

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

COOLER MASTER CO., LTD.,
Petitioner,

v.

ASETEK DANMARK A/S,
Patent Owner.

Case IPR2024-01497
Patent No. 9,733,681

PATENT OWNER'S PRELIMINARY RESPONSE

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EXHIBIT LIST

Exhibit	Description
2001	Petition in IPR2020-00524 challenging claims of U.S. Patent No. 9,733,681.
2002	Updated Mandatory Notice filed in IPR2020-00524.

I. INTRODUCTION

The Board should exercise its discretion to deny institution under 35 U.S.C. § 325(d) because the same prior art and substantially the same arguments advanced in the Petition were previously presented to 1) the Board in IPR2020-00524 challenging the same patent as here (U.S. Patent No. 9,733,681, “the ’681 patent”); 2) the Patent Office during prosecution of the ’681 patent, and 3) to the Patent Office during *inter partes* reexamination of a related patent (Reexamination Control No. 95/002,386).

The Petition is substantially similar to the petition filed in IPR2020-00524 (“the ’524 IPR”), which found the challenged claims 1 and 4 of the ’681 patent not unpatentable based on Duan,¹ Shin,² and Cheon.³ The present Petition adds a secondary reference (U.S. Patent Pub. No. 2006/0185829, “Duan-I”)⁴ and switches Cheon with Nakano (U.S. Patent No. 6,915,653) in an attempt to distinguish the Petition from the ’524 IPR. But Duan-I was previously considered by the Patent Office during prosecution of the ’681 patent, which Petitioner does not disclose in the Petition. Furthermore, the addition of Duan-I to the obviousness combination

¹ U.S. Patent Pub. No. 2006/0185830 (“Duan”).

² Japanese Published Patent Application No. 2002-151638 (“Shin”).

³ U.S. Patent No. 5,731,954 (“Cheon”).

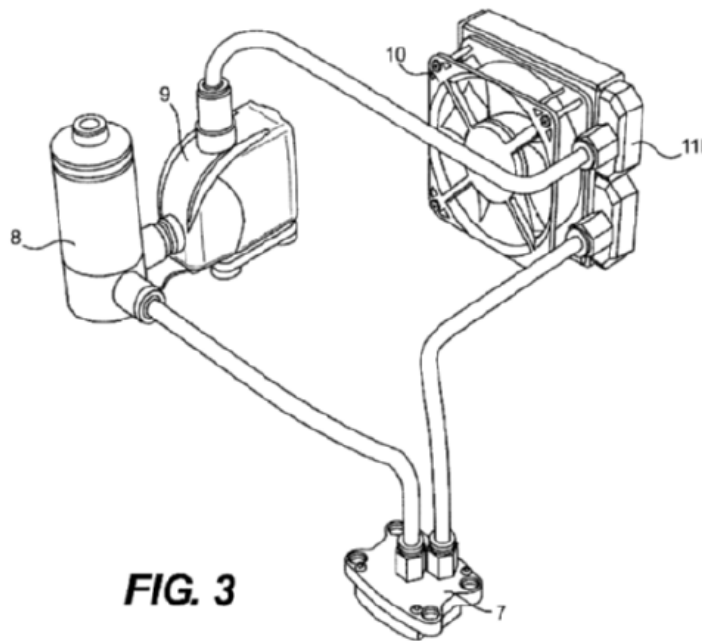
⁴ Hereinafter, the issued patent corresponding to Duan-I, i.e., U.S. Patent No. 7,325,591, is also referred to as Duan-I because the patent publication is materially the same as the issued patent.

previously presented in the '524 IPR does not address the deficiencies of Duan identified by the Board in the final written decision of the '524 IPR. The replacement of Cheon with Nakano also does not meaningfully address the Board's findings and conclusions in the '524 IPR decision. In other words, the art and arguments raised in the Petition are largely the same as those in the '524 IPR. Under the *Advanced Bionics* framework, the Board should defer to the findings in the '524 IPR and deny institution because Petitioner has not meaningfully addressed the Board's decision in the '524 IPR.

