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RECORD OF ORAL HEARING

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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ALLIANCE OF RARE-EARTH PERMANENT MAGNET INDUSTRY,

Petitioner,

v.

HITACHI METALS, LTD.,

Patent Owner.

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Case No. IPR2014-01265 (Patent 6,537,385)
Case No. IPR2014-01266 (Patent 6,491,765)
Technology Center 1700

Oral Hearing Held on Friday, November 6, 2015

BEFORE: MICHAEL P. TIERNEY; MICHELLE R. OSINSKI (via video link); and JO-ANNE M. KOKOSKI; Administrative Patent Judges.

The above-entitled matter came on for hearing on Friday, November 6, 2015, at 1:00 p.m., in Hearing Room A, taken at the U.S. Patent and Trademark Office, 600 Dulany Street, Alexandria, Virginia.

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P R O C E E D I N G S

(1:00 p.m.)

JUDGE TIERNEY: Please be seated.

JUDGE OSINSKI: Good afternoon. This is the final hearing in IPR2014-01265 and 01266. The Petitioner is Alliance of Rare-Earth Permanent Magnet Industry. The Patent Owner is Hitachi Metals, Limited.

These cases concern U.S. Patent Numbers 6,537,385 and 6,491,765. I am Judge Osinski of the Elijah J. McCoy U.S. Patent and Trademark Office in Detroit, Michigan. And Judge Tierney and Judge Kokoski are joining you in Alexandria, Virginia.

Before we begin I would like to remind the parties that this hearing is open to the public and a full transcript of the hearing will be made part of the record.

When you refer to an exhibit on the screen, please state the slide or page number to which you are referring for the record. This is important for clarity in the transcript.

It is also important to help me keep track of the proceeding as I am unable to see what is being projected on the screen. I will be following along with my own copy of the demonstratives.

I will see you on the screen to my right, but the camera is in front of me, so I do apologize if you see the side of my head as I have a tendency to look at the video screen instead of the camera when I speak.

Similarly, I remind you that, although you may see me on the screen to either side of you, the camera is behind the Panel, so please feel free to keep looking straight ahead when talking to me.

Who is representing Petitioner today?

MR. KELLY: Myself, Your Honor, Mr. Chris Kelly.

JUDGE OSINSKI: Sir, could you please move to the microphone? I'm unable to hear unless you speak directly into the microphone.

Thank you.

MR. KELLY: Can you hear me now, Your Honor? I am Mr. Chris Kelly from Alston & Bird LLP for the Petitioner.

JUDGE OSINSKI: Okay. Thank you very much, Mr. Kelly.

Who is representing Patent Owner today?

MR. IRIE: I am, Your Honor. My name is Akira Irie from Morrison & Foerster.

JUDGE OSINSKI: Thank you, Mr. Irie.

Welcome to the Board. In accordance with our order dated October 2nd, 2015, each party has 75 minutes to present their case today.

Petitioner bears the burden of showing unpatentability of the challenged claims so you are going to proceed first, Mr. Kelly, followed by Patent Owner.

Also in accordance with our order, we ask you to present all of your arguments for both IPR2014-01265 and 01266 in one block. Petitioner may reserve rebuttal time, if desired.

Mr. Kelly, would you like to reserve rebuttal time?

MR. KELLY: I would, Your Honor. The Petitioner would like to reserve half an hour of rebuttal time.

JUDGE OSINSKI: Okay. So you will have 45 minutes for your opening argument and then 30 minutes for rebuttal.

Would you like a warning when you reach that point?

MR. KELLY: I would, Your Honor.

JUDGE OSINSKI: Okay. Thank you. Judge Kokoski has kindly agreed to handle the time and she will provide you with any warning. Your time will start when you begin to speak, so please begin when you are ready.

Thank you.

MR. KELLY: Thank you, Your Honor. I would like to begin -- can you hear me all right from here?

JUDGE OSINSKI: Yes, I can hear you.

MR. KELLY: I would like to begin at Petitioner's slide 2 from Petitioner's demonstratives. I would like to make sort of an opening point that I think is relevant to both of the IPR proceedings.

As you can see here, both of the lead independent claims in both the U.S. Patent 6,537,385 and U.S. Patent 6,491,765, which I will refer to respectively as the '385 patent and the '765 patent, both relate to methods of manufacturing alloy powder.

Both require dual pulverization steps and also a removal, particle removal step in the second of the two pulverization steps.

I think that all of the limitations in the pending claims, the Patent Owner and Petitioner would agree, are disclosed somewhere individually in the prior art references that are relied upon in the rejections adopted by the Board.

