

Filed on behalf of: Giesecke+Devrient GmbH, *et al.*

Filed: January 8, 2026

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

GIESECKE+DEVRIENT GMBH,
GIESECKE+DEVRIENT CURRENCY TECHNOLOGY GMBH, AND
PAPIERFABRIK LOUISENTHAL GMBH,
Petitioners,

v.

LUMENCO, LLC,
Patent Owner.

Case No. IPR2024-00836
U.S. Patent No. 10,189,294

**AUTHORIZED RESPONSE TO DIRECTOR REVIEW REQUEST OF
FINAL WRITTEN DECISION**

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Ex. 1004	U.S. Patent No. 62262767 Provisional
Ex. 1005	DE102010048262A1
Ex. 1006	DE102010048262A1 Official Translation into English (“Fuhse262”)
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Ex. 1022	WO2012048847A1_English (“Fuhse847”)
Ex. 1023-1024	Reserved
Ex. 1025	R. Lee, “Micromirror array nanostructures for anticounterfeiting applications,” Proc. SPIE 5310, Optical Security and Counterfeit Deterrence Techniques V, (3 June 2004)
Ex. 1026	Lee R.A., Leech P.W., “Development of Optically Variable Devices for Document Security in CSIRO Journal of the Coatings Association of Australia,” Vol. 42(8), August 2005, p. 22-27.
Ex. 1027	<i>Optics</i> , Hecht, 4th Edition (2002)
Ex. 1028	Saleh and Teich. Fundamentals of Photonics (1st Edition 1991), Ch. 1

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Ex. 1029	Ebewele, R.O. (2000). Polymer Science and Technology (1st ed.). CRC Press.
Ex. 1030	Franssila, S. Introduction to Microfabrication (1st Edition 2004)
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Ex. 1055	Transcript of Deposition of Mikael Lindstrand (April 11, 2025)
Ex. 1056	Petitioners' Demonstratives

I. INTRODUCTION

The Request for Director Review (“Request”) should be denied because it fails to demonstrate any error or abuse of discretion. Instead, the Patent Owner (“PO”) relies on a narrow factual dispute over whether Fushe262 discloses, teaches, or suggests a “voxel” – a claim term absent from the ’294 Patent specification and whose meaning is undisputed. Furthermore, PO offers an unsupported challenge to element [35b.5], which the Board correctly found (and PO does not dispute) as unresponsive to Petitioners’ arguments. Because PO’s challenges lack support in the record, the Board’s findings should remain undisturbed.

Regarding “voxel,” PO fails to allege any specific error in the Board’s legal interpretation of the term, its factual finding regarding the prior art, or its assessment of the expert testimony by Dr. Hesselink (Petitioner’s expert). Instead of addressing these pillars, PO attempts to reargue the definition of a person of ordinary skill in the art (“POSITA”). This rejected argument is fundamentally flawed because it seeks to require experience with “diffusive light,” a concept entirely absent from the ’294 Patent. By extension, contingent on this argument, PO’s challenge to Dr. Hesselink’s credibility is both factually incorrect and legally insufficient. PO merely speculates that Dr. Hesselink’s purported unfamiliarity with “diffusive light” should have precluded the Board from crediting his testimony, while ignoring his actual experience and failing to identify any factual errors in his testimony.

The Request further errs by repeating redundant arguments concerning Fuhse262's disclosure of the "voxel" limitation and by mischaracterizing the prior art in relation to element [35b.5]. Specifically, PO misreads the prior art to wrongly conclude that 2-D and 3-D images in the "foreground" and "background" of each other are somehow "at the same height." These arguments are not only technically incorrect but are also new and unresponsive to Petitioners' arguments.

Ultimately, the Request asks the Director to improperly reweigh evidence that the Board already considered and credited. Because the PO has not demonstrated an abuse of discretion or any erroneous conclusion of law or material fact, the Director should deny the Request.