II. THE '681 PATENT

Computers (and particularly their central processing units, or "CPUs") generate heat during operation, which must be dissipated efficiently and effectively for computers to operate reliably. As technology advances and computers become faster and more powerful, they generate increasing amounts of heat that must be managed. Ex. 1001, 1:17-33. Various heat dissipation methods, including air cooling and liquid cooling, are used to manage heat in computer systems. While air cooling systems are cheaper and easier to install, they are not as efficient as liquid cooling systems at heat removal. *Id.*, 1:34-41. Prior art liquid cooling systems were bulky and posed significant risk of leakage from having several components (such as a heat exchanger, a liquid reservoir, a pump, and a heat radiator) coupled together using tubes. *Id.*, 1:39-49. Such a configuration is illustrated in prior Art Figure 3 of the

'681 patent (depicted below), showing a prior art heat exchanger 7, a prior art liquid reservoir 8, a prior art pump 9, and a prior art heat radiator 11 connected in a closed loop using tubes.



Ex. 1001, Fig. 3

The liquid cooling technology described and claimed in the '681 patent addressed this leakage problem, among others, and resulted in a highly efficient yet compact (narrow profile) liquid cooling device. *See id.*, 1:53-63. Among other things, Asetek's patented technology is a significant advancement from the modular approach of prior art liquid cooling devices. *See id.* Figures 17 and 20 of the '681 patent represent embodiments of the claimed invention. As evident from these figures and the patent claims, Asetek's invention has, among other features, a pump

unit that combines a pump, a dual-chambered “reservoir,” and a “heat-exchanging interface” (i.e., a cold plate) into a single component. *Id.*, 15:49-53, 21:48-57, 22:64-23:26. The “reservoir” in Asetek’s patented design is divided into two chambers, referred to as the “pump chamber” and “thermal exchange chamber” in the ’681 patent claims. *See, e.g., id.*, claim 1, 22:64-23:26. The dual chambers are vertically spaced apart and fluidly coupled together to allow for heat dissipation from the CPU via the “heat-exchanging interface,” i.e., the boundary wall of the “thermal exchange chamber” which is placed in thermal contact with the CPU. *See id.* The unique dual-chambered “reservoir” concept has made manufacturing of liquid cooling products simpler and less costly, and has also made installation of liquid cooling products by users easier as compared to installation of the kit-based modular liquid cooling components (shown in prior art Figure 3 of the ’681 patent). *See id.*, 1:39-63.