It seems to me from the Patent Owner's responses the only issue in almost all of the proposed grounds of rejection is whether or not it would have been obvious to combine those references together.

In particular the point I would like to make is that the issue is whether or not it would have been obvious for a person of ordinary skill to practice all of the steps that are actually recited in the method claims.

The Patent Owner's responses and in the Petitioner's view, nearly every argument made, relates to why it would not have been obvious to practice a very narrow set of particular steps in making an alloy powder which are not reflected in the pending claims.

And I think as the record in the IPRs reflects, there is a clear motivation for combining the references to practice the steps that actually are recited.

Absent any objection from the Board I would like to begin with the second IPR, which is actually the '765 patent.

JUDGE OSINSKI: That's fine. Thank you.

MR. KELLY: Turning to the Petitioner's demonstrative slide 5, we have all of the language from independent claim 1. We have citations to where each of the limitations in independent claim 1 are cited in either Ohashi or Hasegawa.

Is it okay if I refer to those references as Ohashi and Hasegawa?

And, again, I think there is really no dispute that each of those limitations individually are disclosed in one of the two references.

Moving to Petitioner's slide 6, I think there are two primary issues of whether or not it would have been obvious to combine the two references.

The first issue relates to the limitation in independent claim 1 which is bolded in slide 6, and, that is, wherein the first pulverization step comprises a step of pulverizing the material alloy with hydrogen pulverization.

The Petitioner's position is that Hasegawa provides clear motivation for using hydrogen pulverization in the method of Ohashi.

In particular, Hasegawa discloses that the pulverization completed by hydrogen pulverization can be accomplished in one-fourth of the time, it can be a mechanical pulverization, and at the time of Hasegawa's publication was generally used as the method for manufacturing of rare-earth powder.

In the Patent Owner's responses it has been suggested that Ohashi actually teaches away from hydrogen pulverization.

In the first bullet point quote on slide 6 from Ohashi, and I will read from column 4, lines 45 through 50 of Ohashi states: "It is essential that the alloy under pulverization is strictly prevented against oxidation by the atmospheric oxygen by conducting the pulverization in an atmosphere of non-oxidizing or inert gas."

I think it is a fair characterization to say that the Patent Owner's view is that the oxidation that Ohashi is worried about is any oxidation, be it by oxygen or hydrogen or any other element.

The Petitioner's view is that it is quite clear that the oxidation that Ohashi is worried about is oxidation by atmospheric oxygen.

And in particular Ohashi states, and this is the second bullet pointed quote in slide 6, that there is a concern about "adverse influences due to the increased oxygen content in the alloy."

Moving to Petitioner's slide 7, we would like to make a point that in hydrogen pulverization there is no increased oxygen content in the alloy.

And during her deposition Professor Lewis, who is the expert for the Patent Owner, we asked her whether or not oxides would result from the use of hydrogen decrepitation, and her answer was no.

We also asked: "In the course of hydrogen pulverization is an alloy oxidized by atmospheric oxygen during that process?"

And she seemed puzzled by that question and stated that it would be a disaster if oxygen was present in the hydrogen pulverization process.

So I think it is clear there is no risk of an increased oxygen content during hydrogen pulverization and, therefore, really no reason that a person of ordinary skill would not have wanted to use it based on a disclosure of Ohashi.

And just for the record I note that the quotes I'm referring to from Professor Lewis' deposition are shown on slide 7 of Petitioner's demonstrative.

The second issue with respect to claim 1 of the '765 patent I think is whether or not it would have been obvious to remove particles as claimed in independent claim 1 based on the combined disclosure of Ohashi and Hasegawa.

The Petitioner's view is that Ohashi's removal of fine particles smaller than two microns, such that they constitute no more than 1 percent of the final powder, necessarily encompasses the removal of particles that are smaller than one micron, as recited in independent claim 1, and would necessarily result in the final powder having a sub-one micron content of 10 percent or less.

The Patent Owner's argument, as I understand it, is that there would not have been any motivation to remove particles as disclosed in Ohashi in an alloy that had been hydrogen pulverized as disclosed in Hasegawa.

And my understanding is that their argument is sort of two-fold.

The first is that the retention of particles between one and two microns has some value, and the second is that the magnetic properties of the alloy deteriorate unexpectedly at 10 percent.

The first point I would like to make is that the claim does not cover the retention of particles larger than one micron.

Indeed, the focus of the '765 patent is on the removal of those particles which are believed to negatively affect the final magnet's performance. And there is simply no disclosure relating to the retention of any particular range of particles, and that is certainly not recited in independent claim 1.

In addition, independent claim 1 of the '765 patent recites that the final particle, the final content in the final powder of sub-one micron particles is 10 percent or less.