II. LEGAL STANDARD

Director Review of a Board's Final Written Decision is "limited to decisions presenting (a) an abuse of discretion, (b) important issues of law or policy, (c) erroneous findings of material fact, or (d) erroneous conclusions of law." Director Review Process, § 2.B.¹ None of these categories apply. PO's disagreement with the Board's detailed analysis is not an abuse of discretion. PO identifies no important issues of law or policy. PO falls woefully short of demonstrating erroneous findings of material fact or conclusions of law.

¹Available at <https://www.uspto.gov/patents/ptab/decisions/director-review-process>

III. THE BOARD DID NOT ABUSE ITS DISCRETION IN DEFINING THE POSITA

The Board mostly agreed with Petitioners and found a POSITA to mean: “a minimum of an undergraduate degree in electrical engineering, mechanical engineering, or physics and 2 years of experience in micro-optic based security features.”² FWD, at 10-12. The Board correctly rejected PO’s proposed POSITA level, including additional required experience in “diffusive light” and expanding undergraduate degrees to a “similar field.”. FWD, at 11-12.

A. PO Fails to Dispute any Material Fact Relied on by the Board in Defining the Level of a POSITA

The Board conducted a sound analysis, thoroughly analyzed the record and found that Petitioner’s definition is “consistent with the types of problems encountered in the art, the prior art solutions to those problems, and the sophistication of the technology.” FWD, at 10-12. The Board reviewed the ’294 Patent, including its “discussion of anti-counterfeiting devices made up of arrays of lenses used to display unique images....” *Id.* at 11 (citing Ex. 1001, 1:25–37). The Board also considered the specification’s discussion of “using lenses to create holograms.” *Id.* (citing Ex. 1001, 2:1–14)).

² The Board rejected the phrase “at least” preceding “2 years of experience” in Petitioners’ proposal.

Additionally, the Board evaluated “the prior art in this field, such as Fuhse262” and its disclosures “relat[ing] to the use of lenses and mirrors to create hologram images for security purposes.” FWD, at 11 (citing Ex. 1006 ¶¶ 1–7). Based on this review, the Board found that the evidence supported “Petitioner[s]’ proposed definition, that a POSITA would need an educational background to understand optics, lenses, and mirrors along with professional experience with optical security features to understand....” FWD, at 11.

PO does not dispute a single factual finding relied on by the Board. *See* PO Req. at 5-8. Instead, PO merely refers repeatedly to the expert declaration of Dr. Lindstrand. *Id.* However, Dr. Lindstrand fails to address these findings or even reference the ’294 Patent or the prior art. *Id.* Indeed, PO’s only reference to the ’294 Patent in its Request is the statement that the invention is for use with “ambient light,” a point never in dispute. PO Req. at 5-6.

B. The “Diffusive Light” Requirement Was Correctly Rejected

The Board correctly rejected PO’s proposed “diffusive light” requirement for the level of a POSITA. FWD, at 12.

First, the Request should be denied for improperly raising new arguments regarding this unsupported requirement. “The Director will not consider new evidence or new arguments not part of the official record.” Director Review Process, § 3.E; Paper 9 (Scheduling Order) at 9 (“Patent Owner is cautioned that any

arguments not raised in the [POR] may be deemed waived.”); *In re NuVasive, Inc.*, 842 F.3d 1376, 1380–81 (Fed. Cir. 2016). Despite this clear prohibition, the Request relies extensively on new evidence and arguments.

As an initial matter, the section of the Request regarding “diffusive light” cites new evidence: the ’294 Patent at 5:53-56 and the Abstract, and the Lindstrand Declaration at ¶26 and ¶32. *See* PO Req. at 5-7 (Section III.A.1). However, the POR cited only the Lindstrand Dec. at ¶¶27-28 for this argument, and PO did not cite this new evidence in its Sur-Reply³. POR at 9-11; *see* Paper 18 (“PO Sur-Reply”). Thus, the evidence now relied upon is new and should not be considered.

