

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD.,
Petitioner,

v.

CM HK LIMITED,
Patent Owner

IPR2025-01071
Patent 11,698,687

PATENT OWNER'S REQUEST FOR DIRECTOR REVIEW

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I. INTRODUCTION

This case presents a straightforward institution error. The Board instituted review without resolving a dispositive claim-construction dispute, without requiring Petitioner to reconcile materially inconsistent positions taken across proceedings, and without enforcing the fundamental rule that expert testimony cannot be used to supply missing claim limitations in the prior art.

The disputed term, “predicted axial accelerations,” is central to patentability. In prior litigation, Petitioner argued that a person of ordinary skill would not have known whether the term referred to linear, centrifugal, gravitational, or combined accelerations. In this proceeding, Petitioner contends that “predicted axial accelerations” has a well-understood meaning to a POSA that encompasses all such accelerations. Petitioner has not adequately explained this shift, as required by *Revvo* and *Tesla*. That failure was compounded by the Board’s refusal to construe the term, despite the parties’ competing case-dispositive constructions. Finally, the Board allowed Petitioner to use their own English translation of a PCT Application (Bassompierre) although the US National Stage Application was before the Examiner and the Petitioner did not identify an Examiner error.

These errors had cascading consequences. Without construing “predicted axial accelerations,” the Board could not meaningfully assess whether the relied-

upon prior art, Bassompierre, disclosed the limitation under either party's offered construction. Instead, the Board permitted Petitioner to rely on expert testimony to supply that absent (and unconstrued) limitation to a reference which was already considered by the Examiner. Each error independently warrants vacatur.

II. PROCEDURAL HISTORY

A. CYWEE LITIGATION.

CM HK was spun out of CyWee Group Ltd. ("CyWee"). Ex. 2029 at 1. As part of that process, CyWee's entire patent portfolio was assigned to CM HK, except for two patents, U.S. Patents 8,441,438 (the "'438 Patent") and 8,552,978 (the "'978 Patent") that CyWee was asserting against Apple in *CyWee Group Ltd. v. Apple Inc.*, No. 4:14-cv-01853 (N.D. Cal. 4/22/2014). POPR, Paper 8 at 3.

CyWee also asserted these two patents against Samsung in the Eastern District of Texas in a case styled *CyWee Group Ltd. v. Samsung Electronics Co. Ltd., et al*, No. 2:17-cv-00140-WCB-RSP (E.D. Tex.) (the "CyWee Litigation"). The '438 and '972 Patents are related to U.S. Patent No. 11,698,687 (the "'687 Patent"). Paper 8 at 2-3.

B. CYWEE IPRs.

Multiple petitions for *inter partes* review ("IPR") were filed against the '438 and '978 Patents, but they were consolidated into three IPRs: IPR2018-01257, IPR2018-01258, and IPR2019-00143 (collectively the "IPRs"). Paper 8 at 3.

In the IPRs, all asserted claims of the '438 Patent were found unpatentable based on U.S. Patent No. 7,089,148 ("Bachmann"), in combination with U.S. Patent No. 8,267,785 ("Yamashita") and US 2004/0095317 A1 ("Zhang"). During prosecution, the '687 Patent explicitly overcame the art asserted in the IPRs, including multiple rejections based on Bachmann and Yamashita. Ex. 1004 at 123-135, 167-181, 396-411. Paper 8 at 4.

C. CO-PENDING DISTRICT COURT LITIGATION.

On September 18, 2024, eight and a half months before it filed this IPR, Petitioner filed a declaratory judgment in the Northern District of California seeking a declaration of noninfringement of claims 1 and 7 of U.S. Patent 10,852,846 (the "'846 Patent"), claims 1, 14, and 27 of the '687 Patent, claims 1 and 13 of U.S. Patent 10,275, 038 (the "'038 Patent"), and claims 1 and 10 of U.S. Patent 10,817,072 (the "'072 Patent") (the "California Litigation"). Ex. 2002 at ¶¶ 1, 72, 78, 84, 90. Paper 8 at 5.

On May 13, 2025, less than 3 weeks before filing this IPR, the parties filed a Joint Claim Construction and Prehearing Statement and identified seven terms for construction, including competing constructions for "predicted axial accelerations." Ex. 2007 at 2-3. Paper 8 at 5.