If there is, indeed, any invention in the fact that the magnetic properties deteriorate at 10 percent, I would find that irrelevant to the pending claim because it covers alloys in which the content of sub-one micron particles are as low as half a percent.

So the claim is not narrowly tailored to what the Patent Owner argues is the novel aspect of that claim.

I would also like to point out that the Petitioner's view is that the 10 percent threshold of claim 1 is one that would not have been unexpected.

Based on what we can determine from the '765 patent's disclosure, the inventors arrived at that percentage by varying the amount of super-fine powder in the alloy which, in turn, resulted in a change in the oxygen content of the alloy.

This was a known result-effective variable. In Ohashi it was known to remove particles smaller than two micron and it was known in Ohashi that that would affect the oxygen content of the alloy.

As you can see here, as the super-fine powder percentage goes down from 15 to 0.5, so, too, does the oxygen content in the powder. And with those reductions the magnetic properties improve.

In the '765 patent it even states that the best magnetic properties, not surprisingly, are at 3 percent, and that even 5 percent is better than 10 percent.

So I think what Table 1 of the '765 patent indicates is that there is an entirely expected relationship between magnetic properties and the amount of oxygen in the alloy, and the amount of oxygen in the alloy would have been well known to be related to the content of the super-fine powder.

Therefore, the Petitioner's view is that these results are not unexpected at all.

I would also like to comment briefly on dependent claims 3 and 4. The first point I would like to make is one of effectively claim construction, and this is a point that I think is necessitated by the argument that the Patent Owners make.

Dependent claim 3 recites that the alloy is finely pulverized in a high speed flow of gas. However, that high speed flow of gas is recited as part of said pulverization step. Where the claim reads the alloy is finely pulverized, that indicates to the Petitioner at least that this is referring to the second pulverization step.

And I will step back to slide 8 which shows the language of independent claim 1.

The second pulverization step includes both finely pulverizing the alloy and the particle removal step, which is the last step of independent claim 1.

So our view is that the high speed flow of gas -- and I will flip back to Petitioner slide 10 here -- the high speed flow of gas, dependent claim 3, is a high speed flow of gas either in the milling chamber of the jet mill or in the classifying chamber of the jet mill.

Dependent claim 4 recites that that gas comprises oxygen. I would note that there is no limitation on the amount of oxygen in the gas.

And I would also note that dependent claim 5 recites that the oxygen content is "in the range between 0.5

percent and 3 percent by volume." Under the Doctrine of Claim Differentiation the oxygen content of claim 4 must necessarily extend to oxygen contents outside the range of dependent claim 5.

The Petitioner believes that the broadest reasonable construction of dependent claim 4 is a high speed flow of gas which comprises any amount of oxygen.

Turning to whether or not, with that construction, turning to whether or not the references disclose that limitation, I will turn to Petitioner's slide 11.

With respect to high-speed gas in the milling chamber, I would note that Dr. Ormerod confirmed in his declaration that some amount of oxygen cannot be removed from that chamber.

And if you refer to the '765 patent's figure 2, that is the chamber 14. So regardless of the content of the gas that is actually being emitted from the jets 28, our expert's view is that there is some oxygen in that chamber and, as Professor Lewis confirmed in her deposition in the quote that is indicated, at slide 11, that gas in the milling chamber would necessarily be moving at a high speed.

With respect to the cyclone, high-speed gas in the cyclone classifier, which is 16 in figure 2, I would step back to Petitioner slide 10. Ohashi discloses the classification is accomplished via "an air stream" and

Hasegawa discloses that classification is accomplished via wind power.

Petitioner's view is that a person of ordinary skill would understand either an air stream in Ohashi or wind power in Hasegawa to contain some amount of oxygen.

JUDGE OSINSKI: Mr. Kelly, I actually have some questions about claim 4.

MR. KELLY: Okay.

JUDGE OSINSKI: So I understand your position to be that particle classification is part of the second step, but then I think of that second step as including kind of both fine pulverization and particle classification, and when claim 3, dependent claim 3 kind of says that alloy is finely pulverized in a high speed flow of gas, it seems that maybe that does have to refer to what is happening to that fine pulverization in the milling chamber as opposed to what is happening with respect to the particle classification?

MR. KELLY: Sure. The Petitioner's view is that based on the '765 patent the term pulverization is used consistently to refer to the milling, which is occurring in the milling chamber, and the classification that is occurring in the cyclone classifier.

And, again, I would note, if you look at the language of independent claim 1, and I will refer to Petitioner slide 8, the second pulverization step is, indeed, called a pulverization step.

