Nos. 16-1824, -1825

United States Court of Appeals for the Federal Circuit

HITACHI METALS, LTD.,

Appellant,

v.

ALLIANCE OF RARE-EARTH PERMANENT MAGNET INDUSTRY,

Appellee.

Appeals from the United States Patent and Trademark Office, Patent Trial and Appeal Board in Nos. IPR2014-01265 and IPR2014-01266

BRIEF OF APPELLEE

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OCTOBER 26, 2016

CERTIFICATE OF INTEREST

Pursuant to Fed. Cir. R. 47.4, counsel for Appellee, Alliance of Rare-Earth Permanent Magnet Industry certifies the following:

(1) The full name of every party or amicus represented by me is:

Alliance of Rare-Earth Permanent Magnet Industry.

(2) The name of the real parties in interest represented by me are:

Shenyang General Magnetic Co., Ltd.
Ningbo Tongchuang Strong Magnet Material Co., Ltd.
Ningbo Permanent Magnetics Co., Ltd.
Ningbo Ketian Magnet Co., Ltd.
Ningbo Huahui Magnetic Industry Co., Ltd.
Hangzhou Permanent Magnet Group Co., Ltd.
Jiangmen Magsource New Material Co., Ltd.

(3) All parent corporations and any publicly held companies that own 10 percent or more of the stock of the party or amicus curiae represented by me are:

Ningbo Jintian Copper (Group) Co., Ltd.
New Age Investment (HK) Ltd.
Hongkong Huaye Magnetic LTD

(4) The names of all law firms and the partners or associates that appeared for the party or amicus now represented by me in the trial court or agency or are expected to appear in this court are:

From Alston & Bird LLP, Michael S. Connor, Kirk T. Bradley, Christopher B. Kelly, Hai'ou Qin, Hitetada James Abe, and S.H. Michael Kim.

Dated: October 26, 2016

Respectfully submitted,

/s/ Michael S. Connor
Michael S. Connor

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STATEMENT OF RELATED CASES

In accordance with Federal Circuit Rule 47.5, counsel for Appellee Alliance of Rare-Earth Permanent Magnet Industry ("the Alliance") states:

There are no other appeals in or from this same proceeding in the U.S. Patent and Trademark Office ("PTO") that are or previously were pending before this Court or any other appellate court.

Counsel is not aware of any pending case that will be directly affected by this Court's decision in this appeal.

STATEMENT OF THE ISSUES

1. The Board held that Claims 1, 5, and 6 of the ’385 patent were obvious, and further that Claim 1 is anticipated, for three different reasons, each of which independently renders these claims invalid.
    a. Are the Board’s factual findings leading to obviousness of Claims 1, 5, and 6 based on the combination of Hasegawa and Yamamoto supported by substantial evidence?
    b. Are the Board’s factual findings leading to a separate finding of obviousness of Claims 1, 5, and 6 based on the combination of Ohashi and Yamamoto supported by substantial evidence?
    c. Are the Board’s findings of anticipation of Claim 1 based on He, and obviousness of Claims 5 and 6 based on the combination of He and Yamamoto, supported by substantial evidence?
2. The Board held that Claims 1-4, 11, 12, and 14-16 of the ’765 were obvious under various grounds.
    a. Are the Board’s factual findings leading to obviousness based on the combination of Ohashi and Hasegawa supported by substantial evidence?

b. Are the Board's factual findings leading to obviousness based on the combination of Ohashi, Hasegawa, and Yamamoto supported by substantial evidence?

STATEMENT OF THE CASE

I. Procedural Background.

Appellant Hitachi Metals, Ltd. ("Hitachi Metals") is the owner of U.S. Patent Nos. 6,491,765 ("'765 patent") and 6,537,385 ("'385 patent"). Petitioner-Appellee Alliance of Rare-Earth Permanent Magnet Industry ("the Alliance") filed petitions before the USPTO's Patent Trial and Appeal Board ("the Board") requesting *inter partes* review of Claims 1, 5, and 6 of the '385 patent (Case IPR2014-01265; Appx91-128) and Claims 1-4, 11, 12, and 14-16 of the '765 patent (Case IPR2014-01266; Appx1781-1837). Hitachi Metals filed Preliminary Responses in both cases. Appx203-227, Appx1923-1964. The Board instituted review of both patents. Appx228-248, Appx1965-1987.

In response to the Board's institution decisions, Hitachi Metals filed Patent Owner Reponses in both cases. Appx289-331, Appx2028-2079. The Alliance filed corresponding Replies in each case (Appx358-386, Appx2090-2118) and oral argument was held (Appx495-584). The Board issued Final Written Decisions holding all of the challenged claims unpatentable under every instituted ground of rejection. Appx1-28, Appx29-65. Over the course of the proceedings, Hitachi Metals was unable to prevail with respect to any ground of rejection adopted by the Board. Appx26; Appx64; Appx246-247; Appx1986.

II. Factual Background.

A. The Invention Described in the ’765 and ’385 patents.

The ’765 and ’385 patents paint a clear picture of the problem the inventors were trying to solve: how to mitigate the known performance-deteriorating effects of R-rich super-fine powder in manufacturing sintered R-Fe-B type rare-earth magnets.[1] The solution the patents identify to this problem was simply removing this super-fine powder (sized of 1μm or less) during manufacturing so that the content of super-fine powder in the alloy powder used to make magnets would be 10% or less. However, as the parties now agree that this concept was well-known in the art at the time of the invention, Hitachi Metals’ Statement of the Case suggests that the patents describe other inventive concepts. Hitachi Metals’ position is not supported by the patents’ specification.

1. It was known that conventional methods of producing rare-earth alloy powder for sintered magnets result in an alloy powder containing an amount of performance deteriorating R-rich super-fine powder.

As the patents’ background section explains, it was known at the time of the invention that super-fine powder (i.e., powder having a particle size of 1μm or less) having a high concentration of rare-earth element (i.e., R-rich) was produced during conventional magnet manufacturing processes. Appx81 at 1:24-45, 1:64 to 2:22. It

[1] Citations to the common written description in this section are to the earlier-filed ’765 patent.

was also known that, due to its propensity to readily oxidize, this R-rich super-fine powder has a harmful effect on the performance of sintered magnets. *Id*. at 2:22-36.

The problematic R-rich super-fine powder comes about as part of the "pulverization" step of manufacturing R-Fe-B type magnets (i.e., those made from an alloy of iron (Fe), boron (B), and a rare-element (R), such as neodymium). Appx81 at 1:16-21, 1:28-32, 2:18-22. It was known that, during fine pulverization of the alloy, "super-fine powder" having a particle size of 1μm or less is produced and tends to be R-rich. Appx81 at 2:18-22. It was also known that R-rich super-fine powder is problematic because it easily oxidizes if exposed to oxygen during pulverizing and sintering. Appx81 at 2:22-32. If this oxidation occurs, the oxygen content of the resulting magnet increases and leads to a reduction in the coercive force and remanent flux density in the resulting magnet, among other things. *Id*. at 2:32-36. The problem was so well-known that various methods of mitigating this oxidation were already in existence. Appx81 at 2:37-53.

2. The concept identified in the patents as inventive was removing a sufficient amount of super-fine powder to improve the performance of a magnet.

The patents' solution to the R-rich super-fine powder problem was a simple one: removing powder having a particle size of 1μm or less from the rare-earth alloy powder such that the resulting powder contains 10% or less super-fine powder. Appx81-82 at 2:65-3:10. In other words, the inventors confirmed that removing a

sufficient quantity of the R-rich super-fine powder before sintering would reduce oxidation in the final alloy powder and improve the magnetic properties of the resulting sintered magnet. Appx82 at 4:49-62; Appx86-87 at 12:65 to 13:6. Although it was not novel, this is the concept the patents identify as the inventors' discovery and advancement in the art. *Id*.

With respect to the amount of super-fine powder removed, the inventors tested samples of alloy powder with varying percentages of super-fine powder. Appx85-86 at 10:45 to 11-57. Predictably, the inventors observed that a higher concentration of super-fine powder led to a corresponding increase in the oxygen content of the magnet and a decrease in various magnetic properties. *Id*. The patents note that "the best magnetic properties were obtained" when the super-fine powder content was 3.0% or less. Appx86 at 11:48-51. However, using an IHc value of 900 kA/m or more and a Br value of 1.35 T or more as cutoffs, the inventors selected a 10% super-fine powder content as an acceptable limit. *Id*. at 11:38-44; *see also* Appx81-82 at 2:65-3:10.

3. Hitachi Metals' Statement of the Case Incorrectly Characterizes the Invention of the '765 and '385 Patents

Hitachi Metals' Statement of the Case incorrectly characterizes the invention described in the '765 and '385 patents. First, Hitachi Metals incorrectly suggests that the inventors "identified" R-rich super-fine particles as "one of the primary causes of oxidation during sintered rare-earth magnet processing." Blue Brief at 8. Second, Hitachi Metals erroneously suggests the inventors determined that the R-

rich super-fine portion of an alloy could be "more easily isolated from the remaining alloy" by preparing the pre-powder alloy with a rapid cooling method (e.g., strip casting) and pulverizing the alloy using a hydrogen embrittlement process. *Id*. at 9.