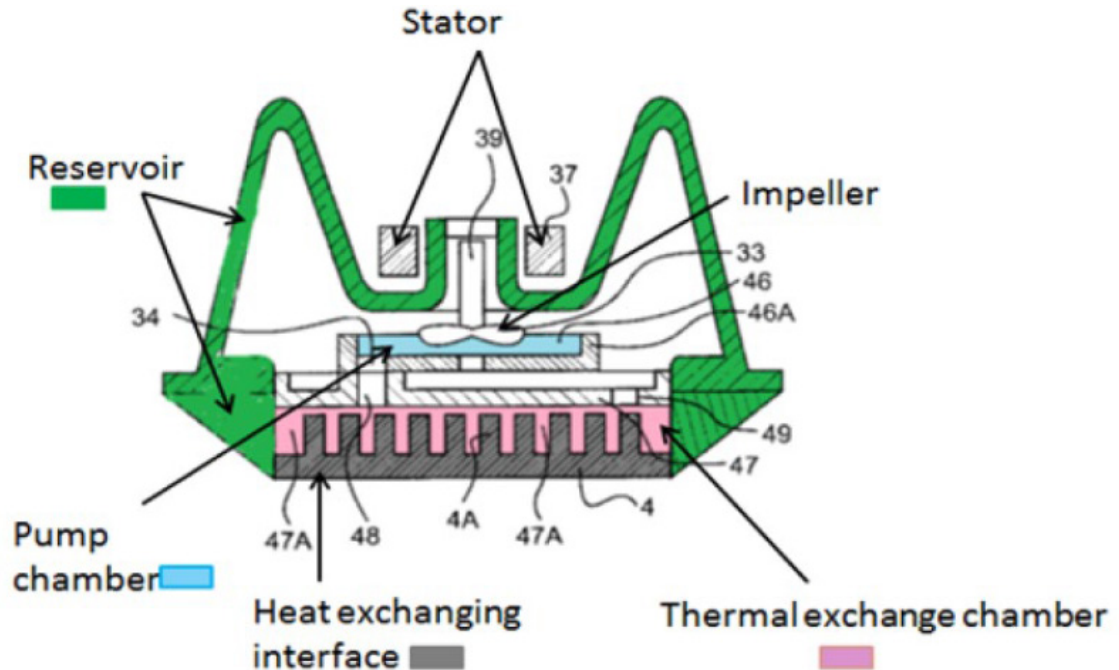


Figure 20

Ex. 1001, Fig. 20 (annotated)

The '681 patent further describes and claims a very specific configuration for the dual-chambered "reservoir," where cooling liquid enters the "pump chamber" through an opening positioned below the center of an impeller housed in the "pump chamber." Ex. 1001, claim 1. For example, in the embodiment shown in Figure 17 and Figure 20 (annotated above), cooling liquid enters pump chamber 46 through an inlet in impeller cover 46A, the inlet being located below the rotational center of an impeller 33 housed in pump chamber 46. *See* Ex. 1001, 22:64-23:5, Figs. 17 and 20. Cooling liquid exits pump chamber 46 through an outlet 34 provided in impeller cover 46A, the outlet being positioned tangential to the circumference of impeller

33. *See* Ex. 1001, 22:64-23:5, Figs. 17 and 20. Thermal exchange chamber 47A is defined between pump chamber 46 and heat exchanging interface 4 in such a way that thermal exchange chamber 47A is positioned below pump chamber 46 and the center of impeller 33. Ex. 1001, Figs. 17 and 20.

III. RELEVANT FACTUAL BACKGROUND

A. Claims 1 and 4 of the '681 Patent Were Found Not Obvious Over Duan in the '524 IPR

The '524 IPR was litigated by some of the same attorneys who have filed this Petition on behalf of a different petitioner. *Compare* Ex. 2002, *with* Pet., 6. In the '524 IPR, petitioner CoolIT, Inc. argued that claims 1 and 4 were rendered obvious by Duan, Shin, and Cheon. Ex. 1002, 21. The Board disagreed with CoolIT and found that it “*has not proven* by a preponderance of evidence that the combination of Duan, Shin, and Cheon renders claims 1 and 4 unpatentable as obvious.” *Id.* (emphasis in original).

Specifically, the '524 IPR petition relied on Duan for the limitations “a thermal exchange chamber formed *below* [a] pump chamber” and “an inlet positioned *below* the center of the impeller [included in the pump chamber]” of claim 1. Ex. 1001, 28:19-33 (claim 1) (emphases added); Ex. 1002, 26, 27. The petition relied on Shin and Cheon only for their discussions of “fan” and “control system.” Ex. 1013, 20. But in Duan, when the thermal exchange chamber is below the pump chamber, the inlet into the pump chamber (liquid inlet 23) is *not* positioned below

the center of the impeller, but is instead positioned horizontally to the side of the impeller, as shown below. Ex. 1013, 16. As a result, Duan cannot simultaneously satisfy both the limitations “a thermal exchange chamber formed below the pump chamber” and “an inlet positioned below the center of the impeller.” *See id.*, 17-20.