And so -- and that includes the removal of particles in the last limitation which is occurring in the cyclone. So I would sort of view both milling and classification to be components of pulverization, within the meaning of independent claim 1.

May I move on?

JUDGE OSINSKI: That addresses my question. I just want to follow up on a second different point.

So is your kind of alternative position that Ohashi has some leftover oxygen in its jet mill?

MR. KELLY: The Petitioner's --

JUDGE OSINSKI: I -- go ahead.

MR. KELLY: Sorry. The Petitioner's view is that in any conventional jet milling apparatus there would be some amount of oxygen in the milling chamber, which our expert supports the idea that not all of the oxygen can be removed even if you are trying to remove the oxygen.

So in any conventional jet milling apparatus, such as the one in the '765 patent or the one that a person of ordinary skill would understand is referred to in Ohashi or Hasegawa, there is going to be some oxygen in that chamber delivered or not, and so that meets the limitation of the claim.

JUDGE OSINSKI: Okay. Thank you.

MR. KELLY: I would like to now turn to dependent claims 11 and 12. As you will see, dependent claim 11 recites the rapid cooling method in independent claim 1 must have a specific cooling rate of 10 to the second Centigrade per second, to 10 to the fourth Centigrade per second, Celsius, excuse me.

And dependent claim 12 states that the melt of the alloy is cooled by a strip casting method.

Again, the Petitioner's view is that there is clear motivation to use -- well, it is clear that the Yamamoto reference discloses strip casting. It is clear that the Yamamoto reference discloses a cooling rate within the claimed range. And it is clear that there would have been motivation to use strip casting.

Yamamoto discloses that one can obtain a more uniform alloy from strip casting and that would have been a primary motivation for a person of ordinary skill to use Yamamoto's strip casting in the method of Ohashi combined with Hasegawa.

I would also note that, as we pointed out in our reply, strip casting was well known to be lower cost and more productive than other methods of alloy production.

In rebuttal to this point the Patent Owner suggests that there is an inherent concern with yield, that is, the yield resulting from the alloy production process when one combines strip casting of Yamamoto, for example, with the hydrogen pulverization of Hasegawa and the particle removal of Ohashi. And the Patent Owner characterizes the 10 percent threshold in claim 1 as a solution to this problem.

In other words, the retention of sub-one micron particles up to 10 percent allows one to keep more powder, in the final powder and, therefore, solve a problem relating to yield.

The Petitioner would note first that the '765 patent never mentions anything relating to yield. It never identifies that as a problem. And the only focus in the '765 patent is on the removal of sub-one micron particles because they increase the oxygen content of the alloy.

Second, if 10 percent retention, up to 10 percent retention of sub-one micron particles is required to solve the yield problem, then the claim, which covers 10 percent or less super-fine content, is not narrowly tailored to the alleged invention.

The claim would prevent someone from removing particles such that only half a percent of super-fine particles are in the final powder.

And according to the Patent Owner's logic, that would not solve any problem relating to yield. It would seem that one would need to be near the 10 percent limitation. And so I think this is another example of the Patent Owner arguing for the patentability of a claim that doesn't exist.

If the claim was narrowly tailored to keeping 10 percent, that would be a different issue, but it is not. It requires 10 percent or less. So there is a range of effectively zero to 10 in independent claim 1.

I would like to next move to slide 13. The Patent Owner tries to support its position relating to yield by referring to the Hattori reference which is I believe Exhibit 2013 in the '765 patent IPR. The Patent Owner suggests that Hattori indicates that one would have to throw away 30 percent of the powder if you were to combine Ohashi, Hasegawa and Yamamoto.

First of all, the relevance of the Hattori patent or, I guess, article, excuse me, is somewhat questionable because it was published in 2009, nine years after the time of the invention. So what it would have meant to a person of ordinary skill at the time of the invention I think is very little.

I would also note that Hattori only indicates particle size distributions for three average particle sizes, and you will see that powder 1, 2 and 3 is indicated at figure 2. Those correspond to median particle sizes of 1.6, 2.6 and 4.6.

In the '765 patent the acceptable range of average particle size is from two to 10 microns. And Dr. Ormerod and

Ohashi agree that three to 10 microns is also an acceptable range.

So I think Hattori's disclosure is really only relevant to a small portion of the particle size that is contemplated in the '765 patent. Moreover, none of the claims recite a particular range of particle size. So I think Hattori's relevance is extraordinarily narrow.

The Petitioner would also note that the amount of super-fine particles that would have to be thrown away can be controlled by adjusting the jet milling settings.

And, in fact, Hattori is evidence of this. The way that one would arrive at these different particle size distributions is by adjusting the jet milling settings.