Furthermore, PO cites this new evidence in support of a novel theory: that the POSITA definition must include “experience with the specific subset of micro-optic based security features claimed by the ’294 [sic] Patent (*i.e.*, micro mirrors that receive and reflect **ambient light**).” PO Req. at 6-7 (emphasis added). However, PO never proposed a level of skill requiring experience with “ambient light,” having argued only for “diffusive light.” PO cannot use Director Review to pivot to a new definition of the POSITA after its original proposal was rejected by the Board.

In addition, PO improperly introduces another novel “ambient light” theory relying on the unstated premises that the POSITA definition must require “diffusive

³ PO did not address the level of ordinary skill in its Sur-Reply. *See* Paper 18.

light” as a “subset” of ambient light, and that a POSITA must possess experience across all such subsets. PO Req. at 5-7. PO never advanced this theory. *See* POR at 9-11; *see generally* PO Sur-Reply. Because this theory was not timely raised during the trial phase and represent a departure from the established record, the Director should disregard this new theory as waived. Director Review Process, § 3.E; Paper 9 (Scheduling Order) at 9; *In re NuVasive, Inc.*, 842 F.3d at 1380–81.

Second, the Board properly rejected PO’s argument for a “diffusive light” requirement. FWD, at 12. In declining to adopt this extraneous requirement, the Board conducted a thorough review of the record and light environment of the ’294 Patent and concluded that the ’294 Patent does not give “any significance to the nature of diffuse light and its effects on the invention.” FWD, at 12.

PO does not dispute these findings, effectively conceding the absence of error. Most significantly, PO does not dispute the Board’s finding that the ’294 Patent “does not mention ‘diffusive light’.” *Id.* Accordingly, it is undisputed that PO’s proposed definition attempts to require experience with a system unmentioned in the ’294 Patent. Faced with silence in the specification, PO improperly attempts to pivot to an “ambient light” requirement it never advocated for below.

C. “Similar Field” Was Rightly Rejected

The Board correctly found that adding the phrase “similar field” would introduce “vagueness and unnecessary uncertainty.” FWD, at 11-12. PO argues for

the first time that such language is “common” in patent disputes (PO Req. at 7-8), which is irrelevant to whether the Board erred here based on the specific record before it. As the Board explained, PO offered no criteria for defining a “similar field.” FWD, at 11-12; POR 9; Hearing Tr. (Paper 30), at 36:3-39:12 (PO’s counsel conceding “I don’t know” what qualifies as a similar field).

IV. THE BOARD PROPERLY WEIGHED EXPERT TESTIMONY

A. No Abuse of Discretion in Weighing Testimony of Dr. Hesselink

PO contends that the Board abused its discretion in crediting Dr. Hesselink’s testimony because “[t]he Board’s incorrect definition of a POSITA” allegedly skewed the weight afforded to the experts. PO Req. at 8-10. Thus, PO’s allegation of abuse of discretion is entirely contingent *under its own POSITA definition*. Because the Director should find no abuse of discretion in declining to adopt PO’s “diffusive light” requirement, PO’s challenge to Dr. Hesselink’s credibility is moot.

Furthermore, any argument that the Board abused its discretion in crediting Dr. Hesselink regardless of the POSITA definition is waived. PO *exclusively* premised its challenge to Dr. Hesselink’s testimony on the theory that he was unqualified under the proposed “diffusive light” definition. *See* POR, 11-13 (Section IV.B: “DR. HESSELINK IS NOT A POSITA”).

Because Dr. Hesselink is qualified under the Board’s proper POSITA definition, his testimony was admissible and entitled to weight. Determining the

relative weight of expert testimony is a core function of the Board. Here, the Board properly credited Dr. Hesselink over Dr. Lindstrand because it was consistent with the physical realities of the '294 Patent, Fuhse262 and relevant disclosures.

