United States Court of Appeals for the Federal Circuit

IN RE APPLIED MATERIALS, INC.

2011-1461, -1462, -1463, -1464

Appeals from the United States Patent and Trademark Office, Board of Patent Appeals and Interferences in Reexamination Nos. 90/010,106; 90/010,107; 90/010,108; 90/010,109.

Decided: August 29, 2012

JOHN A. DRAGSETH, Fish & Richardson P.C., of Minneapolis, Minnesota, argued for appellant. With him on the brief was RICHARD J. ANDERSON.

ROBERT J. MCMANUS, Associate Solicitor, Office of the Solicitor, United States Patent and Trademark Office, of Alexandria, Virginia, argued for appellee. With him on the brief were RAYMOND T. CHEN, Solicitor, and FRANCES M. LYNCH, Associate Solicitor.

Before NEWMAN, CLEVENGER, and LINN, *Circuit Judges*.

Opinion for the court filed by *Circuit Judge* LINN.

Dissenting opinion filed by *Circuit Judge* NEWMAN.

LINN, *Circuit Judge*.

Applied Materials, Inc. ("Applied") appeals from four decisions of the Board of Patent Appeals and Interferences ("Board"). The Board affirmed the examiner's rejections under 35 U.S.C. § 103 in separate *ex parte* reexaminations of the claims of Applied's U.S. Patents No. 5,921,855 ("'855 Patent"); No. 6,520,847 ("'847 Patent"); No. 6,699,115 ("'115 Patent"); and No. 6,824,455 ("'455 Patent") (collectively, "Applied's Patents") covering polishing pads for chemical mechanical polishing ("CMP"). *Ex parte Applied Materials, Inc.*, Reexamination No. 90/010,106, 2010 WL 3454259, at *10 (B.P.A.I. Aug. 31, 2010) ("*Applied I*"); *Ex parte Applied Materials, Inc.*, Reexamination No. 90/010,107, 2010 WL 3454261, at *10 (B.P.A.I. Aug. 31, 2010) ("*Applied II*"); *Ex parte Applied Materials, Inc.*, Reexamination No. 90/010,108, 2010 WL 3448884, at *10 (B.P.A.I. Aug. 31, 2010) ("*Applied III*"); *Ex parte Applied Materials, Inc.*, Reexamination No. 90/010,109, 2010 WL 3448885, at *10 (B.P.A.I. Aug. 31, 2010) ("*Applied IV*"). The Board denied rehearing in each case. *Ex parte Applied Materials, Inc.*, Reexamination No. 90/010,106, 2011 WL 938723, at *3 (B.P.A.I. Mar. 17, 2011); *Ex parte Applied Materials, Inc.*, Reexamination No. 90/010,107, 2011 WL 938725, at *3 (B.P.A.I. Mar. 17, 2011); *Ex parte Applied Materials, Inc.*, Reexamination No. 90/010,108, 2011 WL 938733, at *3 (B.P.A.I. Mar. 17, 2011); *Ex parte Applied Materials, Inc.*, Reexamination No. 90/010,109, 2011 WL 938726, at *3 (B.P.A.I. Mar. 17, 2011). The four appeals are consolidated before this court. Because the Board's decisions are supported by substantial evidence, this court affirms.

I. BACKGROUND

A. The Patents

Integrated circuits are formed on a substrate "by the sequential deposition of conductive, semiconductive or insulative layers" that are "etched [after deposition] to create circuitry features." '855 Patent col.1 ll.10-14; '847 Patent col.1 ll.22-26; '115 Patent col.1 ll.23-27; '455 Patent col.1 ll.25-29. Because the substrate surface becomes increasingly non-planar through this process, the substrate must be periodically planarized, i.e. flattened. '855 Patent col.1 ll.14-30; '847 Patent col.1 ll.26-32; '115 Patent col.1 ll.27-33; '455 Patent col.1 ll.29-35. CMP is one method of planarizing in which the substrate to be planarized is placed against a rotating polishing pad, and a polishing slurry is applied. '855 Patent col.1 ll.31-48; '847 Patent col.1 ll.33-52; '115 Patent col.1 ll.34-52; '455 Patent col.1 ll.36-54. Problems in the art—particularly for pads with perforations—included the uneven distribution of slurry, the accumulation of waste material during pad conditioning, and a polishing problem associated with pad flexibility. '855 Patent col.1 l.62-col.2 l.48; '847 Patent col.2 ll.10-61; '115 Patent col.2 ll.10-61; '455 Patent col.2 ll.12-65. The claimed inventions are "sufficiently rigid" pads with grooves that advantageously distribute the slurry, remove waste material, and increase pad life. '855 Patent col.3 ll.16-24; '847 Patent col.4 ll.4-12; '115 Patent col.4 ll.4-12; '455 Patent col.4 ll.7-15.