These purported discoveries were already well known in the art. The background section of the patents explains that: **(i)** rapid cooling methods, including strip casting, were known alloy production methods (Appx81 at 1:36-63); **(ii)** hydrogen pulverization was a known coarse pulverization method (*Id*. at 1:24-32), **(iii)** the presence of R-rich super-fine powder in alloy powder produced from a rapidly-cooled and hydrogen-embrittled alloy was known (*Id*. at 1:64 to 2:22), **(iv)** the performance-deteriorating effect of this R-rich super-fine powder was known (*Id*. at 2:22-36), and **(v)** various process modifications were already in use to mitigate oxidation of the R-rich super-fine powder (*Id*. at 2:37-53).[2]

The patents never suggest that the inventors were the first discover that R-rich super-fine particles pose an oxidation problem or that the inventors were investigating more effective ways to isolate that R-rich super-fine powder. Moreover, the inventors were unequivocal that their concept of removing R-rich super-fine powder was not limited to rapidly-cooled alloys and applied equally to ingot cast alloys. Appx86 at 12:24-30.

[2] Every cite in Hitachi Metal's Brief regarding the inventors' "isolation" of R-rich super-fine powder is to the background section of the patents. Blue Brief at 8.

The only concept the patents identify as a purported advancement in the art is removal of R-rich super-fine powder in order to reduce oxidation and improve magnetic performance. *Id*. As the Board properly concluded, this concept was already well-known in the art.

B. The Challenged Claims.

The proceedings before the Board did not involve every claim in the '765 and '385 patents. For the '765 patent, the Board's decision addresses only Claims 1-4, 11, 12, and 14-16. For the '385 patent, the Board's Decision addresses only Claims 1, 5, and 6.

1. The Claims at Issue in the '765 Patent: 1-4, 11, 12, and 14-16.

The '765 patent's claims reflect the concept identified in the specification—the removal of super-fine powder. Claim 1 reads as follows:

> 1. A method for manufacturing alloy powder for R-Fe-B rare earth magnets, comprising a first pulverization step of coarsely pulverizing a material alloy for rare earth magnets and a second pulverization step of finely pulverizing the material alloy,
>
> wherein said first pulverization step comprises a step of pulverizing the material alloy by a hydrogen pulverization method, and
>
> said second pulverization step comprises a step of removing at least part of fine powder having a particle size of 1.0 μm or less to adjust the particle quantity of the fine powder having a particle size of 1.0 μm or less to 10% or less of the particle quantity of the entire powder.

Appx87 at 13:21-34.

The final limitation in Claim 1 address the content of super-fine particles (those sized 1.0μm or less) in the powder after the particle removal step. As long as this powder has a content of super-fine particles (1.0μm or less) between zero and 10%, the last limitation of Claim 1 is satisfied. Claim 1 also requires the use of hydrogen pulverization for its first pulverization step, but there is no limitation regarding how the material alloy is initially prepared (e.g., by ingot casting or rapid cooling). Rather, material alloy preparation is the subject of additional requirements added in the challenged dependent claims, which are provided in the table below:

2. The method of claim 1, wherein the average concentration of the rare earth element contained in the fine powder having a particle size of 1.0 μm or less is greater than the average concentration of the rare earth element contained in the entire powder.	Appx87 at 13:35-39.
3. The method of claim 1 or 2, wherein in said pulverization step, the alloy is finely pulverized in a high-speed flow of gas.	Appx87 at 13:40-42.
4. The method of claims 3, wherein the gas comprises oxygen.	Appx87 at 13:43-44.
11. The method of claim 1, further comprising the step of producing the alloy for rare earth magnets by cooling a melt of the alloy at a cooling rate in the range between 10^{2}° C./sec and 10^{4}° C./sec.	Appx87 at 14:16-19.
12. The method of claim 11, wherein the melt of the alloy is cooled by a strip casting method.	Appx87 at 14:20-21.
14. The method of claim 1, wherein the average particle size of the powder obtained in said second pulverization step is in a range between 2 μm and 10 μm.	Appx87 at 14:25-27.

15. The method of claim 1, further comprising the step of adding a lubricant to the powder obtained in said pulverization step.	Appx87 at 14:28-30.
16. A method for manufacturing an R-Fe-B rare earth magnet comprising the steps of: preparing alloy powder for R-Fe-B rare earth magnets by the method of claim 1; and compacting the alloy powder for R-Fe-B rare earth magnets to produce a permanent magnet.	Appx87 at 14:31-36.

2. The Claims at Issue in the ’385 Patent: Claims 1, 5, and 6.

Claim 1 of the ’385 patent does not address super-fine powder content. Instead, Claim 1 is more generally directed to the removal of powder having a high concentration of a rare earth element:

> 1. A method for manufacturing alloy powder for R--Fe--B rare earth magnets, comprising a first pulverization step of coarsely pulverizing an R-Fe-B alloy for rare earth magnets produced by a rapid cooling method and a second pulverization step of finely pulverizing the material alloy,
>
> wherein said second pulverization step comprises a step of removing at least part of the powder in which the concentration of rare earth element is greater than the average concentration of rare earth element contained in the entire powder.

Appx76 at 13:19-30.

Claim 1 of the ’385 patent does not address the method used for its first pulverization step. However, Claim 1 does require that the material alloy be produced by a rapid cooling method. This rapid cooling is also the subject of the challenged dependent claims. In particular, Claim 5 requires “the step of producing the R-Fe-B alloy for rare earth magnets by cooling a molten material alloy at a

cooling rate in a range between 10^{2}° C./sec and 10^{4}° C./sec." Appx76 at 14:1-4. Claim 6 further requires that "the molten material alloy is cooled by a strip casting method." Appx76 at 14:5-6.

C. The Prior Art.

Hitachi Metals correctly acknowledges that "the steps of each of the challenged independent claims were known in the art at the time of the invention." Blue Brief at 3. Further, with the exception of dependent Claim 4 in the '765 patent—where the parties have a claim construction dispute—all steps in the challenged dependent claims were also known in the art at the time of the invention. This is evidenced by the prior art relied on by the Board, which can generally be divided into (i) references disclosing the removal of fine particles from R-Fe-B alloy powder and (ii) references directed to strip casting and lubrication.

1. Particle Removal References.

a. Ohashi.

U.S. Patent No. 4,992,234 to Ohashi et al. ("Ohashi") discloses coarsely pulverizing an ingot cast alloy by mechanical pulverization, finely pulverizing the alloy using a jet mill, and removing particles smaller than 2 μm from the powder to avoid oxidation. Appx698 at 4:37-50, 64-67.[3] In particular, Ohashi teaches a method

[3] Cites to prior art and other evidence common to both IPRs are to the record of the '385 patent IPR.

for preparing a sintered R-Fe-B type magnet in which "substantial improvements can be obtained in the coercive force and maximum energy product of the permanent magnets by removing the fine particles from the alloy powder." Appx697 at 1:6-25; Appx700 at7:54-59. In Ohashi's method, an R-Fe-B alloy is prepared by an ingot casting method and then pulverized "in two steps including rough pulverization and fine pulverization." Appx698 at 4:24-41. Ohashi suggests mechanical pulverizing for rough pulverization and jet milling for fine pulverization. Appx698 at 4:41-45.

Ohashi also discloses that "a substantial amount of extremely fine particles" will be produced from pulverization. Appx698 at 3:34-37. Ohashi emphasizes that these extremely fine particles are "highly susceptible to oxidation." Appx698 at 3:37-43 and 51-56. Ohashi also discloses that "the adverse influences due to the increased oxygen content in the alloy powder can be overcome when the alloy powder does not contain extremely fine particles." Appx698 at 3:43-51.

Accordingly, Ohashi's method includes "removing particles having a diameter smaller than 2 μm from the alloy powder" using "a particle-size classifier machine utilizing a combination of rotative force and air stream." Appx697 at 2:45-46; Appx698 4:64-68; Appx699 5:11-36. Ohashi discloses that "[i]t is important that the volume fraction of the fine particles having a diameter smaller than 2 um in the alloy powder after particle size classification does not exceed 1% or, preferably, 0.5%." Appx699 at 5:50-53.

b. Hasegawa.

Japanese Patent Application Publication No. 1993-283217 to Hasegawa et al. ("Hasegawa") discloses coarsely pulverizing an ingot cast alloy by hydrogen pulverization, finely pulverizing the alloy using a jet mill, and removing particles smaller than 5 μm from the powder to avoid oxidation. Appx689 at ¶¶0002, 0004. Hasegawa teaches the use of "wind power to remove Nd-rich phase that includes large quantities of oxygen due to excessive pulverization." Appx690 at ¶0005. In Hasegawa's method, an R-Fe-B alloy is prepared by an ingot casting method. For coarse pulverization, Hasegawa recommends using hydrogen pulverization, which produces pulverized alloy powder in "one-fourth of the time required with mechanical pulverization." Appx689 at ¶0002. For fine pulverization, Hasegawa recommends using a jet mill. Appx689 at ¶¶0002, 0004.

Hasegawa proposes removing a certain quantity of R-rich particles from the finely pulverized alloy powder. Appx689-Appx690 at ¶0004-0006. In particular, Hasegawa discloses removing "powder having more quantity of rare earth than the input composition," at least 90% of which has a "particle diameter [] 5.0 μm or less." Appx689 at ¶0004. The remaining powder, which is compacted and sintered to form a permanent magnet, will "hav[e] less quantity of rare earth than the input composition" and 90% of the powder will have a "particle diameter [] between 2 and 15 μm." *Id*. By discarding the powder

smaller than 5.0 μm, oxygen content in the resulting magnet can be reduced, leading to "high energy product and high coercivity." Appx690 at ¶0005; Appx691 at ¶0015.

c. He.