And you can see that as you move from a 1.6 particle size of powder 1 to a 4.6 particle size of powder 3, the amount of particle that, for example, 2 percent, drops from above 75 percent in powder 1 to below 25 percent in powder 3.

And I would submit to the Board that a person of ordinary skill could imagine what would happen if you increase the particle size to 10.

So -- please.

JUDGE OSINSKI: Mr. Kelly, so I'm kind of understanding that you can address some of these downfalls that are going to be created through the use of specific cyclone parameters.

But it still does leave me wondering why a more uniform alloy would motivate one of skill in the art to make the change in the first place if you then have to provide all these kind of secondary actions to be able to make it still work.

Why would one of skill in the art be motivated because it produces a more uniform alloy to utilize the strip casting if it then requires all this additional change to the process?

I'm almost more interested in the predictable combination, you know, incorporating strip casting in place of the ingot casting method, but there is not a lot of discussion of that in the petition.

MR. KELLY: Sure. So the -- I would say that one of the reasons there is not a lot of discussion of this in the petition is because almost everyone was using strip casting at the time of the invention, and we didn't anticipate that this would be much of a point of contention.

But I would say that the reason one would want to use strip casting, because it results in a more uniform alloy. From a chemical standpoint, when that alloy is crushed, you get a much narrower distribution of particle sizes.

So all of the particle sizes, whatever they may be, 2.6 or 10 micron, they are grouped together much more closely so you get a much more consistent alloy.

As a result of that, it is much more easy to produce a magnet with better magnetic properties because a greater percentage of those particles are single-crystal particles and they orient much more easily in the final magnet.

So I think that a person of ordinary skill would have understood that a more uniform alloy from just a magnetic chemical perspective was preferable, and adjusting the jet milling settings to accommodate that is something that just would not have been that difficult.

You know, it's not -- there is a classifier router. There's the feed rate into the jet mill. There are basic settings that anyone would have adjusted, in the Petitioner's view.

JUDGE OSINSKI: Okay. Thank you.

JUDGE TIERNEY: I would like to stop here for a moment. We have been talking about motivation to combine. Let's back up and look at a more KSR rationale which is known elements combined with a known purpose to achieve a predictable result.

Can you walk me through that, for both the '385 patent and the '765 patent, with just claim 1, are all of the elements known in the art?

MR. KELLY: Sure.

JUDGE TIERNEY: I think we have covered that so a yes or no is pretty straightforward for me at this point.

MR. KELLY: I'm sorry, you are looking for a yes or no --

JUDGE TIERNEY: Are they all known? And I think we've covered that briefly.

MR. KELLY: Yeah, I mean, the Petitioner's view is that every single limitation in every single claim in issue in the IPRs was known in the art and disclosed in the art.

JUDGE TIERNEY: Okay. Are they all being used for their known purpose?

MR. KELLY: Yes, they would be, Your Honor.

JUDGE TIERNEY: Are they achieving a predictable result?

MR. KELLY: Yes, they are, Your Honor.

JUDGE TIERNEY: Okay. Could you please address the allegation at least in the 1266 case regarding the '765 patent about the unexpected results?

MR. KELLY: I'm sorry?

JUDGE TIERNEY: There is an allegation of unexpected results regarding the '765 patent in the IPR2014-1266.

MR. KELLY: You are asking me to address that issue?

JUDGE TIERNEY: If you could just point out are there unexpected results there that would counter the allegation that this is just known components being used for a known purpose to achieve a predictable result.

MR. KELLY: No, Your Honor, we're not -- well, yes, I can address that. The Petitioner is not aware of any aspect of the '765 patent that would have been unexpected, and we address that in slide 9 here.

My understanding is that the only thing that is suggested as being unexpected is the 10 percent limitation. That's not described as being unexpected in the '765 patent.

And the Petitioner's view is that anyone testing the alloy with the known changes, using a known control variable, would not have been surprised by the results in Table 1.

JUDGE TIERNEY: Okay. Now that we've focused on Table 1, I have a question.

MR. KELLY: Sure.

JUDGE TIERNEY: I have looked at the deposition testimony of Mr. -- I'm going to pronounce his name wrong -- your expert --

MR. KELLY: Ormerod, yes.

JUDGE TIERNEY: -- Ormerod. He indicated that he did not know the parameters, you know, what percent errors were acceptable in this.

Do we have any testimony from anyone in this proceeding who actually conducted that test before us?

MR. KELLY: The Petitioner does not have any evidence of someone who actually conducted that test.

JUDGE TIERNEY: Has the Patent Owner -- are you aware of any evidence that Patent Owner has put in regarding this table and how the experiment was conducted?