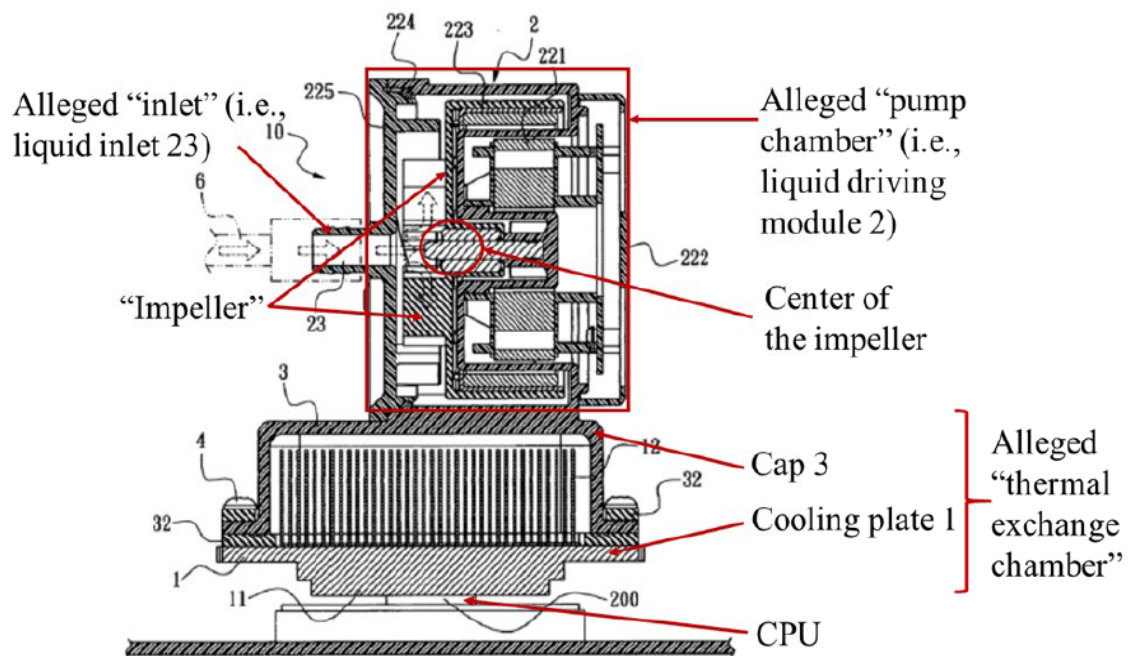


FIG. 7

Id., 17 (Duan, Fig. 7 (annotated))

The Board agreed with Patent Owner. Ex. 1002, 26, 29. As the Board explained, “claim 1 requires a single frame of reference throughout the claim,” and both parties’ experts agreed that “when a consistent frame of reference is applied, Duan cannot teach both of these limitations.” Ex. 1002, 29. Accordingly, the Board found that claim 1 is not obvious over Duan, Shin, and Cheon. *Id.*

B. Duan-I was Considered by the Examiner During Prosecution of the '681 Patent

Petitioner misleadingly states that Duan-I was not “cited” during prosecution of the '681 patent. Pet., 20. But the patent that issued from Duan-I, U.S. Patent No. 7,325,591, was indeed presented to the Patent Office in an IDS and the patent examiner noted that the '591 patent was considered. Ex. 1006, PDF p. 275 (showing that the '591 patent was identified in an IDS and the patent examiner noted “ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH”); *see also* Ex. 1001, 2 (listing U.S. 7,325,591 in the “References Cited” portion of the patent).