"Rare Earth Permanent Magnet Milling Equipment – Jet Mill Closed Loop System" is an article by He Shuixiao published in the journal Magnetic Materials and Parts ("He"). Appx702-711. He discloses coarsely pulverizing a quick quenched alloy, finely pulverizing the alloy using a jet mill, and removing particles sized 1 um or less. Appx704-706. In He's method, a rare earth alloy made from "quick quenching" is first subjected to coarse pulverization, which can be done with "hydrogen burst processing." Appx705. The resulting powder is fed into the jet mill's milling compartment, where it is finely pulverized. *Id*. He then discloses separating and collecting "ultra fine particles" using the jet mill's "cyclone separating device." Appx705-706. In particular, the cyclone is configured to adjust the amount of particles sized 1 um or less to be 0.1% by weight of the qualified powder. Appx706 (left col.).

2. Strip Casting & Lubricant References.

a. Yamamoto.

U.S. Patent No. 5,383,978 to Yamamoto et al. ("Yamamoto") discloses a rapidly cooled alloy for use in making R-Fe-B magnets. Appx712-718. In particular, Yamamoto discloses a strip casting method for preparing an R-Fe-B alloy

in which the alloy is melted and allowed to "uniformly solidif[y]" at a "cooling rate of 10° to 1000° C./sec." Appx714 at 2:32-37, 3:49-54; Appx715 at 4:25-29 and 39-50; Appx716 at 6:16-29. Yamamoto notes that in earlier ingot casting methods, the cooling rate within an ingot can vary such that there is a "difference between the cooling conditions in the inner portions of the ingot and those in the vicinity of the ingot surface." Appx714 at 1:15-47. As a result of this, an α-Fe phase can form in the alloy, the presence of which can reduce magnetic performance and make production of the alloy difficult. Appx714 at 1:25-43; Appx715 3:11-37. Yamamoto discloses that its strip casting method improves upon ingot cast alloys by providing more uniform cooling, a more uniform alloy free of α-Fe, better pulverizability and sinterability, and better magnetic properties. Appx715 at 3:54-57; 4:25-29; Appx716 at 5:46-58; Appx714 at 1:62-64.

b. Kishimoto.

Kishimoto is directed to a process in which a lubricant is added to alloy powder "in order to ensure mobility of the alloy powder during compaction and facilitate mold release." Appx2474 at 1:5-10; 2:35–48.

D. The Key Portions of the Board's Final Decision for the '385 Patent (IPR2014-01265).

The Board's Final Written Decision in the '385 patent IPR held each of Claims 1, 5, and 6 to be unpatentable for three different reasons: **(i)** obviousness in view of Hasegawa and Yamamoto, **(ii)** obviousness in view of Ohashi and

Yamamoto, and **(iii)** anticipation by He and obviousness in view of He and Yamamoto. Appx26. This Court may affirm based on any one of these reasons for unpatentability, each of which is independent of the others.

1. Obviousness of Claims 1, 5, and 6 in view of Hasegawa and Yamamoto.

In its first reason for invalidity, the Board held that Claims 1, 5, and 6 were obvious in view of the combination of Hasegawa and Yamamoto. Appx15; Appx26. As the Board noted, Hitachi Metals "does not dispute that Hasegawa teaches every element of independent claim 1 except for the alloy being produced by a rapid cooling method, nor that Yamamoto teaches a rapid cooling method." Appx10; *see also* Appx12. Hitachi Metals also did not dispute that the elements of Claims 5 and 6 were disclosed in Yamamoto. Appx16. Thus, the only issue before the Board was whether it would have been obvious to substitute Yamamoto's rapid cooling method for Hasegawa's ingot casting method. The Board agreed with the Alliance, finding the combination would have been obvious.

The Board's key factual findings with respect to the combination of Hasegawa and Yamamoto included the following: **(i)** every step recited in Claim 1 was known in the art and used for its known purpose (Appx12); **(ii)** "a person of ordinary skill in the art would have known how to combine Yamamoto's rapid cooling method (in place of Hasegawa's ingot casting method) with Hasegawa's pulverization and particle classification technique using known methods" (Appx12); **(iii)** "a person of

ordinary skill would have recognized the results of [this] combination to be predictable" (Appx13); and **(iv)** "consideration of design incentives . . . would have led one of ordinary skill to pursue the predictable combination of elements" (Appx14).

In addition to relying on the disclosure of Hasegawa and Yamamoto, the Board credited testimony from the Alliance's expert that "the ingot or strip cast methods are interchangeable to those skilled in the art" (Appx13; Appx655-656 at ¶51) and that strip casting is a "lower cost, much more productive process" (Appx14-15; Appx1274 at 10-20). The Board also noted the '385 patent's admission that rapid cooling methods were known and that the invention was described as applicable to both an ingot casting method and a rapid cooling method. Appx12-13; Appx70 at 1:36-45; Appx75 at 12:24-29.

Hitachi Metals' Statement of the Case states that the Board "disregarded" and deemed "irrelevant" whether modifying Hasegawa's method to use the rapid cooling described in Yamamoto would have resulted in diminished yield and poor quality magnets. Blue Brief at 17-18. The Board, however, discussed at length Hitachi Metals arguments regarding diminished yield, as well as rebuttal evidence offered by the Alliance. Appx11-14, Appx16. The Board therefore considered and rejected Hitachi Metals' assertions.

Moreover, the Board found that "[w]hether implementation of Yamamoto's rapid cooling method makes commercial sense does not control the obviousness determination." Appx13. The Board thus considered the diminished yield concerns raised by Hitachi Metals and found that they did not affect the obviousness determination. The Board weighed all of the evidence in the record and found the facts described above underlying its obviousness conclusion. Appx10-15. On the basis of those factual findings—and the undisputed disclosure of every limitation of the claims in the prior art—the Board held Claims 1, 5, and 6 obvious in view of Hasegawa and Yamamoto. Appx15-16.

2. Obviousness of Claims 1, 5, and 6 in view of Ohashi and Yamamoto.

Regarding the second reason for invalidity, the Board held that Claims 1, 5, and 6 would have been obvious in view of Ohashi and Yamamoto. Appx19; Appx26. Once again, Hitachi Metals "d[id] not dispute that Ohashi teaches every element of independent claim 1 except for the alloy being produced by a rapid cooling method, nor that Yamamoto teaches a rapid cooling method." Appx17-18. Hitachi Metals also did not dispute that the elements of Claims 5 and 6 were disclosed in Yamamoto. Appx19-20. Accordingly, the only issue before the Board was whether it would have been obvious to substitute Yamamoto's rapid cooling method for Ohashi's ingot casting method. The Board again agreed with the Alliance, finding the combination would have been obvious.

With respect to the combination of Ohashi and Yamamoto, the Board's analysis largely mirrored its analysis of Hasegawa and Yamamoto. The Board's key factual findings included the following: **(i)** every step recited in Claim 1 was known in the art and, as claimed, was used for its known purpose (Appx18); **(ii)** "a person of ordinary skill in the art would have known how to combine Yamamoto's rapid cooling method with Ohashi's pulverization and particle classification technique using known methods" (Appx18); **(iii)** "a person of ordinary skill would have recognized the results of [this] combination to be predictable" (Appx19); and **(iv)** "design incentives . . . would have led one of ordinary skill to pursue the predictable combination" (Appx19). The Board's factual findings were supported by the disclosure of Ohashi and Yamamoto, testimony from the Alliance's expert regarding the motivation for and predictability of using Yamamoto's strip casting, and the '385 patent's admissions regarding the interchangeability of ingot casting and rapid cooling methods. Appx17-19.

Hitachi Metals' Statement of the Case again suggests the Board dismissed as "irrelevant" its theory that modifying Ohashi's method to use the rapid cooling described in Yamamoto would have resulted in diminished yield and poor quality magnets. Blue Brief at 18. The Board, however, discussed at length Hitachi Metals arguments regarding diminished yield, as well as rebuttal evidence offered by the Alliance. Appx16-19. The Board therefore considered and again rejected Hitachi

Metals' assertions. Appx18-19. Weighing all of the evidence in the record, the Board found the facts described above underlying its obviousness conclusion and on the basis of those factual findings held Claims 1, 5, and 6 obvious in view of Ohashi and Yamamoto. Appx19-20.

3. Anticipation of Claim 1 in view of He and Obviousness of Claims 5 and 6 in view of He and Yamamoto.

Under the third reason for invalidity, the Board held that Claim 1 was anticipated by He and that Claims 5 and 6 were obvious in view of He and Yamamoto. Appx23, Appx26. The parties agree that He discloses every limitation of Claim 1 except for whether the "quick quenching" method in He discloses the claimed "rapid cooling method." Appx21. The parties also agree that Yamamoto discloses the limitations of Claims 5 and 6. Appx24. As a result, the only issue before the Board turned on a matter of claim construction: does the "quick quenching" method disclosed in He fall within the broadest reasonable interpretation of "rapid cooling method" as recited in Claim 1? Appx21-23. The Board found that it does.

The Board's construction of "rapid cooling method" was adopted from the definition provided in the '385 patent's specification: "a cooling method in which 'a molten material alloy is put into contact with a single chill roll, twin chill rolls, a rotary chill disk, a rotary cylindrical chill mold, or the like, to be rapidly cooled thereby producing a solidified alloy thinner than an ingot cast alloy.'" Appx7-8; Appx70 at 1:38-45. In supporting its construction, the Board addressed Hitachi

Metals' argument that the term should be construed as "a cooling mechanism different and faster than ingot casting, but not cooled so fast that it exceeds rapids cooling and enters the domain of super-rapid cooling." Appx7. The Board noted the specification's description of a specific cooling rate range as "a preferred embodiment" coupled with the inclusion of cooling rates in dependent claim 5 indicated that "rapid cooling method" was never intended to be limited to a particular cooling rate. Appx7-9; Appx71 at 3:51-54. In addition, the specification's description of strip casting and centrifugal casting as examples of rapid cooling did not indicate that "rapid cooling method" was intended to "exclude super-raid cooling methods." Appx7; Appx70 at 1:38-45.