Applied's Patents were amended during the reexamination. The amended claims cover pads (or an apparatus with a pad) for CMP with grooves having a depth "between about 0.02 inches and 0.05 inches," a width "between about 0.015 inches and 0.04 inches," a pitch "between about 0.09 inches and 0.24 inches," and "sidewalls that are substantially perpendicular to the polishing surface." *Applied I* at *1 (emphasis removed); *see also*

Applied II at *1-2; *Applied III* at *1-2; *Applied IV* at *1-2. The pitch refers to "the radial distance between adjacent grooves." '855 Patent col.5 ll.28-29; '847 Patent col.6 ll.42-44; '115 Patent col.6 ll.42-44; '455 Patent col.6 ll.39-41.

B. Proceedings Below

The Board's decision in each of the consolidated appeals is essentially identical. The Board affirmed the examiner's obviousness rejections under 35 U.S.C. § 103(a) based on the following prior art: (1) "Improving CMP Performance Using Grooved Polishing Pads" from the CMP-MIC Conference on February 22-23, 1996 by Milind Weling, et al. ("Weling"); (2) the English translation of a Japanese Patent Application, publication number H5-146969, published June 15, 1993 ("Breivogel"); and (3) a European Patent Application, publication number 0 674 972 A1, published April 10, 1995 ("Talieh").

Weling discloses U-shaped grooves but also discloses a groove depth and pitch smaller than that claimed in Applied's Patents. Nevertheless, the Board found that Weling's disclosure of a width of 0.01 inches met the claim limitation requiring widths between "about 0.015 inches and 0.04 inches."

Talieh and Breivogel disclose grooves with larger dimensions than the grooves in Weling. Breivogel's calculated width and pitch overlap with those claimed in Applied's Patents. While the width and pitch disclosed in Talieh are larger than those in Applied's Patents, Talieh discloses that the grooves can have a larger or smaller pitch. The depth disclosed by Talieh and Breivogel overlap the depths claimed in Applied's Patents. The overlap between the ranges in Applied's claims and the dimensions disclosed in the prior art was accurately depicted by the United States Patent and Trademark Office ("PTO") in the following table.

	Depth	Width	Pitch
Claimed	"about" 0.02-0.05 inches	"about" 0.015-0.04 inches	"about" 0.09-0.24 inches
Weling	0.015 inches	0.01 inches	0.06 inches
Talieh	"at least" 0.02 inches	"approximately" 0.126 inches	0.492-0.984 inches
Breivogel	0.01-0.06 inches	0.03125-0.5 inches or 0.0156-0.25 inches	0.031-0.5 inches

Appellee's Br. 22.

The Board found Applied's claims obvious because the prior art discloses values overlapping the claimed ranges and the dimensions were result-effective variables. The Board treated the identification of an optimal range of a result-effective variable as being within the ordinary skill in the art. *See In re Boesch*, 617 F.2d 272, 276 (CCPA 1980); *In re Aller*, 220 F.2d 454, 456 (CCPA 1955).

The Board found that Applied failed to provide evidence that the claimed groove dimensions produced unexpected results. Additionally, the Board found that Weling did not teach away from the invention claimed in Applied's Patents and that there was insufficient evidence of commercial success to outweigh the evidence of obviousness.

In each case, Applied requested rehearing, which the Board denied. Applied appeals all four decisions of the Board. This court has jurisdiction under 28 U.S.C. § 1295(a)(4).