On May 15, 2025, the California court granted CM HK's motion to dismiss for lack of personal jurisdiction but also granted Samsung's request to conduct

jurisdictional discovery, which is ongoing. Ex. 2005 at 21.

III. LEGAL STANDARDS

The “Director may review any decision on institution under 35 U.S.C. 135, 314, or 324.” 37 CFR § 42.75(a). The Director may review institution 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;” and “both discretionary and merits-based issues may be raised, subject to the limitations (a)-(d) above.” Director Review Process § 2(B). The Director may review *sua sponte* or upon request from a party to the proceeding. 37 CFR § 42.75(b)-(c).

IV. ARGUMENT

The Board’s decision to institute review should be vacated for four independent reasons. First, the Board incorrectly concluded that Petitioner satisfied the requirements of *Revvo* and *Tesla* despite Petitioner’s failure to explain materially inconsistent positions regarding the scope of “predicted axial accelerations.” Second, the Board erred by declining to resolve a dispositive claim-construction dispute over that term. Third, the Board improperly permitted Petitioner to rely on expert testimony to “derive” the “predicted axial accelerations” claim limitation that is not disclosed by Bassompierre. Fourth, the Board and Director erred by not using discretionary denial and allowed Samsung to present their own English translation of art before the Examiner.

**A. PETITIONER FAILED TO EXPLAIN ITS CHANGED POSITION REGARDING
“PREDICTED AXIAL ACCELERATIONS.”**

In the CyWee Litigation, Petitioner argued that a POSA would not have known whether “predicted axial accelerations” referred to linear, centrifugal, gravitational, or combined accelerations. Here, Petitioner contends that “axial acceleration” has a well-understood meaning to a POSA and ordinarily encompasses linear, centrifugal, and gravitational accelerations. Paper 14. The Board erred when it held that the district court’s rejection of Petitioner’s prior indefiniteness arguments was “sufficient reason” to apply plain and ordinary meaning, even though this does not resolve the Petitioner’s conflicting positions. Decision at 19-22.

In the CyWee Litigation, Petitioner asserted three claim terms were indefinite, including: “comparing the second quaternion in relation to the measured angular velocities ω_x , ω_y , ω_z of the current state at current time T with the measured axial accelerations A_x , A_y , A_z and the predicted axial accelerations A_x' , A_y' , A_z' also at current time T” from claims 14 and 19 of the '438 Patent. Ex. 2025 at 4, 12, 14; Ex. 2026 at ¶ 42. Petitioner advanced three bases for indefiniteness: (1) “a POSA would have understood the term ‘axial accelerations’ could have multiple possible interpretation,” (2) “a POSA would have understood that it would be impossible to correctly decompose a given reading from an accelerometer in order to determine the individual values of each of the components of acceleration

induced by the forces identified above,” and (3) “a POSA would have understood that under any of the practical interpretations of axial accelerations, it would have been mathematically impossible to compare the angular velocities with axial accelerations.” Ex. 2026 at ¶¶ 65-68, 160, 162, 163, 171, 193-95.

Petitioner and its expert argued that a POSA would not have known whether “predicted axial accelerations” referred to linear, centrifugal, gravitational, or combined accelerations and that the ’438 Patent’s specification “provides no guidance regarding which interpretation is correct.” Ex. 2026 at ¶¶ 164–65; Ex. 2025 at 13. As the Board noted, the relevant portions of the ’438 Patent’s specification are identical to those of the ’687 Patent. Decision at 11. Under Petitioner’s CyWee position, a POSA would not have known what type(s) of acceleration were encompassed by “predicted axial accelerations.”

The district court rejected Petitioner’s indefiniteness arguments, holding that “axial acceleration” refers to acceleration vectors along three axes and found the specification sufficiently instructs a POSA how to compare the signal sets. Ex. 1021 at 14–17. However, the court did not specify which types of accelerations are included in the scope of the term “predicted axial accelerations” because that issue was not presented. *Id.* Thus, the district court’s ruling resolved indefiniteness but did not adopt—or consider—any affirmative construction of “predicted axial accelerations.”