C. Duan-I was Asserted by the Requester and Considered by the Patent Office in an *Inter Partes* Reexamination of a Related Patent

The Petition asserts that U.S. Patent No. 8,245,764 (“the '764 patent”) is “closely related” to the '681 patent and “shares a number of similarities” with the '681 patent claims. Pet., 3. The Petition, however, barely addresses the *inter partes* reexamination of the '764 patent that considered Duan-I. *See* Pet., 20. In contrast to Petitioner’s limited acknowledgment of Duan-I’s consideration during the reexamination, the Reexamination Request extensively asserted that the '764 patent claims were either anticipated by Duan-I and/or rendered obvious by Duan-I alone or in combination with Hamman or Cheon. Ex. 1011, PDF p. 1638 (identifying Duan-I as relevant prior art); PDF pp. 1899-1903 (discussing alleged anticipation and obviousness based on Duan-I); PDF pp. 1966-2016 (claim charts mapping

Duan-I against the claims of the '764 patent). The Patent Office, however, found that the '764 patent claims were not unpatentable based on Duan-I's disclosure, either alone or in view of other modifying references. *Id.*, PDF p. 1833.

D. The '764 Patent IPR is Not Significant to this Petition

The Petition emphasizes that the claims of the related '764 patent were found obvious over the Duan-Duan I combination in an IPR involving the '764 patent ("the '764 Patent IPR"). Pet., 3, 14-15, 21. But the findings and conclusions of the '764 Patent IPR are minimally relevant to this Petition because the '764 patent claims do not include the limitations "a thermal exchange chamber formed below the pump chamber" and "an inlet positioned below the center of the impeller" present in the '681 patent claims, which are critical to this IPR.

Moreover, Patent Owner did not contest the petition in the '764 Patent IPR and did not file a patent owner response. Ex. 1004, 14, 16-17. Accordingly, the Board "adopt[ed] the Petition's unchallenged contentions as [the Board's] analysis." *Id.* Patent Owner did not contest the petition in the '764 Patent IPR because the '764 patent will expire in May 2025, and so Patent Owner chose not to invest limited legal funds into upholding the patentability of soon-to-expire patent claims. The '681 patent, however, has an expiration date in May 2028.

IV. INSTITUTION SHOULD BE DENIED UNDER 35 U.S.C. § 325(d)

The Board has discretion to deny review when “the same or substantially the same prior art or arguments previously were presented to the Office.” 35 U.S.C. § 325(d). Specifically, § 325(d) provides that the Director may elect not to institute trial if the challenge to the patent is based on matters previously presented to the Office. *Advanced Bionics, LLC v. MED-EL Elektromedizinische Geräte GmbH*, IPR2019-01469, Paper 6, 7-9 (P.T.A.B. Feb. 13, 2020) (precedential) (“*Advanced Bionics*”). When evaluating matters under § 325(d), the Board uses the following two-part framework outlined in *Advanced Bionics*: (1) determining whether the same or substantially the same art previously was presented to the Office, or whether the same or substantially the same arguments previously were presented to the Office; and (2) if either condition of the first part of the framework is satisfied, determining whether the petitioner has demonstrated that the Office erred in a manner material to the patentability of the challenged claims. *Id.*, 8.

In applying this two-part framework, the Board considers the following non-exclusive factors:

- (a) the similarities and material differences between the asserted art and the prior art involved during examination;
- (b) the cumulative nature of the asserted art and the prior art evaluated during examination;

- (c) the extent to which the asserted art was evaluated during examination, including whether the prior art was the basis for rejection;
- (d) the extent of the overlap between the arguments made during examination and the manner in which Petitioner relies on the prior art or Patent Owner distinguishes the prior art;
- (e) whether Petitioner has pointed out sufficiently how the Examiner erred in its evaluation of the asserted prior art; and
- (f) the extent to which additional evidence and facts presented in the Petition warrant reconsideration of the prior art or arguments.

Becton, Dickinson & Co. v. B. Braun Melsungen AG, IPR2017-01586, Paper 8, 17-18 (P.T.A.B. Dec. 15, 2017) (precedential as to § III.C.5, first paragraph). If, after review of factors (a), (b), and (d), the Board determines that the same or substantially the same art or arguments were previously presented to the Office, then factors (c), (e), and (f), which relate to whether the petitioner demonstrates that the Office erred in a manner material to the patentability of the challenged claims, is considered in determining whether trial should be instituted. *Advanced Bionics*, 10.