PO now asserts for the first time that Dr. Hesselink's Declaration "should have been... excluded completely." PO Req. at 9. As the Board noted, "Patent Owner has not moved to exclude Dr. Hesselink's testimony." FWD, at 12 (citing 37 C.F.R. § 42.62). By failing to file evidentiary objections or a motion to exclude, PO waived any argument that Dr. Hesselink is unqualified to testify. *See* Pet. Reply, at 26-27.

Moreover, PO incorrectly alleges that "Dr. Hesselink has no experience with systems including diffusive light" and "Petitioner[s] admit[] this." PO Req. at 1. This assertion is factually inaccurate. In direct response to the arguments raised in the POR, Petitioners identified in their Reply that Dr. Hesselink possesses two years of experience specifically with diffusive light micro-optic security features. Pet. Reply at 27-28 (citing EX1003 ¶¶5-9 (describing decades of pioneering work in optical and holographic displays for security applications)). Petitioners further noted that while the PO listed various other types of experience (*see* POR at 11-12), it never sought to cross-examine Dr. Hesselink regarding his actual qualifications in this area. *Id.* Further, PO's Sur-Reply failed to address these points. *See, generally*, PO Sur-Reply. The Director should find no abuse of discretion and disregard the PO's request to exclude or re-weight this testimony.

B. No Abuse of Discretion in Weighing Testimony of Dr. Lindstrand

PO's contention that "[t]he Board abused its discretion in failing to credit Dr. Lindstrand's testimony" (PO Req. at 10) is meritless and mischaracterizes the Board's analysis. As an initial matter, the Board never found Dr. Lindstrand was unqualified, as PO alleges. PO Req. at 10. In fact, Petitioners clarified at the hearing that while Dr. Lindstrand did not meet the educational requirements of a POSITA, "the Board is perfectly capable of weighting the evidence." Hearing Tr. at 54:1-8.

PO's only evidence of alleged abuse of discretion is a superficial tally of citations in the FWD and the Board's reliance on Dr. Hesselink. PO Req. at 10. Critically, PO fails to identify *what* testimony (even a single example) of Dr. Lindstrand's testimony that the Board overlooked or misconstrued.

Instead, the record reflects that the Board carefully weighed Dr. Lindstrand's testimony but found it insufficient. For example, Dr. Lindstrand's broad conclusions were contradicted by his own deposition admissions that the specific facts alleged by Dr. Hesselink to conclude the opposite were correct. *See* FWD, at 28 (admitting that intersecting light beams would reflect off the entire surface of Fuhse262's micromirrors). Furthermore, regarding the "voxel" limitation, the Board found that "Dr. Lindstrand's testimony ... merely repeats Patent Owner's allegations nearly verbatim without sufficient additional explanation or citations to evidence." FWD, at 31-32. Thus, the Board properly afforded "little weight" pursuant to the Federal

Rules, precedential PTAB authority, and Federal Circuit authority. The Board's refusal to credit the parroting of attorney argument is not an abuse of discretion.

V. SUBSTANTIAL EVIDENCE SUPPORTS THE BOARD'S FINDINGS

PO alleges material errors in the Board's findings regarding (1) "voxels" (PO Req. at 10-12), and (2) element [35b.5] (PO Req. at 13-14). The so-called "errors" are recycled challenges to the Board's POSITA definition, and in any case, fail to identify material error.

A. PO's Disputes Regarding the Claim Language Depend on its Rejected POSITA Definition

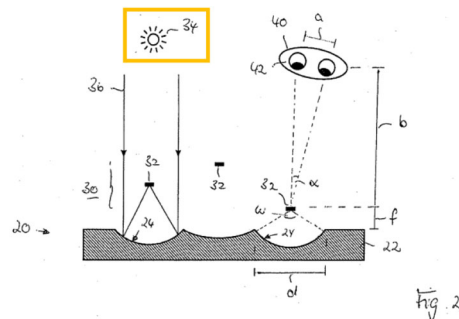
PO's arguments regarding "voxel" and element [35b.5] are premised on "[t]he Board's errors in defining a POSITA and its abuse of discretion in giving the appropriate weight to the experts' testimony." PO Req. at 10-14. Thus, the only alleged "error" in the Board's "voxel" and element [35b.5] findings is a recycled challenge to the POSITA definition and the weight of the expert testimony. These arguments fail for the reasons stated above. These arguments also fail for additional, independent reasons, as discussed below.