By contrast, in this proceeding Petitioner asserts that “predicted axial accelerations” is so well understood that it does not need construction. Paper 14 at 4; Pet. at 22 (“Other than the ‘spatial reference frame’ term ... the Board need not construe any other claim terms ...”). At the same time, Petitioner expressly reserves the ability to advance alternate claim construction arguments in other venues and “is not ... waiving any arguments concerning claim scope ... that can only be raised in the district court.” *Id.* at 22 n.7.

Following *Revvo* and *Tesla*, the Board authorized Petitioner to “file a brief ... explaining why it has taken different positions regarding the construction of ‘predicted axial accelerations.’” Paper 13 at 3. In that brief, Petitioner claimed it “never argued that the term ‘predicted axial accelerations’ was indefinite in the CyWee case.” Paper 14 at 4-5. Instead, it argued that “it is mathematically impossible to compare axial acceleration with an angular velocity, which renders the claim indefinite.” *Id.* at 3. Petitioner then claimed that its “position, then, and now, was simply that the term ‘axial acceleration’ (whether predicted or measured) has a meaning well-understood by those of ordinary skill, *i.e.*, the term ordinarily encompasses all three types of acceleration,” *i.e.*, “linear, centrifugal, and gravitational.” *Id.* at 3-4.

The Board credited Petitioner’s explanation and held that the district court’s rejection of Petitioner’s indefiniteness arguments was sufficient reason under

Revvo to justify Petitioner’s contention that “predicted axial accelerations” be given its plain meaning here, “even if it had previously argued that the term was indefinite.” Decision at 21-22.

The district court’s holding does not resolve the inconsistency between Petitioner’s two positions regarding the scope of “predicted axial accelerations.” In the CyWee Litigation, Petitioner argued that a POSA “would not have known” whether “predicted axial accelerations” referred to linear, centrifugal, gravitational, or combined accelerations. Ex. 2025 at 12. Here, Petitioner asserts the opposite—that “axial acceleration (whether predicted or measured) has a meaning well understood by those of ordinary skill” and “ordinarily encompasses three types of acceleration.” Paper 14 at 4. Petitioner has not explained this change in position. Nor does the district court’s ruling resolve the inconsistency, because the court did not adopt, or consider, any affirmative construction of “predicted axial accelerations.” Ex. 1021 at 15. The term’s scope remains unresolved.

Allowing Petitioner to advance materially different positions regarding claim scope across proceedings without adequate explanation undermines the PTO’s goal of “providing greater predictability and certainty in the patent system.” *Revvo Techs.*, IPR2025-00632, Paper 20 at 4–5 (quoting 83 Fed. Reg. at 51,342–43). “The Board’s claim construction rules are designed to ensure that the Board

correctly construes claim terms to minimize inconsistency in claim construction between forums.” *Id.* at 4.

Revvo requires a petitioner to “explain sufficiently why the different positions are warranted” when it advances inconsistent constructions across proceedings. *Revvo Techs.*, IPR2025-00632, Paper 20 at 5. Petitioner did not do so here. The CyWee district court did not “decline to adopt” a prior construction of “predicted axial accelerations,” because no such construction was presented or adopted. Ex. 1021 at 15. The Board erred in treating the district court’s indefiniteness ruling as sufficient justification for Petitioner’s shifting positions. Decision at 21-22.

Accordingly, the Institution Decision should be vacated.

B. BOARD ERRED BY FAILING TO CONSTRUE “PREDICTED AXIAL ACCELERATIONS.”

The Board erred as a matter of law by declining to construe the disputed claim term “predicted axial accelerations.” Although the Board acknowledged that the parties proposed materially different constructions, it concluded that “the threshold question of institution can be decided without expressly construing ‘predicted axial accelerations.’” Decision at 15–17. That conclusion was erroneous because the scope of this term is central to evaluating whether the relied-upon prior art discloses the limitation.

The Board recognized the parties' competing constructions. Petitioner asserts that "the term 'axial acceleration' (whether predicted or measured) ... ordinarily encompasses three types of acceleration, i.e., "linear, centrifugal, and gravitational." Decision at 15-16 (citing Paper 14 at 3-4). Patent Owner, by contrast, contends that "predicted axial accelerations" are "gravitational accelerations along the electronic device's axes at time T, derived from the current quaternion." Decision at 16.