II. DISCUSSION

A. Standard of Review

Obviousness is a question of law with several underlying factual inquiries, including what a reference teaches,

whether a reference teaches away, and whether there is commercial success. *Graham v. John Deere Co. of Kan. City*, 383 U.S. 1, 17-18 (1966); *Para-Ordnance Mfg., Inc. v. SGS Imps. Int'l, Inc.,* 73 F.3d 1085, 1088 (Fed. Cir. 1995). This court reviews the Board's determination of obviousness de novo and the Board's factual findings for substantial evidence. *In re Gartside*, 203 F.3d 1305, 1316 (Fed. Cir. 2000). Substantial evidence is "such relevant evidence as a reasonable mind might accept as adequate to support a conclusion." *Consol. Edison Co. v. NLRB,* 305 U.S. 197, 229 (1938). "[T]he possibility of drawing two inconsistent conclusions from the evidence does not prevent an administrative agency's finding from being supported by substantial evidence." *Consolo v. Fed. Mar. Comm'n*, 383 U.S. 607, 620 (1966).

The Board's judgment must be reviewed on the grounds upon which the Board actually relied. *See Sec. & Exch. Comm'n v. Chenery Corp.,* 332 U.S. 194, 196 (1947); *In re Lee*, 277 F.3d 1338, 1345-46 (Fed. Cir. 2002). Alternative grounds supporting the Board's decision generally are not considered. *See Lee*, 277 F.3d at 1346. "The [Board] must set forth its findings and the grounds thereof, as supported by the agency record, and explain its application of the law to the found facts." *Id.* at 1342.

However, "[w]hile we may not supply a reasoned basis for the agency's action that the agency itself has not given, *SEC v. Chenery Corp.,* 332 U.S. 194, 196 (1947), we will uphold a decision of less than ideal clarity if the agency's path may reasonably be discerned." *Bowman Transp., Inc. v. Arkansas-Best Freight Sys., Inc.,* 419 U.S. 281, 285-86 (1974); *see also In re Huston*, 308 F.3d 1267, 1280-81 (Fed. Cir. 2002) (affirming the Board's "cryptic" conclusions because the Board's path could be discerned and the Board's decision was supported by substantial evidence (quoting *Bowman,* 419 U.S. at 285-86)).

B. Evidence of Obviousness

Applied argues that the Board's analysis was conclusory and lacked sufficient evidentiary support. Applied specifically argues that the examiner's conclusion that it would have been obvious to one of ordinary skill in the art to select a groove depth, width, and pitch double those disclosed in Weling was not supported by the prior art. Applied further argues that because the prior art did not address the impact of altering each dimension on pad performance, the prior art did not specify the *result* of each purported result-effective variable, and so the prior art could not lead one of ordinary skill to the claimed invention. Furthermore, Applied observes that there were multiple dimensional variables selected based on multiple criteria, with "trade-offs among the several results obtained based on the selection of those variables (such as selecting pitch and width to balance pad flexibility, difficulty in removing waste material, and slurry transport) . . . ." Appellant's Br. 36-37, 39. Finally, Applied argues that Breivogel and Talieh teach, in addition to larger grooves, grooves with a different profile and spiral or offset grooves, respectively.

The PTO defends the Board's decisions by arguing that the prior art contains dimensions overlapping the ranges in Applied's claims. The PTO contends that the examiner's doubling of the dimensions was not necessary to the finding of obviousness and that any adjustment of the dimensions was based properly on the premise that the prior art taught that the groove dimensions could be adjusted upward. The PTO also identifies parts of the record showing that the prior art recognizes that the dimensions are result-effective variables and that the advantages of Applied's ranges were not unexpected.

The Board affirmed the examiner's rejection "because one of ordinary skill in the art would have recognized

after reading the prior art that the dimensions recited in the claims are result-effective variables, and because the prior art further discloses values including those recited in the claims." *Applied I* at *7; *see also Applied II* at *7; *Applied III* at *7; *Applied IV* at *7. This court must affirm or reverse the Board's decisions on these grounds alone. *See Chenery,* 332 U.S. at 196; *Lee*, 277 F.3d at 1345-46. The Board's opinions in the present appeals are not a model of clarity, but the Board's "path may reasonably be discerned." *See Bowman,* 419 U.S. at 285-86.

First, the Board's conclusion that the prior art discloses dimensional values overlapping the ranges claimed in Applied's Patents is supported by substantial evidence. While the Board failed to cite the relevant cases, this "path" to obviousness is consistent with this court's precedent. *In re Peterson,* 315 F.3d 1325, 1329 (Fed. Cir. 2003) ("A *prima facie* case of obviousness typically exists when the ranges of a claimed composition overlap the ranges disclosed in the prior art."); *see In re Geisler*, 116 F.3d 1465, 1469 (Fed. Cir. 1997); *In re Malagari*, 499 F.2d 1297, 1303 (CCPA 1974). Such overlap itself provides sufficient motivation to optimize the ranges. *See Peterson,* 315 F.3d at 1330 ("The normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of . . . ranges is the optimum combination . . . .").