Applying its claim construction, the Board focused primarily on Hitachi Metals' argument that He's "quick quenching" most likely refers to a melt-spinning process with a cooling rate in excess of $10^6 K\ s^{-1}$. Appx22-23. In particular, the Board noted that Hitachi Metals described the melt-spinning process as one in which a melted alloy is sprayed on to a rotating water cooled wheel or disc. Appx22. Noting that its claim construction was not limited to a particular cooling rate range, the Board found that the melt-spinning process fell squarely within its construction of "rapid cooling method." Appx22-23. Accordingly, the Board found that He's disclosure of "quick quenching" was a rapid cooling method and, as such, Claim 1 was anticipated. *Id*.

Crediting the testimony of the Alliance's expert, the Board also agreed with the Alliance's showing that combining Yamamoto's strip casting method with He would be nothing more than a predictable substitution of one well-known alloy production method for another. Appx25-26. In particular, the Board found that **(i)** every step recited in Claims 5 and 6 was known in the art and, as claimed, was used for its known purpose (Appx25); **(ii)** "a person of ordinary skill in the art would have known how to combine [He and Yamamoto] using known methods" (Appx25); and **(iii)** a person of ordinary skill "would have recognized the results of the combination to be predictable" (Appx25-26). On the basis of these factual findings, the Board held that Claims 5 and 6 were obvious in view of He and Yamamoto. Appx26.

E. Key Portions of the Board's Final Decision for the '765 Patent (IPR2014-01266).

The Board's Final Written Decision in the '765 patent IPR held the following: **(i)** Claims 1-14, 14, and 16 are obvious in view of Ohashi and Hasegawa, **(ii)** Claims 11 and 12 are obvious in view of Ohashi, Hasegawa, and Yamamoto, and **(iii)** Claim 15 is obvious in view of Ohashi, Hasegawa, and Kishimoto. Appx64.

1. Obviousness of Claims 1-4, 14, and 16 in view of Ohashi and Hasegawa.

Under the first ground, the Board held that Claims 1-4, 14, and 16 are obvious in view of the combination Hasegawa and Yamamoto. Appx48. The parties agreed that Ohashi discloses every element of Claim 1 except for hydrogen pulverization,

and that Hasegawa discloses hydrogen pulverization. Appx39. The parties also agreed that Ohashi discloses every limitation of Claims 2-3, 14, and 16, but Hitachi Metals' disputes that Ohashi discloses Claim 4's recitation of a high-speed flow of gas "comprising oxygen." Appx48-50; Appx50-53. Thus, the issues before the Board were **(i)** whether it would have been obvious to substitute Hasegawa's hydrogen pulverization method for Ohashi's mechanical pulverization and **(ii)** whether Ohashi disclosed pulverization in a high-speed flow of gas "comprising oxygen," as recited in Claim 4.

With respect to the first question, the Board agreed with the Alliance, finding the combination of Ohashi and Hasegawa to be obvious. Appx47-48; Appx50. The Board's key factual findings with respect to the combination of Ohashi and Hasegawa included the following: **(i)** every element of Claims 1-3, 14, and 16 is disclosed in the combination of Ohashi and Hasegawa (Appx37-39; Appx48-49); **(ii)** "a person of ordinary skill in the art at the time of the '765 patent would have knowledge of the differences between mechanical and hydrogen pulverization techniques, and the resulting material alloys" (Appx42; Appx36-37); (**iii)** modifying Ohashi to use hydrogen pulverization would be "in accordance with Ohashi's teachings of conducting the pulverization in an atmosphere of a non-oxidizing *or* inert gas" (Appx42-43); **(iv)** "a person of ordinary skill in the art would have been motivated to modify Ohashi's method . . . to incorporate Hasegawa's hydrogen

pulverization technique in place of Ohashi's mechanical pulverization techniques in order to be able to more easily crush the material alloy" (Appx46-47); and **(v)** "there would have been a reasonable expectation of success in modifying Ohashi to incorporate Hasegawa's hydrogen pulverization technique in place of Ohashi's mechanical pulverization techniques" (Appx47).

The Board's discussion of these finding notes Hasegawa's disclosure that hydrogen pulverization is faster and more efficient than mechanical pulverization, and that—at the time of Hasegawa's disclosure in 1992—hydrogen pulverization "was generally used as the method for the manufacture of rare-earth-iron-boron based magnet powder." Appx47; Appx689 at ¶0002. In addition, the Board credited testimony from the Alliance's expert that hydrogen pulverization "was a well-known and common technique for coarse pulverization in a non-oxidizing gas environment to crush more easily an [R-Fe-B] material alloy," that a person of ordinary skill would have been motivated to combine Ohashi and Hasegawa for this reason, and that the results of the combination would have been predictable. Appx40; Appx47; Appx2395 at ¶71.

In rejecting Hitachi Metals' arguments, the Board found that Hitachi Metals failed to establish that a person of ordinary skill would not have been able to account for the difference between mechanical and hydrogen pulverization. Appx41. Noting that Claim 1 "does not require a certain amount of sub-2μm be retained" (Appx46),

the Board also rejected Hitachi Metals' argument that Ohashi teaches away from the combination with Hasegawa (Appx45-46) and found that Hitachi Metals' theory of unexpected results was not tied to the method of Claim 1 (Appx44-45).

With respect to the second question, the Board agreed with the Alliance that Ohashi's disclosure of using an "air stream" for particle classification was sufficient disclosure of pulverization using a high-speed flow of gas "comprising oxygen." Appx53; Appx87 at 13:40-44. In particular, the Board found that "one of ordinary skill in the art would recognize [Ohashi's air stream] comprises some amount of oxygen." Appx52 (citing Appx2403-2404 at ¶82). Addressing Hitachi Metals' argument that Ohashi's "particle size classification" occurs *after* fine pulverization, the Board concluded that the broadest reasonable interpretation of Claim 4 in view of the '765 patent's specification was that "the second pulverization step of finely pulverizing the material alloy . . . includes both a first sub-step of milling and a second sub-step of particle classification." Appx51-52; Appx81-82 at 2:66 to 3:7; Appx82 at 4:58-62. Based on these factual findings, the Board held Claim 4 obvious in view of Ohashi and Hasegawa. Appx53.

2. Obviousness of Claims 11 and 12 in view of Ohashi, Hasegawa, and Yamamoto.

Under the second ground, the Board held that Claims 11 and 12 are obvious in view of the combination of Ohashi, Hasegawa, and Yamamoto. The parties agreed that Yamamoto discloses the cooling rate range added in Claim 11 and "strip

casting" as recited in Claim 12. Appx54-55. The only issue before the Board was whether it would have been obvious to substitute Yamamoto's cooling rates and strip casting method for Ohashi's ingot casting method. *Id*. The Board again agreed with the Alliance, finding the combination would have been obvious. Appx61-62.

Both the parties' arguments and the Board's analysis largely mirrored those presented with respect to the combination of Ohashi and Yamamoto in the '385 patent IPR. The Board's key factual findings included the following: **(i)** every step recited in Claims 11 and 12 was known in the art and used for its known purpose (Appx57); **(ii)** a person of ordinary skill in the art would have known how to combine Yamamoto and Ohashi (as modified by Hasegawa) using known methods (Appx57); **(iii)** "a person of ordinary skill would have recognized the results of [this] combination to be predictable" (Appx57; Appx61); and **(iv)** design incentives, such as lower cost and better productivity, would have motivated a skilled artisan to pursue the predictable combination (Appx61).

The Board again rejected Hitachi Metals' arguments that combining Ohashi and Yamamoto would lead to diminished yield and that Ohashi teaches away from using hydrogen pulverization. Appx56-61. Weighing all of the evidence in the record, the Board found the facts described above and, on the basis of those factual findings, held Claims 11 and 12 obvious in view of Ohashi, Hasegawa, and Yamamoto. Appx61-62.

3. Obviousness of Claim 15 in view of Ohashi, Hasegawa, and Kishimoto.

Under the third ground, the Board held that 15 was obvious in view of the combination of Ohashi, Hasegawa, and Kishimoto. Appx62-64. Hitachi Metals' makes no separate argument with respect to Claim 15. Blue Brief at 47, 65. If this Court affirms the Board's determination of obviousness in view of Ohashi and Hasegawa with respect to Claim 1, it should also affirm the Board's holding with respect to Claim 15.

SUMMARY OF THE ARGUMENT

The Board properly found all challenged claims of the '385 and '765 patents invalid as obvious or anticipated. Here, there is no dispute that the prior art discloses every limitation in the independent claims for both patents. Further, there is no dispute that, under the Board's claim constructions, the prior art discloses every limitation of the challenged dependent claims. This Court should affirm. Under the proper standard of review, which Hitachi Metals largely ignores, the questions before this Court center on whether the Board's factual findings underlying its obviousness and anticipation determinations are supported by substantial evidence. Under every ground of unpatentability, the Board's determinations were supported by substantial evidence.