B. Substantial Evidence Supports the Board's Findings Regarding "Voxels"

PO fails to identify material error in the Board's conclusions regarding "voxels." PO Req. at 10-12. PO argues that interference would prevent voxel formation in an ambient light system. PO Req. at 11-12. However, PO admits this

is a simple disagreement with the Board’s factual findings, stating: “Thus, contrary to the Board’s conclusion, a POSITA would actually have understood that, due to interference....” PO Req. at 11-12. Disagreement with a conclusion is not an error of fact or law or an abuse of discretion.

Furthermore, PO’s argument is irrelevant. PO’s argument is premised on the proposition that Petitioners’ obviousness position is invalid in ambient light systems. PO Req. at 11. Yet, PO never disputed that **Fuhse262 is an ambient light system**, and discloses illumination via **ambient light** sources such as “sunlight or a ceiling lamp,” a finding that PO did not contest in its POR or Sur-Reply. This is seen in Fuhse262 figure 2:



Pet. at 19-20 (citing EX1006 and EX1003, ¶¶129-130).

Thus, PO’s argument is untethered from the prior art of record. The Board considered and rejected Dr. Lindstrand’s “interference” theory as conclusory and “entitled to little weight.” FWD, at 30-32. The Board conducted an extensive analysis of whether Fuhse262 system forms “voxels” and concluded that it did. *See* FWD, at 25-32. PO identifies no error in the Board’s evaluation.

Finally, PO falsely accuses the Board of “improperly shifting the burden of persuasion.” PO Req. at 12-13. However, the Board explicitly stated that the “burden never shifts to Patent Owner.” FWD, at 9, *see also* 41 (finding that “Petitioner has demonstrated by a preponderance of the evidence...”). The Board’s requirement that PO “explicitly show” why voxels would not form is not a burden shift. PO Req. at 12 (citing FWD, at 30). It was a demand for evidence to support PO’s rebuttal after the Board found Petitioner had met its initial burden. *Id.*

Specifically, the Board was simply evaluating PO’s argument. PO argued that “overlapping light beams” may result in “an irregular shape” and not a voxel. POR, at 16-17. As the Board correctly noted, “Patent Owner argues that light beams that intersect in an irregular or unintentional manner would not necessarily form a voxel, ***but does not explicitly show that Fuhse262’s light beams do, in fact, intersect in an irregular manner.***” FWD, at 30 (emphasis added). Thus, PO mischaracterizes the Board’s finding on the insufficiency of its own evidence as a shift in the legal burden.

PO’s claim that the Board shifted the burden by noting that PO “does not explain what more is required of Fuhse262 to disclose the creation of voxels” is similarly misplaced. PO Req. at 12. Again, PO had argued that more was required to form a voxel than what Fuhse262 was capable of providing. *See* POR, at 17-18. The Board evaluated and rejected this argument because PO failed to identify what

more was required. FWD, at 30-32. Indeed, during the hearing, when asked what the '294 Patent disclosed that necessitated more than what Fuhse262 provides, PO conceded, "I have nothing to rely on." Hearing Tr., at 42:20-25.

In sum, the Board's finding that Fuhse262 discloses the claimed voxels is supported by substantial evidence, including the very ambient light disclosures that PO now attempts to use as a basis for its interference theory. Rather than identifying a failure of proof by Petitioner, PO simply seeks to re-argue factual disputes that the Board already resolved in view of a complete record.