Second, the Board's finding that the dimensional variables were result-effective, rendering their optimization within the grasp of one of ordinary skill in the art, was supported by substantial evidence. *See Boesch*, 617 F.2d at 276. "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." *Aller*, 220 F.2d at 456. This rule is limited to cases in which the optimized variable is a "result-effective variable." *In re Antonie*, 559 F.2d 618, 620 (CCPA 1977);

see Boesch, 617 F.2d at 276 ("[D]iscovery of an optimum value of a result effective variable . . . is ordinarily within the skill of the art."). In the present case, because the prior art disclosed values overlapping the claimed ranges, the "general conditions" of the claim are disclosed. *See Aller*, 220 F.2d at 456; *see also Boesch*, 617 F.2d at 276. The question is whether the dimensions were known to be result-effective variables.

Contrary to Applied's argument, there is evidence that the claimed groove dimensions are result-effective variables—rendering their optimization within the ordinary skill in the art. *See Boesch*, 617 F.2d at 276. The Board cited the Examiner's Answers, which observed that Breivogel teaches that "[t]he number of grooves per area and the groove pitch are optimized for the type of pad and the slurry that is used to achieve a high polishing rate and polishing uniformity." Examiner's Answer at 4-5 *Applied I* ("Examiner's Answer I"); Examiner's Answer at 5 *Applied II* ("Examiner's Answer II"); Examiner's Answer at 5 *Applied III* ("Examiner's Answer III"); Examiner's Answer at 5 *Applied IV* ("Examiner's Answer IV"). Breivogel clearly discloses that pitch affects the polishing rate and uniformity, and further indicates that one of ordinary skill in the art can alter the pitch to achieve the desired polishing properties. The Board also found that a person of ordinary skill in the art would have recognized that changing the groove width would affect the polishing rate and uniformity. This is a reasonable conclusion because the number of grooves per area—which is disclosed in Breivogel as affecting the polishing rate and uniformity—is related to the groove width: the Board used the number of grooves per area disclosed in Breivogel to calculate the width of the grooves that Breivogel disclosed. Because of the close relationship between the number of grooves per area and the width, the Board's finding that the width also affected the desired polishing pad properties was supported by substantial evidence.

Thus, the Breivogel disclosure demonstrates that both the width and pitch were known to be result-effective variables.

The "Examiner's rationale," which was referenced with approval by the Board for a related reason discussed below, also supports the finding that the depth is a result-effective variable. *Applied I* at *7; *Applied II* at *7; *Applied III* at *7; *Applied IV* at *7. The examiner's Answer stated that increasing the dimensions was advantageous because the pad could be used for a longer time without being worn down to the point of being "too shallow." Examiner's Answer I at 5; Examiner's Answer II at 5; Examiner's Answer III at 5; Examiner's Answer IV at 5. The examiner further explained elsewhere in the Answer that "one of ordinary skill in the art would certainly expect that increasing the thickness of the pad and the size of the grooves would result in a pad having a longer service life since it would take longer for such a pad to wear down/out; this expectation is based on the basic engineering principle that a frictional element that is worn over time by friction will last longer if its thickness is increased." Examiner's Answer I at 14; Examiner's Answer II at 14-15; Examiner's Answer III at 14; Examiner's Answer IV at 14-15. Thus, the Board's finding that the depth would also have been recognized by one of ordinary skill to affect a particular result, making it too a result-effective variable, was supported by substantial evidence.

The Board found that the "Examiner's rationale" supported the doubling of the groove dimensions in Weling to achieve the claimed dimensions. *Applied I* at *7; *Applied II* at *7; *Applied III* at *7; *Applied IV* at *7. Applied correctly argues that the Board and the examiner lacked substantial evidence to exactly double all of the groove dimensions in Weling to achieve the claimed dimensions. Nevertheless, because the prior art teaches larger grooves

and a person having ordinary skill in the art would have known that the dimensions were result-effective variables, the exact doubling of the dimensions was unnecessary to the Board's finding of obviousness. The underlying correct premises were sufficient to support the Board's finding of obviousness.