Here, the Board should exercise its discretion under §325(d) to deny institution because the same prior art and arguments were previously considered by the Board and the Patent Office, and the Petition fails to present additional evidence

and facts that warrant reconsideration of the prior decisions by the Board and the Patent Office.

A. Part One of The *Advanced Bionics* Framework

1. *Becton, Dickinson* Factors (a) and (b): The Prior Art Cited by Petitioner is the Same Prior Art Previously Considered by the Patent Office and the Board

The primary reference asserted in the Petition, Duan, was previously asserted against the '681 patent in the '524 IPR and thoroughly considered by the Board. *See supra* Section III.A. Patent Owner successfully argued that Duan did not disclose the limitations “a thermal exchange chamber formed below the pump chamber” and “an inlet positioned below the center of the impeller [included in the pump chamber]” of claim 1. *Id.*; Ex. 1002, 26, 27. Claims 1 and 4 of the '681 patent, which were challenged in the '524 IPR, were found not unpatentable based on Duan in combination with Shin and Cheon. Ex. 1002, 29, 30. Accordingly, it is evident that the Board substantively considered Duan and found that it does not meet the requirements of independent claim 1 (and claims 2-7 that depend therefrom).

The combination of Duan-I with Duan does not cure the deficiencies of Duan identified by the Board in the '524 IPR. *See infra* Sections IV.B and V. But more importantly, Duan-I was also considered by the Patent Office during prosecution of the '681 patent. *See supra* Section III.B. The Petition failed to acknowledge that Duan-I was considered during prosecution.

Duan-I was also considered in an *inter partes* reexamination of the related '764 patent. *See supra* Section III.C. The Reexamination Request asserted that the '764 patent claims were either anticipated by Duan-I, or rendered obvious by Duan-I alone or in combination with Hamman or Cheon. Ex. 1011, PDF pp. 1899-1903 (discussing alleged anticipation and obviousness based on Duan-I); PDF pp. 1966-2016 (claim charts mapping Duan-I to the claims of the '764 patent). The Patent Office, however, found that the '764 patent claims were not unpatentable based on Duan-I, either alone or in view of other modifying references. *Id.*, PDF p. 1833.

2. *Becton, Dickinson* Factor (d): Substantially the Same Arguments Were Previously Considered by The Patent Office

Petitioner applies Duan in substantially the same manner as in the '524 IPR. *Compare* Pet. 29-83, *with* Ex. 2001, 22-60. The main exception is that Petitioner argues here that “a POSITA would have been motivated to rotate Duan’s liquid driving module 2 (pump) counterclockwise by 90 degrees in Figure 7 to reduce the system’s overall height, in view of Duan-I.” Pet., 45. But rotation of Duan’s liquid driving module still does not meet the limitation “an inlet positioned below the center of the impeller,” which was found to be missing in Duan in the '524 IPR. *See infra* Section V.A.

B. Part Two of the Advanced Bionics Framework

1. *Becton, Dickinson* Factor (c): Duan and Duan-I Were Substantially Evaluated During the '524 IPR and the reexamination, respectively.

Duan was the primary reference asserted in the '524 IPR. Thus, it was substantially evaluated by the Board and the challenged claims were found unpatentable. *See generally* Ex. 1002.