The Board erred at least because the Petition fails under either construction. If Petitioner's proposed construction is adopted, it fails because, as Petitioner concedes, Bassompierre only "predicts" gravity; not the linear and centrifugal acceleration: "As Dr. Sarrafzadeh explains, this derivation of the predicted axial acceleration in quaternion form is done using known quaternion relations with a gravity frame of reference and known quaternion mathematics." Pet. at 41. Bassompierre's gravity-only prediction does not disclose "predicted axial accelerations" that "encompass three types of acceleration," as Petitioner's proposed construction requires.

Conversely, if Patent Owner's proposed construction were adopted, the Petition likewise fails because the "predicted axial accelerations" identified in Bassompierre are derived exclusively from Euler angles, not quaternions. Pet. at 38-41. As discussed below, Bassompierre does not contain any disclosure of how to

derive “predicted axial accelerations” from a quaternion. *See generally* Ex. 1006. Instead, Petitioner fills this gap by having its expert “derive the predicted acceleration of Bassompierre in quaternion form ... using quaternion rotation,” a calculation not disclosed in Bassompierre itself. Pet. at 41. Paper 8 at 29.

Because the scope of “predicted axial accelerations” is material to patentability and dispositive under either proposed construction, the Board was required to construe the term. Its failure to do so renders the institution decision legally erroneous and requires vacatur.

C. THE PETITION IMPROPERLY RELIES ON EXPERT TESTIMONY TO SUPPLY MISSING CLAIM LIMITATIONS.

Bassompierre does not disclose any formulas for calculating “predicted axial accelerations” using quaternions, and the Petition impermissibly relies on expert testimony to supply missing claim limitations. At institution, however, a petitioner must demonstrate that the relied-upon prior art itself discloses the challenged limitations; expert testimony may explain what a reference teaches, but it may not be used to fill gaps in the disclosure. Ex. 2028.

To map the claims onto Bassompierre, Petitioner relies on an embodiment of Bassompierre that is entirely based on Euler angles and asserts that it is obvious to wholesale convert every step and equation involving Euler angles into quaternions. This is shown below in the equation annotated by Petitioner:

$$\hat{x}_k = \begin{pmatrix} \theta_{k-1} \\ \psi_{k-1} \end{pmatrix} + T_e \left(\alpha \sqrt{\omega_y^2 + \omega_z^2} \right) + K_k \begin{pmatrix} \alpha_{x,k} \\ \alpha_{y,k} \\ \alpha_{z,k} \end{pmatrix} - \begin{pmatrix} -\sin \theta_k^- \\ \cos \theta_k^- \cdot \sin \psi_k^- \\ \cos \theta_k^- \cdot \cos \psi_k^- \end{pmatrix}$$

current quaternion (time T) (Ψ_k^-, θ_k^-)

previous quaternion (T-1)
measured angular velocities (time T)
measured acceleration (time T)
predicted acceleration (time T)

Ex. 1002 at ¶ 53.

Petitioner attempts to justify its quaternion conversions by asserting that Bassompierre “teaches a POSA to substitute quaternions for Euler angles,” citing language from Bassompierre’s “first variant.” Pet. at 39. But that assertion misreads the reference. The first variant only adopts quaternions when modeling states and their rotations (i.e., the torsion angles θ and ψ are replaced with a quaternion formulation of the same torsion) and otherwise relies on Euler angles. Ex. 1006 at 20:10–21:7. In Bassompierre’s first variant, the measurement vector is identified as the accelerometer outputs, $y = [a_x, a_y, a_z]$, which is not quaternion. *Id.* at 21:2-3. Bassompierre provides no quaternion-based equations for predicting accelerometer measurements and no disclosure of how to derive predicted axial accelerations from a quaternion state. *Id.* at 20–21. The rationale taught by Bassompierre for converting the state model—avoiding sine and cosine computations—does not apply to the measurement model, because Bassompierre defines pitch and roll (θ and ψ) as state variables. Pet. at 17. Bassompierre does not describe, teach, or

suggest any analogous benefit for replacing Euler angles with quaternions in the measurement model or measurement predictions. Ex. 1006 at 20-21.