The Board primarily rested its finding that the dimensions were result-effective variables on Applied's admission: "A person having ordinary skill in the art after reviewing the teachings of Weling, Talieh and Breivogel would have understood that polishing pads with grooves can be formed where at least the groove dimensions . . . could have been modified. Such modification would have changed the polishing rate and pad characteristics . . . ." *Applied I* at *6 (quoting Applied's brief to the Board); *Applied II* at *6 (same); *Applied III* at *6 (same); *Applied IV* at *6 (same). The Board did not err in relying on Applied's admission because the admission indicates that the prior art taught that the dimensions could be modified and that modification would affect pad performance, which was sufficient to find the dimensions to be result-effective variables. While Applied also stated that the prior art "is *silent* as to the impact of the groove pitch and width on performance," the prior art did not need to disclose the result with any greater specificity than it already did. *Applied I* at *6 (quoting Applied's brief to the Board); *Applied II* at *6 (same); *Applied III* at *6 (same); *Applied IV* at *6 (same).

In cases in which the disclosure in the prior art was insufficient to find a variable result-effective, there was essentially *no* disclosure of the relationship between the variable and the result in the prior art. In *Antonie*, the court found the variable not result-effective because the prior art did not disclose the claimed ratio, or even recognize that one of the variables in the ratio was relevant to the desired property. 559 F.2d at 619-20. In *In re Yates*,

663 F.2d 1054 (CCPA 1981), the court found the variable not result-effective because there was no teaching of the claimed relationship and also "no evidence of this relationship in the prior art." 663 F.2d at 1056-57 (emphasis omitted). While the absence of any disclosure regarding the relationship between the variable and the affected property may preclude a finding that the variable is result-effective, the prior art need not provide the exact method of optimization for the variable to be result-effective. A recognition in the prior art that a property is affected by the variable is sufficient to find the variable result-effective.

Applied's Patents do articulate how the groove dimensions affect pad properties with greater specificity than the prior art. '855 Patent col.5 ll.34-65; '847 Patent col.6 l.50-col.7 l.14; '115 Patent col.6 l.50-col.7 l.14; '455 Patent col.6 l.47-col.7 l.11. But, generally, a claim to a product does not become nonobvious simply because the patent specification provides a more comprehensive explication of the known relationships between the variables and the affected properties.

The outcome of optimizing a result-effective variable may still be patentable if the claimed ranges are "critical" and "produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art." *Aller*, 220 F.2d at 456; *see Antonie*, 559 F.2d at 620. Similarly, a prima facie case of obviousness established by the overlap of prior art values with the claimed range can be rebutted by evidence that the claimed range is "critical" because it "achieves unexpected results." *Peterson,* 315 F.3d at 1330 (quoting *Geisler*, 116 F.3d at 1469-70). But Applied provided no such evidence. The Board correctly found that there was no indication that obtaining the claimed dimensions was beyond the capabilities of one of ordinary skill in the art or produced any unexpectedly beneficial properties, further supporting

the Board's finding that the optimization of the dimensions was obvious.

Nothing indicates that the optimization of the variables was anything other than the exercise of ordinary skill in the art. Likewise, the combination of the various dimensions from the different pieces of prior art was also obvious. The mere fact that multiple result-effective variables were combined does not necessarily render their combination beyond the capability of a person having ordinary skill in the art. Evidence that the variables interacted in an unpredictable or unexpected way could render the combination nonobvious, *see KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 421 (2007), but Applied failed to show anything unpredictable or unexpected in the interaction of the variables.

In addition to the width, depth, and pitch, Applied argues there are two other variables relating to the shape of the grooves, but nothing renders the combination of these five variables nonobvious. Some of Applied's claims cover "a plurality of substantially circular concentrically arranged grooves." *Applied I* at *1 (emphasis omitted); *see also Applied II* at *1; '115 Patent col.12 ll.38-39; '455 Patent col.12 ll.36-37, col.12 ll.61-62. Weling and Breivogel both disclose concentrically arranged grooves. Appellant's Br. 10, 12; *Applied I* at *2; *Applied II* at *2; *Applied III* at *2; *Applied IV* at *2. Applied's Patents also claim grooves with "sidewalls that are substantially perpendicular to the polishing surface." *Applied I* at *1; *Applied II* at *1; *Applied III* at *1; *Applied IV* at *1. Weling discloses similar U-shaped grooves, and Breivogel expressly indicates that one of ordinary skill could modify the cross-sectional shape of the grooves: The "grooves themselves can have many different configurations. For example, grooves may have a flat bottom or semicircular cross section." *Applied I* at *2, *4, *8 (quoting Breivogel); *Applied II* at *2, *4, *8 (same); *Applied III* at *2, *4, *8