Rather than focus on the appropriate standard of review, Hitachi Metals attempts to relitigate the Board's factual findings before this Court. However, Hitachi Metals agrees that the prior art discloses the inventive concept identified in the '385 and '765 patents—namely, the removal of R-rich super-fine powder in order to reduce oxidation and improve magnetic performance. Because the inventive concept was known, Hitachi Metals tries to refocus the issues to other topics. Hitachi Metals' theory of the case is that it would not have been obvious to use well-known alloy casting and pulverization techniques—such as rapid cooling and hydrogen pulverization, both of which were also known—in combination with the alloy production methods described in the prior art. The Board properly rejected this theory.

In the IPR for the ’385 patent, the Board held Claims 1, 5, and 6 unpatentable for three different reasons, and this Court may affirm based on any one of the reasons set forth by the Board. The Alliance presented, and the Board accepted, substantial evidence that Yamamoto’s rapid cooling method offered numerous advantages, including lower cost, higher productivity, and the production of a more uniform alloy. Further, substantial evidence supported the Board’s finding that rapid cooling had been widely-adopted in the industry at the time of the invention, and that a person of ordinary skill would have been well-capable of implementing a rapid cooling method with a reasonable expectation of success. Contrary to Hitachi Metals’ assertions, the Board considered and properly rejected Hitachi Metals’ arguments that combining Yamamoto with Hasegawa, Ohashi, or He would have resulted in a diminished yield. Based on its factual findings—all of which are supported by substantial evidence—the Board correctly found Claims 1, 5, and 6 of the ’385 patent unpatentable.

In the IPR for the ’765 patent, the Alliance likewise presented, and the Board accepted, substantial evidence that Hasegawa’s hydrogen pulverization method was faster and generally superior to mechanical pulverization. Further, substantial evidence supported the Board’s finding that hydrogen pulverization had also been widely-adopted in the industry at the time of the invention, and that a person of ordinary skill would have been well-capable of implementing hydrogen

pulverization with a reasonable expectation of success. Weighing Hitachi Metals' arguments against the overwhelming evidence of obviousness provided by the Alliance, the Board correctly found Claims 1-4, 11, 12, and 14-16 of the '765 patent unpatentable.

Applying the proper standard of review, this Court should affirm the Board's determinations.

ARGUMENT

I. Standard of Review.

This Court reviews the Board's legal determinations de novo and its factual findings underlying those determinations for substantial evidence. *In re Urbanski*, 809 F.3d 1237, 1241 (Fed. Cir. 2016). Anticipation is a question of fact reviewed for substantial evidence. *Synopsys, Inc. v. Mentor Graphics Corp*., 814 F.3d 1309, 1317 (Fed. Cir. 2016). Obviousness is a question of law based on underlying factual findings. *Urbanski*, 809 F.3d at 1241. While the Board's ultimate determination of obviousness is reviewed de novo, the factual findings underlying that determination are reviewed for substantial evidence. *Id*.

A factual finding is "supported by substantial evidence if a reasonable mind might accept the evidence to support the finding." *Id*. The substantial evidence standard of review does not allow the Court to substitute its judgment for that of the Board and does not allow the parties to retry factual issues before the Court de novo. *Inland Steel Indus., Inc. v. United States*, 188 F.3d 1349, 1359 (Fed. Cir. 1999).

Claim construction is a question of law, which is reviewed de novo. *Teva Pharm. USA, Inc. v. Sandoz, Inc.*, 135 S. Ct. 831, 838 (2015). Subsidiary factual findings supporting a claim construction are reviewed for clear error. *Id*.

II. The Board's Conclusions of Unpatentability with Respect to the '385 Patent Should be Affirmed.

A. The Board correctly held Claims 1, 5, and 6 obvious in view of Hasegawa and Yamamoto.

There is no dispute among the parties and the Board that Hasegawa discloses every step of Claim 1 with the exception of a rapid cooling method. There is also no dispute that Yamamoto discloses a rapid cooling method and, in particular, one involving a cooling rate within the range of Claim 5 and the use of strip casting as recited in Claim 6. Thus, the question before this Court is *not* whether the prior art discloses the inventive concept identified in the '385 patent— the removal of R-rich super-fine powder in order to reduce oxidation and improve magnetic performance. It is settled that this concept was not novel. The only issue on appeal is whether the Board properly determined that it would have been obvious to use Hasegawa's powder-removal method for a rapidly cooled alloy, such as that disclosed in Yamamoto. There is overwhelming evidence that the Board was correct.

1. The Board's factual findings underlying the combination of Hasegawa and Yamamoto are supported by substantial evidence.

The Board's determination that it would have been obvious to combine Hasegawa and Yamamoto was based on a number of factual findings, each of which is supported by substantial evidence. **First**, substantial evidence supports the Board's finding that every step recited in Claim 1 was known in the art and, as claimed, was used for its known purpose. Appx12. There is no dispute regarding

this finding. It is clear that Hasegawa discloses coarse pulverization of an R-Fe-B alloy (Apx689 at ¶0002), fine pulverization of that alloy (Appx689 at ¶¶0002, 0004), and the removal of powder having a higher concentration rare earth element (Appx689 at ¶0004; Appx690 at ¶0005), and that Yamamoto discloses a rapid cooling method in the form of strip casting (Appx715 at 4:39-50; Appx716 at 6:16-29) at a cooling rate within the range of Claim 5 (Appx714 at 2:32-37; Appx715 at 4:25-29).

Second, substantial evidence supports the Board's finding that "a person of ordinary skill in the art would have known how to combine Yamamoto's rapid cooling method (in place of Hasegawa's ingot casting method) with Hasegawa's pulverization and particle classification technique using known methods." Appx12. Again, there appears to be no dispute with respect to this finding. As an initial matter, "combining" Yamamoto with Hasegawa is simply a matter of choosing to pulverize an alloy made by rapid cooling (Yamamoto) instead of ingot casting (Hasegawa). Yamamoto is explicit that its R-Fe-B rapidly cooled alloy is intended to be pulverized into powder for permanent magnets. Appx714 at 2:17-23, 2:62 to Appx715 at 3:2. Moreover, the Alliance's expert—Dr. Ormerod—confirmed that "ingot or strip cast methods are interchangeable to those skill in the art" and that the modification would involve substituting one known technique for another. Appx655-656 at ¶51; Appx663 at ¶¶63-64.

Third, substantial evidence supports the Board's finding that "a person of ordinary skill would have recognized the results of [this] combination to be predictable." Appx13. Yamamoto itself discloses the predictable effect of strip casting—a more uniform alloy substantially free of α-Fe. Appx714 at 1:29-37 and 59-64, 2:32-37; Appx715 at 3:49-57, 4:25-31; Appx716 at 5:46-58. The predictability of using strip casting was also confirmed by the Alliance's expert. Appx661-662 at ¶59; Appx663 at ¶¶63-64. Further, the parties agreed that a person of ordinary skill would have known that a strip cast alloy (subsequently hydrogen pulverized) would have a narrower particle size and shape distribution in comparison to a typical ingot cast alloy. *See* Appx373 and Appx305.

Fourth, substantial evidence supports the Board's finding that "consideration of design incentives . . . would have led one of ordinary skill to pursue the predictable combination of elements." Appx14. As Yamamoto discloses, the use of rapid cooling results in a more uniform alloy that "exhibit[s] superior pulverizability and sinterability" and can be used to form magnets having "excellent properties." Appx714 at 2:32-37; Appx716 5:46-58. Dr. Ormerod agreed this would have motivated a person of ordinary skill to use a rapidly cooled alloy in Hasegawa's process. Appx661-662 at ¶59; Appx663 at ¶¶63-64. In addition, Dr. Ormerod testified that "at the time of the invention, . . . most high-volume manufacturers of sintered rare-earth-iron-boron magnets were either . . . strip casting or buying

material that was made by a manufacturer . . . who used strip casting." Appx1273 at 14-19. The reason for this was that strip casting is a "lower cost, much more productive process." Appx1274 at 10-20. In its opening brief, Hitachi Metals does not dispute that rapid cooling would have offered these advantages.

2. The Board considered and properly rejected Hitachi Metals' theory that a skilled artisan would not have combined Hasegawa and Yamamoto due to diminished yield.

Rather than focusing on the appropriate standard of review, Hitachi Metals attempts to relitigate the Board's factual findings before this Court. In particular, Hitachi Metals repeats its arguments that a person of ordinary skill would not have combined Hasegawa and Yamamoto because incorporating Yamamoto's strip casting into the process disclosed in Hasegawa would have resulted in a lower production yield and therefore poorer quality magnets. Blue Brief at 26-30. According to Hitachi Metals, this theory should have "compelled" the Board to conclude that a person of ordinary skill would not have combined Hasegawa and Yamamoto. Blue Brief at 30. This argument fails for a number of reasons.

First, even if this Court were to accept that combining Hasegawa and Yamamoto would lead to a diminished yield, there remains substantial evidence to support the Board's finding that it would have been obvious to combine Hasegawa and Yamamoto. As the Board noted in its Decision to Institute review of the '385 patent, "[w]hile tradeoffs may be required in balancing the benefits of rapidly cooled

alloys with ingot cast alloys, such tradeoffs do not necessarily prevent the proposed combination." Appx238. Substantial evidence supports the Board's finding that Yamamoto's rapid cooling method would have resulted in an alloy that is more uniform, contains less α-Fe, exhibits superior pulverizability and sinterability, and imparts better magnetic properties. *See e.g.*, Appx714 at 1:59-64; Appx715 at 3:49-57, 4:25-31; Appx716 at 5:46-58; *see generally supra* at § II(A)(1). There is further evidence that Yamamoto's strip casting method would have enabled lower-cost and high-output production of the alloy. *Id*. In other words, there is substantial evidence that a person of ordinary skill would have weighed the above-described advantages against any diminished yield and magnet quality and found Yamamoto's rapid cooling method to be a suitable alloy production method for use with Hasegawa.