In the *inter partes* reexamination of the related '764 patent, which allegedly “shares a number of similarities” with the '681 patent claims, Duan-I was the basis of three invalidity grounds proposed by the requester. *See supra* Section III.C; Pet., 3. The Patent Office analyzed Duan-I thoroughly and rejected the proposed unpatentability grounds based on Duan-I. Ex. 1011, PDF p. 1833. In particular, the Patent Office noted that “[a]ll of the claims require that there be a pump chamber vertically spaced from a thermal exchange chamber As seen in Figures 3 and 7 the thermal [exchange] chamber surrounds the pump chamber and cannot therefore, be vertically spaced from it.” *Id.* Because the '681 patent claims also require the pump chamber and the thermal exchange chamber to be vertically spaced apart, the Patent Office’s analysis of Duan-I is pertinent to the application of Duan-I in this IPR Petition.

2. *Becton, Dickinson* Factors (e) and (f): Petitioner Failed to Sufficiently Point Out How the Board or Patent Office Erred or Why the Evidence and Facts of the Petition Warrant Reconsideration.

Petitioner has not explained how the Patent Office erred in its analysis of Duan-I during the reexamination of the '764 patent. For example, Petitioner failed to identify any specific teaching in Duan-I that the Patent Office misapprehended in finding that the pump chamber and the thermal exchange chamber are not vertically spaced apart.

Nor has Petitioner provided any plausible evidence or facts that warrant reconsideration of the Board's determination in the '524 IPR. The Petition alleges that one skilled in the art would have been motivated to rotate the pump chamber of Duan by 90° in view of Duan-I "given the known 'compact trend of computer[s].'" Pet., 45. But the alleged "compact trend" does not justify rotating the pump (liquid cooling module 2) or making other modifications without any indication in Duan that the length of the pump is meaningfully greater than its diameter. Because patent figures are not drawn to scale and there is no teaching in either Duan or Duan-I that rotation and/or vertical placement of the pump would reduce the overall height, Petitioner's "compact trend" argument appears to have been made using impermissible hindsight and the '681 patent claims as a roadmap to reach the claimed invention. *Otsuka Pharmaceutical Co., Ltd. v. Sandoz, Inc.*, 678 F.3d 1280, 1296 (Fed. Cir. 2012) ("The inventor's own path itself never leads to a conclusion of obviousness; that is hindsight. What matters is the path that the person of ordinary skill in the art would have followed, as evidenced by the pertinent prior art."); *KSR*

Int'l Co. v. Teleflex Inc., 550 U.S. 398, 421 (2007). (cautioning against “the distortion caused by hindsight bias” in an obviousness analysis). Given Petitioner’s conclusory and impermissible hindsight-based motivation-to-modify argument, the Board’s prior determination in the ’524 IPR does not warrant reconsideration.

Because Petitioner has not sufficiently demonstrated how the Board and the Patent Office erred in their evaluation of Duan and Duan-I in a manner material to patentability of the challenged claims, part two of the *Advanced Bionics* framework supports denial of institution. *See Advanced Bionics*, 8.

V. THE BOARD SHOULD DENY INSTITUTION BECAUSE THE COMBINATION OF DUAN AND DUAN-I FAILS TO DISCLOSE OR SUGGEST SEVERAL LIMITATIONS OF INDEPENDENT CLAIM 1

A. The Combination of Duan and Duan-I Fails to Disclose 1) an Inlet Positioned Below the Center of the Impeller to Direct Cooling Liquid into the Pump Chamber, and 2) a First Passage Connecting an Outlet at the Outer Circumference of the Pump Chamber to the Thermal Exchange Chamber

As the Board previously found in the ’524 IPR, Duan does not have an inlet positioned below the center of the impeller and a thermal exchange chamber positioned below the pump chamber. Ex. 1002, 29. Duan-I also does not disclose an inlet to the pump chamber positioned below the center of the impeller. *See* Ex. 1008, Figs., 7 and 8. Nor does Duan-I have an outlet at the outer circumference of the pump chamber and a first passage connecting the outlet to the thermal exchange chamber. *See id.* Rather, *cooling liquid enters Duan-I’s pump chamber through an inlet 11*