(same); *Applied IV* at *2, *4, *8 (same). Thus, there is no indication that it would have been nonobvious to combine these two groove features with the other Breivogel dimensions (depth, width, and pitch), particularly because Breivogel includes the circular groove arrangement and recognizes that the cross-sectional groove shape was a variable that could be altered by one of ordinary skill in the art.

Applied argues that the triangular cross-section of the grooves in Breivogel renders that reference inadequate. One of ordinary skill in the art is not foreclosed from combining the Breivogel dimensions with the Weling cross-sectional shape merely because Breivogel discloses triangular grooves. A reference must be considered for everything that it teaches, not simply the described invention or a preferred embodiment. *See EWP Corp. v. Reliance Universal Inc.*, 755 F.2d 898, 907 (Fed. Cir. 1985); *In re Lamberti*, 545 F.2d 747, 750 (CCPA 1976). Even though Breivogel describes grooves with a particular cross-sectional shape, this does not preclude one of ordinary skill in the art from utilizing Breivogel's other teachings on the width, depth, and pitch in combination with other features of the Weling pad. One of ordinary skill in the art is not an "automaton." *KSR*, 550 U.S. at 421. For the same reasons, Talieh's teachings on the dimensions can be combined with the Weling pad, despite the fact that Talieh teaches grooves with a centered spiral or offset circular arrangement.

C. Teaching Away

The Board found that Weling does not criticize or teach away from pads with deeper grooves; Weling simply discloses that shallow grooves are preferred over a perforated pad. Applied argues that Weling teaches away from the claimed invention and that the Board misinterpreted Weling as preferring grooves generally over perforations.

Applied argues that Weling teaches the advantages of *shallow* grooves. The PTO argues that Weling noted the "several critical ways" in which perforations and grooves differ, suggesting the focus of Weling was on the general differences between grooves and perforations. Appellee's Br. 32-33 (quoting Weling).

"A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant." *In re Gurley*, 27 F.3d 551, 553 (Fed. Cir. 1994). While Applied's alternative interpretation of Weling is plausible, the mere fact that alternative conclusions can be drawn from the evidence is not relevant to determining whether substantial evidence supports the Board's conclusion. *See Consolo*, 383 U.S. at 620. The substantial evidence inquiry requires this court to determine whether the evidence reasonably supports the Board's conclusion, which in this case it does. *See Consol. Edison,* 305 U. S. at 229.

D. Commercial Success

The guaranteed performance of Applied's CMP machines depends on following the best known methods published by Applied. The best known methods allow for the use of either a pad embodying the structures described in the Weling reference (the "Weling pad") or recited in the claims of Applied's Patents (the "Applied pad"). Applied alleged that the Applied pad gained market share in competition with the Weling pad also covered by the best known methods. Nevertheless, the Board found that there was insufficient evidence of a nexus between the features of the claimed invention and its success because the best known methods are a factor unrelated to the quality of the claimed invention. *See In re Huang*, 100 F.3d 135, 140 (Fed. Cir. 1996).

The Board also found that Applied's evidence of alleged market share was insufficient to overcome the prima facie case of obviousness because Applied failed to provide sales data. Applied defined the market as Applied's CMP machines and provided 20% ranges for the market share. Applied did not have exact sales data because it did not historically sell the pads and had no way to gauge market share with greater accuracy.

Applied argues that there is a nexus between the features of the invention and its market share because the Applied pad successfully competed against the Weling pad under the best known methods. Applied also argues that the ranges were the best evidence it had available.

The PTO argues that the best known methods are a factor unrelated to the quality of the claimed invention. The PTO also argues that the absence of actual sales data calls into question the accuracy of the market shares Applied asserted, rendering Applied's evidence of the market share insufficient.