MR. KELLY: I'm not aware, no.

JUDGE TIERNEY: So where he was indicating that he needed more information in order to provide a reasoned discussion of this table, he was unable to have such because it is not in the evidence of record?

MR. KELLY: My recollection of Dr. Ormerod's position is that he was concerned about the error rate basically, you know, the rate of these results.

The Petitioner's view is that if you are thinking about it from the perspective of would a person of ordinary skill arrive at the invention of claim 1, the Table 1, if anything, supports that position.

And so whether or not -- certainly if Table 1 cannot be trusted because there is no disclosure of the exact methodology or the error rate, if you disregard it then I think our other arguments stand. If you keep it and consider it, I think it supports Petitioner's position.

JUDGE TIERNEY: Would this be considered hearsay, Table 1, that is?

MR. KELLY: I don't know, Your Honor. It is a figure in the '765 patent and that's why we are pointing to it, because it is the only evidence we have of why the claims in that patent would have allegedly been unexpected or related to unexpected results.

JUDGE TIERNEY: Without someone testifying as to how the experiment was conducted and actually as to the accuracy of the data reported, how much weight should we give the Table 1?

MR. KELLY: Your Honor, I think the results in Table 1 should be treated with some skepticism. But the point I would make to the Board is that, even if you do give all faith and credibility to the results in Table 1, the result is still the same, that they are not unexpected.

So my view is that -- or the Petitioner's view is that the Board doesn't necessarily need to reach a decision on whether or not significant weight needs to be accorded to Table 1 because, even if you do, the Table 1 supports the position of the Petitioner.

JUDGE TIERNEY: Thank you.

MR. KELLY: The last point I would like to make on the '765 patent is I would like to point to figure 3 in the '765 patent.

And the version of figure 3 which is shown at slide 14 is taken from the Patent Owner's response at page 19, of the 1266 response.

The Patent Owner suggests that all of the particles in the area in gray would have to be removed if one were to follow the teachings of Ohashi. And the quick point I would like to make is that that is not necessarily true. Ohashi teaches the removal of particles below two microns -- so to the left of the number 2 on the X axis on slide 14 -- such that they constitute no more than 1 percent of the final alloy powder.

If you look on the Y axis and you count down from the 5, which is indicated on the Y axis, over to the first hashmark which would be the 1 percent hashmark, and then you draw a straight line to the right along, parallel to the Y axis, it would be only the particles above that line and to the left of the 2 micron indicator that would have to be removed.

So it is actually a small portion of the particles that are indicated on figure 3.

I would like to turn to the '385 patent now, unless there are other questions on the '765 patent.

So turning to claim 1 of the '385 patent, the first adopted combination of Hasegawa and Yamamoto, I think the issues are very much the same.

The Petitioner's view is that all of the limitations are disclosed in the two prior art references, and the only issue is whether or not it would have been obvious to combine those two references together.

I would note in particular that Hasegawa is extraordinarily clear about the removal of particles that are rare-earth-rich, and also that the motivation for doing that in Hasegawa is exactly the same as that in the '765 patent and the same as in Ohashi, and, that is, that those particles are removed because they are susceptible to oxidation.

With respect to whether or not the combination of Hasegawa and Yamamoto would result in a diminished yield, I think the issues are pretty much identical to those we addressed in the '765 patent.

The one thing I would note is that in the '385 patent there is absolutely no limitation on the content of particles that are removed.

So as the Patent Owner suggests, if 10 percent is indeed a solution to the problem of yield, that is, keeping 10 percent of the sub-one micron particles, then this is not reflected anywhere in claim 1.

And so it would seem untenable to me to, on the one hand, advocate that 10 percent is an inventive solution to the problem of yield and then, on the other hand, advocate that independent claim 1 in the '385 patent is, nonetheless, patentable over effectively the same prior art.

The other point I would make is that the Patent Owner refers again to Hattori and suggests that, I believe, 58 percent of the particles would have to be thrown away at the 4.6 micron level in Hattori.

And the point I would again make is that that argument is how much powder would have to be thrown away if one were to use the exact same alloy in Hattori, the exact same jet milling settings in Hattori, and mill the powder to exactly 4.6 microns as disclosed in Hattori.

That is not evidence of how much powder would have to be thrown away for any particle size, average particle size from two to 10 and for any alloy that was strip cast and hydrogen pulverized.

With respect to ground B in the '385 patent, once again all of the limitations the Petitioner believes are clearly disclosed in Ohashi and Yamamoto.

And I would like to make the point that the Patent Owner relies instead of on Hattori to the Li reference, which is Exhibit 2011, I believe, in the '385 patent IPR, as evidence for the amount of particles that would have to be thrown away.