Second, there was substantial evidence that a person of ordinary skill would have known how to mitigate a reduction in yield and magnet quality when using a strip cast alloy. For example, Hitachi Metals' expert unequivocally confirmed that a person of ordinary skill would have understood that jet milling parameters could be adjusted to control the amount of superfine particles resulting from fine pulverization. Appx788 at 17-22. Additional evidence offered by Hitachi Metals confirmed this point.[4] *See e.g.*, Appx1485 (optimizing jet mill classifier speed to "[e]nsure over

[4] Although this evidence was offered with its Patent Owner Response in the IPR, Hitachi Metals now avoids discussing it in its Blue Brief.

milling does not happen during [the] grinding process to avoid making extra fine powder"); Appx1486 ("[a]fter optimizing the key factors for controlling jet mill process, the [particle size distribution] was improved, got much narrower than before, and the fine powder decreased obviously"); Appx1433 at p. 4 ("The critical parameters to be controlled during milling are particle size [and] particle size distribution . . . ."). Thus, there is substantial evidence that a person of ordinary skill would have known to adjust jet milling settings to accommodate the characteristics of a strip cast alloy, prevent over-milling, and limit the amount of discarded fine powder.

Third, the Board properly discounted Hitachi Metals' evidence regarding diminished yield. Hitachi Metals relies on articles published well after the time of the invention, including in the years 2002, 2007, and 2009. Blue Brief at 27-28 (citing Appx1437); Blue Brief at 28 (citing Appx1443); and Blue Brief at 29 (citing Appx1481). These documents are not relevant to the perspective of a person of ordinary skill at the time of the invention. In addition, Dr. Lewis' conclusion that combining Hasegawa and Yamamoto would require "discarding more than half" of the resulting powder is based on data in an article that provides no indication of the rare-earth content of its tested alloy and no indication of the jet milling parameters used for pulverization, each of which can affect the amount of fine powder produced. *See* Appx1484; Appx788 at 17-22. Dr. Lewis' calculations regarding yield are therefore irrelevant to the Board's obviousness determination.

Finally, Hitachi Metals' arguments in this appeal are divorced entirely from the '385 patent's claims and specification. Claims 1, 5, and 6 involve pulverizing a rapidly cooled alloy and removing "at least part of the powder" having a higher concentration of rare earth element without any limitation regarding the amount of powder discarded or the pulverization methods used. Appx76 at 13:19-30. Instead of addressing the *claimed* concept, Hitachi Metals incorrectly focuses on the result of using a rapidly cooled alloy with Hasegawa's precise pulverization and particle removal teachings. Blue Brief at 28-30. Moreover, Hitachi Metals' position is undermined by the lack of any indication in the '385 patent that the inventors sought to solve—or even recognized—a problem relating to manufacturing yield for rapidly cooled alloys.

3. The Board's legal conclusion of obviousness in view of Hasegawa and Yamamoto was correct

Hitachi Metals also attempts to convert the Board's factual findings into some form of legal error by arguing that the Board "disregarded," "dismissed," "rejected," and "refus[ed] to consider" that Hasegawa and Yamamoto would not have been combined due to diminished yield. Blue Brief at 4, 17, 18, 22, 32. In this respect, Hitachi Metals misapprehends the Board's decision—its theory was found unpersuasive, not disregarded. The Board outlined Hitachi Metals' arguments, noted its argument that the combination of Hasegawa and Yamamoto would lead to "significantly diminished yield," and made clear that Hitachi Metals' theory was

considered. Appx11-13; Appx15. The Board weighed all of the evidence before it—including Hitachi Metals' evidence—and found that combining Hasegawa and Yamamoto to arrive at the methods of Claims 1, 5, and 6 would have been obvious.

The Board explained that "the evidence supports that consideration of design incentives, such as the provision of a 'lower cost, more productive [process] better suited for higher volume manufacturing' would have led one of ordinary skill to pursued the predictable combination of elements." Appx14-15 (citing Appx1274 at 10-20). In its explanation, the Board referred to "design incentives," noting cost and productivity as examples. In other words, the totality of the evidence before the Board indicated that a person of ordinary skill would have been motivated to combine the teachings of Hasegawa and Yamamoto.

The Board also reasoned—correctly—that "[w]hether implementation of Yamamoto's rapid cooling method makes commercial sense does not control the obviousness determination." Appx13. The existence of evidence that Yamamoto's rapid cooling method might have a commercial drawback does not compel a finding of nonobviousness. The Board so concluded, and its findings were supported by substantial evidence. *See also In re NTP, Inc.*, 654 F.3d 1279, 1292 (Fed. Cir. 2011) ("This court does not reweigh evidence on appeal, but rather determines whether substantial evidence supports the Board's fact findings."); *In re Jolley*, 308 F.3d 1317, 1329 (Fed. Cir. 2002) ("[W]here two different, inconsistent conclusions may

reasonably be drawn from the evidence in record, an agency's decision to favor one conclusion over the other is the epitome of a decision that must be sustained upon review for substantial evidence.").

Hitachi Metals also argues that this Court has reversed the Board in "nearly identical circumstances," pointing to *Institut Pasteur & Universite Pierre et Marie Curie v. Focarino*, 738 F.3d 1337 (Fed. Cir. 2013). Blue Brief at 32-34. The *Focarino* case bears little resemblance to the facts at issue here. In *Focarino*, "the sole prior-art reference identified by the Board" disclosed a method that was highly toxic to the cell at issue and "the Board identified *no reason at all* that a skilled artisan would have pursued a method toxic to cells." *Focarino*, 738 F.3d at 1345-46. By contrast, neither Hasegawa nor Yamamoto indicates that their combination would necessarily result in a diminished yield, and the evidence before the Board provides numerous reasons why a skilled artisan would have combined Hasegawa and Yamamoto. *See e.g.*, Appx715 at 3:49-57, 4:25-29; Appx716 5:46-58; *see generally supra* at § II(A)(1).

Before the alloy is ever pulverized, Yamamoto's rapid cooling method affords low-cost production, better alloy uniformity, and reduced α-Fe. *See supra* at § II(A)(1). Moreover, Yamamoto's alloy exhibits superior pulverizability and sinterability during later production stages. *See supra* at § II(A)(1). If a diminished

yield is the price to be paid for these advantages, the skilled artisan still has a reasonable expectation of success.

In view of the Board's factual findings and the substantial evidence supporting them, the Board's ultimate legal conclusion of obviousness is correct and without error.

B. The Board correctly held Claims 1, 5, and 6 obvious in view of Ohashi and Yamamoto.

As with the combination of Hasegawa and Yamamoto, there is no dispute among the parties and the Board that Ohashi and Yamamoto disclose every step of Claims 1, 5, and 6. There is overwhelming evidence supporting the Board's conclusion that it would have been obvious to use Ohashi's powder-removal method for a rapidly cooled alloy, such as that disclosed in Yamamoto.

1. The Board's factual findings underlying the combination of Ohashi and Yamamoto are supported by substantial evidence.

The Board's factual findings underlying its obviousness determination based on Ohashi and Yamamoto are supported by substantial evidence. **First**, substantial evidence supports the Board's finding that every step recited in Claim 1 was known in the art and, as claimed, was used for its known purpose. Appx18. Ohashi discloses coarse pulverization and fine pulverization of an R-Fe-B alloy (Appx698 at 4:24-41 and 41-45), as well as the removal of powder smaller than 2 μm, which would have a higher concentration rare earth element (Appx697 at 2:45-46;

Appx698 at 4:64-68; Appx699 at 5:11-36, 5:50-53; Appx674 at ¶81). Yamamoto discloses a rapid cooling method in the form of strip casting (Appx715 at 4:39-50; Appx716 at 6:16-29) at a cooling rate within the range of Claim 5 (Appx714 at 2:32-37; Appx715 4:25-29).

Second, substantial evidence supports the Board's finding that "a person of ordinary skill in the art would have known how to combine Yamamoto's rapid cooling method with Ohashi's pulverization and particle classification technique using known methods." Appx18. Yamamoto's R-Fe-B rapidly cooled alloy is intended to be pulverized into powder for permanent magnets (Appx714 at 2:17-23; Appx714-715 at 2:62 to 3:2; Appx716 at 6:16-29) and the Alliance's expert has confirmed that rapid cooling methods and ingot cast methods are interchangeable (Appx655-656 at ¶51; Appx671 at ¶77; Appx672 at ¶78).

Third, substantial evidence supports the Board's finding that "a person of ordinary skill would have recognized the results of [this] combination to be predictable." Appx19. Yamamoto discloses the predictable effect of strip casting on alloys (Appx714 at 1:29-37 and 59-64, 2:32-37; Appx715 at 3:49-57, 4:25-31; Appx716 at 5:46-58) and the predictability of using strip casting was confirmed by the Alliance's expert (Appx669-670 at ¶74; Appx671 at ¶77; Appx672 at ¶78).

Fourth, substantial evidence supports the Board's finding that "evidence of design incentives . . . would have prompted one of ordinary skill in the art to pursue the predictable combination." Appx19. As discussed earlier, Yamamoto discloses that rapid cooling results in a more uniform alloy with better pulverizability and sinterability, and which can be used to form magnets with "excellent properties." Appx714 at 2:32-37; Appx716 at 5:46-58. Dr. Ormerod agreed this would have motivated a person of ordinary skill to use a rapidly cooled alloy in Ohashi's process (Appx669-670 at ¶74; Appx671 at ¶77; Appx672 at ¶78) and confirmed the ubiquity of strip casting and its advantages at the time of the invention (Appx1273 at 14-19; Appx1274 at 10-20).

