude" was clearly foreseeable. ETG used the "determining" language in the '850 Patent. *See* '850 Patent, col. 14, ll.8–10. The district court correctly applied prosecution history estoppel to bar assertion of infringement under the doctrine of equivalents by the accused devices, which do not "measure" phase and amplitude.

VI

For the forgoing reasons, this court affirms the judgment of the district court.

AFFIRMED

COSTS

Costs to ETG.