Bassompierre consistently treats quaternions as part of the state model only. For example, Bassompierre discloses embodiments that use quaternions in the state model while retaining Euler angles in the measurement model.

state model is of the form: **measurement model** is of one of the following forms:

$$\dot{q} = \frac{1}{2} \begin{bmatrix} q_0 \\ q_1 \\ q_2 \\ q_3 \end{bmatrix} \otimes \begin{bmatrix} 0 \\ \omega_x \\ \omega_y \\ \omega_z \end{bmatrix}; \quad \begin{cases} a_x = -\sin \theta \cdot \cos \psi \\ a_y = -\sin \psi \\ a_z = \cos \theta \cdot \cos \psi \\ \omega_y = \sin \theta \cdot \sin \psi \cdot \omega_u + \cos \psi \cdot \omega_v + \cos \theta \cdot \sin \psi \cdot \omega_w \\ \omega_z = \sin \theta \cdot \cos \psi \cdot \omega_u - \sin \psi \cdot \omega_v + \cos \theta \cdot \cos \psi \cdot \omega_w \end{cases}$$

Ex. 1006 at 6:5–8, 7:5–10, 20:20-24, 23:5-12.

In other words, “[a]lthough Bassompierre mentions quaternions could be used ‘to avoid computations of sines and cosines’, it does not explain how an extended Kalman filter would implement quaternions... The reference provides no quaternion update formula, and no quaternion error model.” Paper 8 at 10-11.

Petitioner’s expert fills this gap by deriving predicted acceleration formulas from general knowledge, not from Bassompierre. Ex. 1002 ¶¶ 72–75 (citing Kim, Ex. 1007). This is hindsight reconstruction, not explanation. Paper 8 at 29.

Moreover, Petitioner argued against the idea that a POSA could simply swap out Euler angles for quaternions in its arguments against priority. Specifically, Petitioner argued against priority for the ’687 Patent because its provisional

application only disclosed Euler-angle based sensor fusion algorithms, “not quaternions.” Pet. at 68-70. This concedes that Euler angles and quaternions are not interchangeable by general knowledge, contradicting Petitioner’s invalidity theory. Paper 8 at 9-10.

In short, the ’687 patent describes a method where the orientation state is represented and propagated using quaternions, and predicted axial accelerations are calculated *directly* from the quaternion state for comparison with measured sensor outputs. Bassompierre, by contrast, uses quaternions only for the state model in its “first variant,” while the measurement model—including predicted accelerations—remains in Euler angles. Bassompierre does not disclose or suggest calculating predicted accelerations from a quaternion state or accelerations in quaternion form. Petitioner’s expert supplies those missing teachings wholesale. Reliance on such expert-driven derivation at institution is improper, and the institution decision should be vacated.

D. THE PETITION RELIES ON ART PREVIOUSLY BEFORE THE OFFICE WITHOUT IDENTIFYING MATERIAL ERROR.

The version of Bassompierre upon which the Petitioner is relying is their own English language translation of WO2009/156499 (Ex. 1006), rather than US2011/0199298 (Ex. 2015), which is the publication of its US National Stage Entry Application considered by the Examiner during prosecution from an IDS presented by the Applicant and during a search. Ex. 1004 at 123 and 331. Petitioner

has not identified any material difference between its translation and US2011/0199298, has not provided any explanation for relying on its own translation, nor presented any material error on the part of the Examiner. Patent Owner maintains that discretionary denial is warranted under *Advanced Bionics*. Paper 7 at 9-14.

V. CONCLUSION

The institution decision rests on a series of compounding legal errors. The Board excused Petitioner's unexplained shift from asserting that the scope of "predicted axial accelerations" was unknowable to asserting that it is well understood, contrary to *Revvo* and *Tesla*. The Board then declined to construe that disputed term even though its scope is material and dispositive. Finally, the Board permitted Petitioner to rely on expert testimony to supply the missing "predicting axial accelerations" claim limitation.

These errors undermine the predictability and consistency that the PTO's claim-construction framework is designed to ensure. Institution cannot rest on unresolved claim scope, unexplained shifts in claim construction positions, or expert testimony to supply limitations missing from prior art considered during prosecution. For these reasons, Patent Owner respectfully requests that the Director vacate the institution decision.

Respectfully Submitted,

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CERTIFICATE OF SERVICE 37 C.F.R. § 42.6(e))

The undersigned hereby certifies that the above document was served
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