2. The Board considered and properly rejected Hitachi Metals' theory that a skilled artisan would not have combined Ohashi and Yamamoto due to diminished yield.

Reiterating its arguments regarding Hasegawa and Yamamoto, Hitachi Metals argues that a person of ordinary skill would not have combined Ohashi and Yamamoto because incorporating Yamamoto's strip casting into the Ohashi's process would have required discarding an unacceptable amount of powder leading to increased costs and an inferior product. Blue Brief at 34-35. The Board considered and rejected Hitachi Metals' arguments for the same reasons identified earlier.

There was substantial evidence that a person of ordinary skill would have weighed the advantages of strip casting against any diminished yield and found Yamamoto's rapid cooling method to be a suitable alloy production method for use with Ohashi. *See e.g.*, Appx716 at 5:46-58; Appx1274 at 10-20; *see generally supra* § II(B)(1). Further, there was substantial evidence that a person of ordinary skill would have known how to mitigate a reduction in yield. *See e.g.*, Appx788 at 17-22; Appx1486; *see generally supra* § II(A)(2). Applying the proper standard of review—disregarded by Hitachi Metals—substantial evidence supports the Board's conclusion that "[f]or the same reasons as described above in connection with the challenge based on the combination of Hasegawa and Yamamoto, Patent Owner's arguments do not persuasively rebut Petitioner's rationale relating to the combination of prior art elements according to known methods to yield a predictable result in light of design incentives that would have prompted one of ordinary skill in the art to pursue the predictable combination." Appx18.

3. The Board's legal conclusion of obviousness in view of Ohashi and Yamamoto was correct.

Hitachi Metals again attempts to convert the Board's factual findings into a legal question. However, Hitachi Metals' assertion that the Board "failed to support its conclusion with rational underpinnings" again fails for the reasons articulated above in Section II(A)(3) of this brief. *See* Blue Brief at 35-36.

Once again, Hitachi Metals' suggestion that its evidence was disregarded is contradicted by the Board's Decision. Blue Brief at 35-36. The Board was clear that Hitachi Metals' arguments were considered, weighed against the other evidence in the record, and found not to "persuasively rebut" the Alliance's overwhelming evidence of obviousness. Appx18. Moreover, Hitachi Metals' reliance on *Focarino* is again misplaced—neither Ohashi nor Yamamoto indicates that their combination would necessarily result in a diminished yield, and the evidence the before the Board provides numerous other reasons a skilled artisan would have combined Ohashi and Yamamoto. *See supra* at § II(B)(1); Blue Brief at 36.

C. The Board Correctly Held Claim 1 Anticipated by He and Claims 5 and 6 Obvious in View of He and Yamamoto.

With the exception of a rapid cooling method, the parties agree that He discloses every step of Claim 1. The parties also agree that Yamamoto discloses the limitations of Claims 5 and 6. In this appeal, the issue of whether He discloses a rapid cooling method is entirely a matter of claim construction. Specifically, there is no dispute that He's disclosure of "quick quenching" falls within the Board's definition of "rapid cooling method." As such, the only issue with respect to the anticipation of Claim 1 by He is whether the Board's construction of "rapid cooling method" was correct. *See Microsoft Corp. v. Proxyconn, Inc.*, 789 F.3d 1292, 1297-98 (Fed. Cir. 2015). With respect to Claims 5 and 6, the only issue is whether the Board correctly found that it would have been obvious to combine He and Yamamoto.

1. The Board properly construed the term "rapid cooling method" and correctly found Claim 1 anticipated by He.

The Board agreed with the Alliance that the '385 patent's specification provided a "clear definition" of the term "rapid cooling method." Appx7-8; Appx70 at 1:38-45. The Board's construction of "rapid cooling method" was therefore based on this definition: "a cooling method in which 'a molten material alloy is put into contact with a single chill roll, twin chill rolls, a rotary chill disk, a rotary cylindrical chill mold, or the like, to be rapidly cooled thereby producing a solidified alloy thinner than an ingot cast alloy.'" Appx7-8; Appx70 at 1:38-45. The Board's definition is rooted firmly in the patent specification and its breadth is consistent with the limitations of dependent Claims 5 and 6, requiring "a cooling rate in a range between 10^{2}° C./sec and 10^{4}° C./sec" and "cooled by a strip casting method," respectively. Appx76 at 14:1-4.

Hitachi Metals argued that the Board "erred by stretching its construction to reach cooling rates that one of ordinary skill in the art would consider in excess of 'rapid.'" Blue Brief at 44. However, Hitachi Metals arguments are "divorced from the specification and the record evidence." *Microsoft*, 789 F.3d at 1298. Hitachi Metals suggests that the term "rapid cooling method" should exclude methods with cooling rates that "exceed[] rapid cooling and enter[] the domain of super-rapid cooling." Blue Brief at 43-44. Yet, Hitachi Metals fails to identify any discussion

of super-rapid cooling in the ’385 patent’s specification or elsewhere in the intrinsic record.

Hitachi Metals also fails to articulate what the proper construction of “rapid cooling method” should be. Specifically, Hitachi Metals appears to argue that “rapid cooling method” should be defined in relation to cooling rates, without ever defining the term “rapid cooling method” in terms of a cooling rate range. *See* Blue Brief at 39-45. By contrast, the ’385 patent clearly defines “rapid cooling method” not by a particular range of cooling rates, but by the method used to cool the molten alloy. Appx70 at 1:38-45.

For the foregoing reasons, the Board’s construction of “rapid cooling method” and its determination of anticipation based on He should be affirmed.

2. The Board correctly determined that Claims 5 and 6 were obvious in view of He and Yamamoto.

The Board’s factual findings underlying its obviousness determination based on Ohashi and Yamamoto are supported by substantial evidence. Appx25-26. First, substantial evidence supports the Board’s finding that every step recited in Claims 5 and 6 was known in the art and used for its known purpose. Appx25; *see* Appx714 at 2:32-37; Appx715 at 4:25-50; Appx716 at 6:16-29. Second, substantial evidence supports the Board’s finding that “a person of ordinary skill in the art would have known how to combine [He and Yamamoto] using known methods.” Appx25; *see* Appx681-688 at ¶¶92-94; Appx1436 (strip casting is

"similar to melt spinning"). Third, substantial evidence supports the Board's finding that a person of ordinary skill "would have recognized the results of the combination to be predictable." Appx25-26; *see* Appx715 at 3:49 to 4:6, 4:39-59; Appx1273 at 14-19.

On the basis of these factual findings—each of which is supported by substantial evidence—the Board correctly held that Claims 5 and 6 were obvious in view of He and Yamamoto. Appx26.

III. The Board's Conclusions with Respect to the '765 Patent Should be Affirmed.

A. The Board correctly held Claims 1-4, 14, and 16 obvious in view of Ohashi and Hasegawa.

There is no dispute among the parties and the Board that Ohashi discloses every step of Claim 1 with the exception of a hydrogen pulverization method, Hasegawa discloses hydrogen pulverization, and Ohashi discloses every limitation of Claims 2-3, 14, and 16. The questions before this Court are thus **(i)** whether the Board's finding that it would have been obvious to combine Ohashi and Hasegawa is supported by substantial evidence and **(ii)** whether the Board correctly construed Claim 4 and correctly found that Ohashi discloses its "comprising oxygen" limitation. The Board's determinations in both instances should be affirmed.

1. The Board's factual findings underlying the combination of Ohashi and Hasegawa are supported by substantial evidence.

The Board's factual findings underlying its obviousness determination based on Ohashi and Yamamoto are supported by substantial evidence. **First**, substantial evidence supports the Board's finding that every element of Claim 1 is disclosed in the combination of Ohashi and Hasegawa. Appx37-39. Ohashi discloses coarse pulverization and fine pulverization of an R-Fe-B alloy (Ohashi at 4:24-41 and 41-45), as well as the removal of powder smaller than 2 μm such that "the volume fraction of the fine particles having a diameter smaller than 2 um in the alloy powder after particle size classification does not exceed 1%" (Appx697 at 2:45-46; Appx698 4:64-68; Appx699 5:11-36, 5:50-53). Ohashi's particle removal step necessarily involves "removing at least part of fine powder having a particle size of 1.0 μm or less to adjust the particle quantity of the fine powder having a particle size of 1.0 μm or less to 10% or less of the particle quantity of the entire powder," as recited in Claim 1. Appx2395-2400 at ¶72-77. Hasegawa discloses the use of hydrogen pulverization for coarsely pulverizing an R-Fe-B alloy in the production of permanent magnets. Appx689 at ¶0002-04.

Second, substantial evidence supports the Board's finding that "a person of ordinary skill in the art at the time of the '765 patent would have knowledge of the differences between mechanical and hydrogen pulverization techniques, and the resulting material alloys." Appx42; Appx36-37. Hasegawa discloses how hydrogen

is absorbed into the cast alloy to allow disintegration and discusses example particle sizes resulting from the pulverization. Appx689 at ¶0002, In addition, the Alliance's expert and Hitachi Metals' expert agree that hydrogen pulverization would have been a well-known method of coarse pulverization to a person of ordinary skill. Appx2379 at ¶44; Appx2395 at ¶71; Appx1304 at 9-17; Appx750 at 5-11; Appx795 at 19-23.