positioned at the side of the pump chamber/impeller, exits the pump chamber through an opening at the center of the impeller, and flows directly into the thermal exchange chamber (without flowing through a passage). Ex. 1008, Figs., 6, 7, 8 (showing cooling liquid entering the pump chamber at the side and entering the thermal exchange chamber through an opening at the center of the impeller). Indeed, Petitioner's fabricated drawings of "Duan + Duan-I" in the Petition do not appear in either Duan or Duan-I; rather, Petitioner inserts and rearranges passages not disclosed by either reference without proper rationale or explanation. *See e.g.*, Pet., 27, 52, 55 (showing the assembled image of "Duan + Duan-I" having the pump chamber of Duan and thermal exchange chamber of Duan-I and a plurality of made-up passages to connect the two chambers).

Petitioner has not provided any meaningful justification for modifying Duan and Duan-I to direct cooling liquid into the pump chamber at the center of the impeller through a made-up passage wedged in between Duan's pump chamber and Duan-I's thermal exchange chamber, which neither reference teaches. *See* Pet., 73. Petitioner has also not provided any explanation for allowing cooling liquid to exit the pump chamber at the outer circumference of the pump chamber and to enter the thermal exchange chamber through a fabricated side passage (instead of entering the thermal exchange chamber through an opening at the center of impeller, as taught by Duan-I). *Compare* Pet., 76, with Ex. 1008, Figs., 7 and 8.

Thus, contrary to Petitioner's misleading drawings, neither Duan nor Duan-I discloses having an inlet positioned below the center of the impeller and a first passage connecting an outlet at the outer circumference of the pump chamber to the thermal exchange chamber.

B. The Combination of Duan and Duan-I Fails to Disclose a Second Passage Positioned at Either End of the Thermal Exchange Chamber for Directing Cooling Liquid Out of That Chamber

According to the Petition, Duan modified in view of Duan-I has the thermal exchange chamber of Duan-I. *See* Pet., 46 (showing “Duan + Duan-I” having the thermal exchange chamber of Duan-I); *see also id.*, 83. But Duan-I's thermal exchange chamber does not include “at least one second passage configured to direct the cooling liquid out of the thermal exchange chamber, the at least one second passage is positioned at either the first end or the second end of the thermal exchange chamber,” as required by claim 1. In Duan-I, cooling liquid from the thermal exchange chamber is directed upwards into compartment 14 surrounding the pump chamber, from where cooling liquid flows to the heat radiator through outlet 12. *See* Ex. 1008, Fig. 6, ¶¶ [0020], [0025], [0028]. Petitioner's fabricated drawing of “Duan + Duan-I” shows a second passage through Duan-I's thermal exchange chamber that is not actually present in Duan-I. *See* Pet., 46, 83. Accordingly, the Petition fails to show how Duan modified in view of Duan-I discloses or suggests the limitation “at least one second passage configured to direct the cooling liquid out of the thermal

exchange chamber, the at least one second passage is positioned at either the first end or the second end of the thermal exchange chamber” of claim 1.

VI. CONCLUSION

For these reasons, the Board should deny institution of *inter partes* review under Section 325(d).

Respectfully submitted,

Dated: February 18, 2025

By: /Arpita Bhattacharyya/
Arpita Bhattacharyya
Reg. No. 63,681

CERTIFICATE OF COMPLIANCE

Pursuant to 37 C.F.R. § 42.24(d), I, Arpita Bhattacharyya, certify that **Patent Owner's Preliminary Response** contains 3,972 words, excluding those portions identified in 37 C.F.R. § 42.24(a), as measured by the word-processing system used to prepare this paper.

Dated: February 18, 2025

/Arpita Bhattacharyya/

Arpita Bhattacharyya

Reg. No. 63,681

CERTIFICATE OF SERVICE

The undersigned certifies that a copy of the foregoing **Patent Owner's Preliminary Response** and **Exhibits 2001-2002** were served electronically via email on February 18, 2025, in their entirety on the following:

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