The Patent Owner says that between 8 and 12 percent of the particles would have to be thrown away at an average particle size of around 5.9, which is what I think is reflected in Li.

Similarly, to the issues with the Hattori reference, Li was published in 2006 and I think is of minimal guidance to issues here.

I would also note that Li in the Petitioner's view actually supports our arguments that jet milling settings can control the amount of super-fine particles that are thrown away. Li discloses that the bottom figure, which is what you see on slide 19, the Petitioner's demonstrative, is the particle size distribution before optimization of jet milling processes.

The top figure is what happens after those processes are optimized. And you can see that the particle size distribution gets much narrower and the amount of fine particles decreases.

So Li actually supports the notion that one can reduce the amount of super-fine particles by adjusting jet milling settings.

In addition, I would note that the notion that one would have to throw away 8 to 12 percent of the particles based on the disclosure in Li, again, is only true for the exact average particle size distribution that Li indicates here in figure 1, and is only true for the exact alloy that Li has tested.

So I think that is just of little relevance to the broad claim of independent claim 1 in the '385 patent, which has absolutely no limitation on the amount of particle, the amount of particles removed.

And I think that is evident in the '765 patent's focus on the removal of R-rich particles.

I think it is clear from the record that the inventors of the '385 patent simply believe that removing R-rich particles was a novel idea, and it was not.

The last issue I would like to address is the rejection, the anticipation rejection based on the, I will say He reference. I'm not exactly sure how it is pronounced.

I don't think there is any dispute that all of the limitations of claim 1 are disclosed in He with the exception of an alloy produced by rapid cooling.

The Patent Owner's argument, as the Petitioner understands it, is that He's disclosure of an alloy made from quick quenching is not rapid cooling.

The first point I would like to make on that issue is that we believe that quick quenching refers to strip casting, which is rapid cooling. That is what Dr. Ormerod, the Petitioner's expert, testified.

And if the Board agrees that quick quenching is, indeed, strip casting, then I think it is clear that limitation of claim 1 is disclosed. If, as the Patent Owner suggests, quick quenching is actually the melt spinning process, which they would characterize as super-rapid cooling, our position is that that is still a rapid cooling method.

The definition of melt spinning offered by the Patent Owner is that a melt is sprayed through an orifice in a quartz tube onto a rotating water-cooled copper wheel or disc.

Similarly, the definition of rapid cooling offered in the '385 patent is that the molten material is poured onto, among other things, a rotary chill disk. So I would argue that rapid cooling would -- should be construed to include melt spinning.

Moreover, I would note that dependent claims 5 and 6 relate to cooling rates between 10 to the two and 10 to the fourth Celsius per second and also strip casting in particular. And so under the Doctrine of Claim Differentiation, independent claim 1 of the '385 patent should be construed, the rapid cooling method of independent claim 1, should be construed to cover methods outside of these two here.

Nevertheless, even if quick quenching is construed to not include melt spinning and even if He's disclosure of quick quenching is believed to mean melt spinning, the Petitioner's view is that it would have been obvious to use strip casting at the recited cooling rate based on the disclosure of Yamamoto.

The only reference I'm aware -- or the only argument I'm aware of that the Patent Owner makes as to why that would not have been obvious is that melt spinning achieves a higher cooling rate and is, therefore, advantageous.

I think, if that were true, then no one would ever use strip casting. As we've talked about before, strip casting was widely used at the time of the invention. And if it is true that a person of ordinary skill would not have used strip casting because its cooling rate was lower than melt spinning, then I'm not sure why that would be the case.

And that's all I have on my opening, unless there are other questions.

JUDGE OSINSKI: Mr. Kelly, so what is your claim construction for rapid cooling? Does it require that the molten material be put in contact with chill rolls, disks, and molds or the like?

MR. KELLY: Yes, Your Honor, I would say that rapid cooling should be defined as any method of cooling where -- and I will quote from the '385 patent -- "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."

JUDGE OSINSKI: Do we know that quick quenching requires the use of those type of tools?

MR. KELLY: Well, Your Honor, the Petitioner would admit that He does not provide a clear definition of what quick quenching is.

What our position is, is that a person of ordinary skill reviewing the term quick quenching would understand that to mean rapid cooling, and certainly would not understand that to mean some form of super or ultra-rapid cooling as the Patent Owner suggests.

JUDGE OSINSKI: Okay. You have the statement from your expert to that effect, about quick quenching being rapid cooling?

MR. KELLY: Yes.

JUDGE OSINSKI: Is there any other evidence that I'm missing in the record? Is it merely relying on the expert statement?