Third, substantial evidence supports the Board's finding that modifying Ohashi to use hydrogen pulverization would be "in accordance with Ohashi's teachings of conducting the pulverization in an atmosphere of a non-oxidizing *or* inert gas." Appx42-43. Ohashi cautions against oxidation by "atmospheric oxygen" and notes "adverse influences dues to the increased oxygen content in the alloy powder." Appx698 at 3:37-65, 4:45-50. Hitachi Metals' expert confirmed that hydrogen pulverization does not cause oxidation by atmospheric oxygen. Appx800 at 8-20; Appx802 at 6 to Appx803 at 13; Appx796 at 8-18; Appx2715 at ¶38.

Fourth, substantial evidence supports the Board's finding that "a person of ordinary skill in the art would have been motivated to modify Ohashi's method for the preparation of a permanent magnet of a [R-Fe-B] alloy . . . to incorporate Hasegawa's hydrogen pulverization technique in place of Ohashi's mechanical pulverization techniques in order to be able to more easily crush the material alloy." Appx46-47. Hasegawa discloses that hydrogen pulverization produces coarsely

pulverized alloy powder in "one-fourth of the time required with mechanical pulverization," which "reduces pulverization time and improves pulverization yield and pulverization efficiency." Appx689 at ¶0002. The Alliance's expert and Hitachi Metals' expert also agree that hydrogen pulverization was known to be is superior to mechanical pulverization. Appx2394-2395 ¶¶70-71; Appx1304 at 9-17; Appx2714; Appx789 at 22 to Appx790 at 1.

Fifth, substantial evidence supports the Board's finding that "there would have been a reasonable expectation of success in modifying Ohashi to incorporate Hasegawa's hydrogen pulverization technique in place of Ohashi's mechanical pulverization techniques." Appx47. Hasegawa discloses that, by 1992, hydrogen pulverization "was generally used as the method for the manufacture of rare-earth-iron-boron based magnet powder." Appx689 at ¶0002. Further, the parties' experts again agree that a person of ordinary skill would have recognized the widespread adoption of hydrogen pulverization for manufacturing powder for sintered magnets. Appx795 at 19-23; Appx1304 at 9-17.

Hitachi Metals fails to address the proper standard of review and instead argues that "[t]he Board's decision should be reversed because it failed to require evidence that the asserted combinations could be combined and would work for their intended purpose." Blue Brief at 47. To the contrary, the evidence is overwhelming that hydrogen pulverization was a well-known, widely adopted, and highly

advantageous process for pulverizing alloy powder for sintered magnets. Applying the proper standard of review, substantial evidence supports the Board's conclusion that it would have been obvious to combine Ohashi and Hasegawa. Thus, the Board correctly held that Claims 1-3, 14, and 16 obvious in view of Ohashi and Hasegawa. Appx19; Appx20-22.

2. The Board's construction of dependent Claim 4 was correct and should not be vacated.

The Board correctly concluded that the broadest reasonable interpretation of Claim 4 was that "the second pulverization step of finely pulverizing the material alloy . . . includes both a first sub-step of milling and a second sub-step of particle classification." Appx51-52. First, the plain language of the claims supports this construction. Claim 4 depends from Claim 3, which recites: "wherein in said pulverization step, the alloy is finely pulverized in a high-speed flow of gas." Appx87 at 13:40-42. The pulverization step in Claim 3 refers to the "second pulverization step of finely pulverizing the material alloy" recited in Claim 1. In particular, Claim 1 recites that the "second pulverization step" also includes the process of removing fine powder (the cyclone classification step). Thus, the plain language of Claim 1 is that "pulverizing" encompasses both the process of milling the alloy powder in the jet mill chamber and the process classifying the powder in the jet mill's cyclone—both of which utilize high-speed gas flows.

Second, the '765 patent's specification repeatedly describes "fine pulverization" as including a step of removing part of the fine powder. Appx81-82 at 2:66-3:7; Appx82 at 4:56-62; Appx85 at 10:46-50. Moreover, despite focusing on milling of the alloy powder, Hitachi Metals does not dispute that a high-speed flow of gas would be used in cyclone particle classifier disclosed in the '765 patent. Appx84 at 8:22-50.

Hitachi Metals also argues that "the Board based its conclusion on a new claim interpretation . . . without having given Hitachi Metals notice of or an opportunity to respond to the correctness of that interpretation." Blue Brief at 54. However, the Board's claim construction was responsive to arguments first raised by Hitachi Metals' in its Patent Owner Response. Appx2055-2058. In other words, the Board claim construction addresses an argument of Hitachi Metals' own invention. *Id*. Furthermore, Hitachi Metals' had the option of requesting leave from the Board to file a sur-reply addressing claim construction and elected not to. *See Nintendo of America, Inc. v. ILife Technolgies,* Case IPR2015-00106 (Paper 25) (Dec. 7, 2015) (granting patent owner leave to file sur-reply addressing claim construction). Because Hitachi Metals' raised the argument addressed by the Board's claim construction, addressed that claim construction at oral argument, and declined to request leave to file a sur-reply before the Board, the Board's decision with respect to Claim 4 should not be vacated. *See* Appx56-57.

For the foregoing reasons, the Board's construction is correct and should not be vacated. In addition, substantial evidence supports the Board's finding that Ohashi's particle classification "air stream" would "comprise oxygen" as recited in Claim 4. Appx699 at 5:11-36; Appx2403-2404 at ¶82. Accordingly, the Board's determination that Claim 4 is obvious in view of Ohashi and Hasegawa should be affirmed.

B. The Board correctly held Claims 11 and 12 obvious in view of Ohashi, Hasegawa, and Yamamoto.

There is no dispute among the parties and the Board that Yamamoto discloses the limitations added by Claims 11 and 12. There is overwhelming evidence supporting the Board's conclusion that it would have been obvious to combine use Ohashi's powder-removal method for a rapidly cooled alloy, such as that disclosed in Yamamoto.

1. The Board's factual findings underlying the combination of Ohashi, Hasegawa, and Yamamoto are supported by substantial evidence.

The Board's factual findings underlying its obviousness determination based on Ohashi and Yamamoto are supported by substantial evidence. **First**, substantial evidence supports the Board's finding that the additional steps recited in Claims 11 and 12 were known in the art and used for their known purpose. Appx57; *see* Appx714 at 2:32-37; Appx715 at 4:39-50. **Second**, substantial evidence supports the Board's finding that a person of ordinary skill in the art would have known how

to combine Yamamoto and Ohashi (as modified by Hasegawa) using known methods." Appx57; *see* Appx716 at 6:16-29; Appx2378 at ¶43; Appx2406 at ¶87. **Third**, substantial evidence supports the Board's finding that "a person of ordinary skill would have recognized the results of [this] combination to be predictable." Appx57 and Appx61; *see* Appx714 at 1:29-37 and 59-64, 2:32-37; Appx715 at 3:49-57, 4:25-31; Appx716 at 5:46-58; Appx2408 at ¶92; Appx1273 at 14-19. **Fourth**, substantial evidence supports the Board's finding that design incentives, such as lower cost and better productivity, would have motivated a skilled artisan to pursue the predictable combination. Appx61; *see* Appx716 at 5:46-58; Appx2408 at ¶92; Appx1274 at 10-20.

On the basis of these factual findings—all of which are supported by substantial evidence—the Board correctly found Claims 11 and 12 obvious in view of Ohashi, Hasegawa, and Yamamoto.

2. The Board considered and properly rejected Hitachi Metals' theory that a skilled artisan would not have combined Ohashi and Yamamoto due to diminished yield.

Hitachi Metals argues that "Claims 11 and 12 would not have been obvious based on [Ohashi, Hasegawa, and Yamamoto] for the same reasons that the claims of the '385 patent would not have been obvious." Blue Brief at 63. Hitachi Metals' attempt to convert the Board's factual findings into a legal question fails for the reasons articulated earlier in Sections II(A)(2)-(3) of this brief. The Board properly

rejected Hitachi Metals' arguments that combining Yamamoto and Ohashi (as modified by Hasegawa) would lead to diminished yield and that Ohashi teaches away from using hydrogen pulverization. Appx56-61. Weighing all of the evidence in the record, the Board found the facts described above and, on the basis of those factual findings, correctly held Claims 11 and 12 obvious in view of Ohashi, Hasegawa, and Yamamoto. Appx61-62.

CONCLUSION AND RELIEF SOUGHT

For the foregoing reasons, the Alliance respectfully requests that this Court affirm the Board's decision that Claims 1, 5, and 6 of the '385 patent are unpatentable and the Board's decision that Claims 1-4, 11, 12, and 14-16 of '765 patent are unpatentable.

Dated: October 26, 2016

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CERTIFICATE OF SERVICE

I hereby certify that a copy of the foregoing BRIEF OF APPELLEE was served on October 26, 2016 via filing with USCAFC's CM-ECF System, which caused a copy to be served by e-mail on all registered users listed below.

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I further certify that pursuant to ECF 10-B set forth in the Administrative Order Regarding Electronic Case Filing, I will submit six (6) copies of the forgoing BRIEF OF APPELLEE within five days of the court's acceptance of the brief in ECF, via UPS overnight, to the Clerk, United States Court of Appeals for the Federal Circuit, 717 Madison Place, N.W., Washington, D.C. 20439.

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I hereby certify that in accordance with Fed. R. App. P. 32(a)(7)(B)(i) the foregoing Brief of Appellee contains 12,528 words, excluding the parts of the brief exempted by Fed. R. App. P. 32(a)(7)(B)(iii), as measured by the word processing software used to prepare this brief.

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Dated: October 26, 2016

Respectfully Submitted by:

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