**C. Substantial Evidence Supports the Board's Findings
Regarding Element [35b.5]**

First, the Request fails to identify material error in the Board's findings. PO Req. at 13-14. PO's challenge addresses only the claimed "spaced a distance apart," but the Request fails to allege material error in the Board's well-supported finding that "one [2-D image] being in the foreground and one [2-D image] in the background would teach or suggest to a person of ordinary skill in the art that the two images are in planes spaced apart from each other." FWD, at 43.

For this language, Petitioners supported by Dr. Hesselink's testimony identified, *inter alia*,⁴ disclosures in Fuhse262 (*see* ¶117) of a 2-D image and a 3-D

⁴ Petitioners relied on arguments of overlapping limitations to show Fuhse262 teaches two separate, 2-D images in planes. Pet. Reply at 14-16; FWD, at 40.

image in the “foreground” and “background” of each other, and explained that it would have been obvious to provide two 2-D images in different planes. Pet. Reply at 14-21; Pet. at 42-43. The Board agreed, and PO identifies no error in this finding. *See* FWD, at 41-43.

Instead, PO’s challenge relies on the untenable assertion that 2-D and 3-D images in the “foreground” and “background” are “at the same height.” PO Req. at 13-14. Beyond being a new and unresponsive argument, this claim is factually incorrect and stems from a misquotation of Fuhse262. While PO suggests that ¶117 of Fuhse262 supports its position, that paragraph actually specifies that only 2-D images have image points at the same height. *Id.*; Ex. 1006, ¶117. This description does not apply to 2D and 3D images collectively. Indeed, Fuhse262 repeatedly distinguishes between 3-D images having image points at different heights and 2-D images having image points fixed to the same height, as documented. Pet. Reply at 15-19; Pet. at 21-23, 35-37; EX1006, ¶¶15, 36, 68, 125-28.

Second, PO’s theory that the 2-D and 3-D images in ¶117 of Fuhse262 are “at the same height” is a new argument. PO Req. at 13-14. PO argued to the Board that “planes, like images, can be 2-D or they can be 3-D, i.e., they can have depth,” and that “a POSITA would understand that the 3-D motif and the 2-D motif [in ¶117 of Fuhse262] are both displayed *within the same three-dimensional plane*.” POR at 21-24 (emphasis in original). Thus, PO’s new argument that the 2-D and 3-D images

have the same height is not only new, but *opposite* to its argument before the Board that both images are in the same 3-D depth of multiple height values. PO Req. at 13-14; POR at 21-24.

Third, the Request fails to allege error in the Board's finding that its record argument "does not address Petitioner's contentions." FWD, at 42-43. The Board correctly found that PO *only* argued that the 2-D and 3-D images in ¶117 of Fuhse262 did not satisfy the claims, which does "not address Petitioner's contentions, which are based on two two-dimensional images." FWD, at 42-43; Pet. Reply at 17-19. This finding is unchallenged in the Request. *See* PO Req. at 13-14. Accordingly, even if the Director agreed with PO's unsupported and new argument, it would be moot because the Board's finding that the argument was only directed to 2-D and 3-D images (and are therefore unresponsive) would remain undisturbed.

VI. CONCLUSION

PO's Request for Director Review should be denied.

Dated: January 8, 2026

Respectfully submitted,

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CERTIFICATE OF COMPLIANCE

Pursuant to 37 C.F.R. § 42.24(d), the undersigned certifies that foregoing
Petitioners' Authorized Response to Director Review Request, exclusive of the
parts exempted as provided in 37 C.F.R. § 42.24(c), is less than or equal to 15 pages.

Dated: January 8, 2026

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CERTIFICATE OF SERVICE

The undersigned certifies that on January 8, 2026, a true and correct copy of the foregoing **Petitioners' Authorized Response to Director Review Request** was served by electronic mail on Patent Owner's counsel of record listed below, pursuant to its Mandatory Notices.

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