The Board's finding that the evidence of commercial success did not overcome the prima facie case of obviousness is supported by substantial evidence. The party seeking the patent bears the burden to overcome the prima facie case of obviousness with evidence of secondary considerations, such as commercial success. *Id.* at 139. Commercial success is relevant to obviousness only if there is a "nexus . . . between the sales and the merits of the claimed invention." *Id.* at 140. There must be "proof that the sales were a direct result of the unique characteristics of the claimed invention—as opposed to other economic and commercial factors unrelated to the quality of the patented subject matter." *Id.*

The Board correctly found that the best known methods were a commercial factor unrelated to the quality of

the claimed invention, significantly weakening the evidence of commercial success. Applied provided some evidence that its claimed invention was more successful than the Weling pad. However, the more probative evidence of commercial success relates to whether the sales represent "a substantial quantity in th[e] market." *Id.* at 140 ("This court has noted in the past that evidence related solely to the number of units sold provides a very weak showing of commercial success, if any."). The Board observed that "customers may have had a choice of polishing pads" other than those covered by the best known methods, although the record does not clearly indicate whether this is true. *Applied I* at *10; *Applied II* at *9; *Applied III* at *9; *Applied IV* at *9. Nevertheless, this observation by the Board indicates an appropriate concern with the nature of the evidence presented by Applied. An important component of the commercial success inquiry in the present case is determining whether Applied had a significant market share relative to *all* competing pads based on the merits of the claimed invention, which Applied did not show.

With respect to the sufficiency of the evidence, the Board was also correct to find that Applied did not provide adequate proof of the asserted market share. Applied is not relieved of the burden of proving commercial success simply because it lacks the capability to marshal probative evidence. Just as the number of units sold without evidence of the market share is only weak evidence of commercial success, *see Huang*, 100 F.3d at 140, so too is an assertion of market share lacking in sales data.

Thus, the Board correctly found the limited evidence Applied provided of commercial success could not overcome the prima facie finding of obviousness both based on the lack of nexus and the insufficiency of the evidence.

III. CONCLUSION

For the foregoing reasons, this court concludes that the decisions of the Board are supported by substantial evidence. The decisions of the Board are, thus, affirmed.

AFFIRMED

United States Court of Appeals for the Federal Circuit

IN RE APPLIED MATERIALS, INC.

2011-1461,-1462,-1463,-1464

Appeals from the United States Patent and Trademark Office, Board of Patent Appeals and Interferences in Reexamination Nos. 90/010,106; 90/010,107; 90/010,108; 90/010,109.

NEWMAN, *Circuit Judge*, dissenting.

In this crowded art of polishing pads, there is no product with the combination of width, depth, and pitch of the product here patented. The patented product has achieved significant commercial success, displacing pads having the parameters that are here said to render the claimed pad obvious.

The question is not whether the differences from the prior art are large or small; the question is whether it would have been obvious to change the combination of width, depth, and pitch in the manner of the patentee, with a reasonable expectation that the changed product would have the advantages here obtained. As stated in *In re Dow Chemical Co.*, 837 F.2d 469, 474 (Fed. Cir. 1988), "the expectation of success must be founded in the prior art, not in the applicant's disclosure."

The PTO offered no support in the prior art, or in common sense, for such an expectation of improved properties. All that the PTO offers is prior art having variations in width, depth, and pitch; there is no suggestion of changing the parameters in the manner done by this patentee. Nothing in the record shows that the patentee's concurrent changes in width, depth, and pitch were simply "knowledge so basic that it certainly lies within the skill set of an ordinary artisan." *Mintz v. Dietz & Watson, Inc.*, 679 F.3d 1372, 1377 (Fed. Cir. 2012). Yet the evidence is that the consumer has shown a clear preference for the patentee's product as compared with the prior art products. This is highly relevant to the question of obviousness, for the purchasing consumer is in the best position to evaluate technological changes that appear to judges to be minor, yet that are of significance to the product's properties, as measured in the marketplace. *See Ashland Oil, Inc. v. Delta Resins & Refractories, Inc.*, 776 F.2d 281, 306 (Fed. Cir. 1985) ("Secondary considerations may be the most pertinent, probabitve, and revealing evidence available to the decision maker in reaching a conclusion on the obviousness/nonobviousness issue.").

The Court observed in *Dickinson v. Zurko*, 527 U.S. 150, 162 (1999), that "[t]he APA requires meaningful review," "not simply rubber-stamping agency factfinding." On the correct law, the polishing pad with the claimed parameters has not been shown to be obvious. From my colleagues' contrary holding, I respectfully dissent.