MR. KELLY: Yes, Your Honor, and I think that is necessary because the purpose of the expert is to offer opinions on what a person of -- how a person of ordinary skill would have interpreted the reference.

And we don't dispute that a clearer definition of quick quenching is not provided in He, and so the evidence we've offered is Dr. Ormerod's testimony.

JUDGE OSINSKI: Okay. Thank you.

MR. KELLY: Thank you.

JUDGE OSINSKI: Okay. Thank you, Mr. Kelly.

Mr. Irie, whenever you are ready, you have 75 minutes for your response.

MR. IRIE: Before I begin, Judge Osinski, I may make some hand gestures during my argument and I just wanted to make sure which direction am I supposed to do it in? This way?

JUDGE OSINSKI: I'm over here.

MR. IRIE: Okay. So I should go --

JUDGE OSINSKI: If you face the Panel I should be able to see it.

MR. IRIE: Okay. All right. Thank you.

JUDGE OSINSKI: Okay. Thank you.

MR. IRIE: And I do apologize in advance for that.

Okay? I would like to begin then.

JUDGE OSINSKI: Okay. Please proceed.

MR. IRIE: Good afternoon, Your Honors. My name is Akira Irie and I'm here on behalf of Hitachi Metals, and also joined today by Mehran Arjomand as well, and we are both from Morrison & Foerster.

Before I get into the argument I just wanted to briefly introduce Hitachi Metals on slide 1 of the Patent Owner's slides. Hitachi Metals is a Japanese magnet manufacturer. They make, some of their magnets, Neodymium-Iron-Boron magnets, that are sold under the trade name of Neomax. In addition, they have a very large patent portfolio of over 600 patents, of which two are the patents that are at issue here today.

Moving then to slide 3, I would like to first address the Petitioner's arguments as to the '765 patent, and specifically claim 4, which is reproduced on slide 4 here -- or, sorry, claim 1.

The dispute on claim 1 of the '765 patent, it turns on two parts, the hydrogen pulverization requirement, and the second part, the particle removal limitation. I would like to first address the hydrogen pulverization.

On slide 5 we have the excerpt from the Ohashi reference. This is the principal reference that Petitioner is relying on as part of the combination to invalidate claim 1. And in this passage there are, as we see it, two parts in this passage.

The first part of the Ohashi passage that's on slide 5 is talking about a goal, what Ohashi is trying to do, and that is to prevent oxidation.

The second half of this passage which has a highlighted portion of the non-oxidizing or inert gas, that is the means by which Ohashi is going to achieve its goal. And so Ohashi says there is a goal here and the way you achieve that goal is by using a non-oxidizing or inert gas.

Now, with this teaching from Ohashi in mind, when you try to combine Ohashi with the hydrogen pulverization of Hasegawa, you run into a problem.

JUDGE TIERNEY: Why don't we stop here. What exactly is the goal they are trying to achieve in Ohashi? Is it preventing oxidation or is it preventing oxidation by atmospheric oxygen?

MR. IRIE: We submit that it is preventing against oxidation by oxygen.

JUDGE TIERNEY: Because the literal language is "prevented against oxidation by the atmospheric oxygen."

MR. IRIE: Yes. So we agree that that is the means or, sorry, the goal that Ohashi is attempting to accomplish.

JUDGE TIERNEY: I think we have a difference here, because there is a difference between just oxidation in general and then there is oxidation by atmospheric oxygen, which is kind of a species of the general oxidation.

Are they trying to prevent the specific, the species oxidation by atmospheric oxygen, or the genus of any oxidation?

MR. IRIE: The goal is to prevent against oxidation by the atmospheric oxygen. The specific means that Ohashi employs is broader than that. They say you want to avoid that by using a non-oxidizing or inert gas.

JUDGE TIERNEY: But wouldn't one of ordinary skill in the chemical arts know that if you use hydrogen it would not have oxidation by atmospheric oxygen?

MR. IRIE: Yes, Your Honor, but the problem is that one of ordinary skill in the art would also look at the specific means that are prescribed by Ohashi, which says that you are supposed to use a non-oxidizing or inert gas.

And they will look at hydrogen gas in the context of hydrogen pulverization and try to figure out is hydrogen going to be oxidizing and is hydrogen gas going to be inert.

So moving to slide 6 here, we see first off that hydrogen gas in the context of hydrogen pulverization is obviously not inert. This is a chemical pulverization process in which the hydrogen gas will be reacting with the Neodymium-rich portion of the alloy.

Moving then to slide 7, this is the portion about where the hydrogen is oxidizing. At a chemical level, when you perform hydrogen pulverization, the Neodymium-rich phase in your alloy is going to react with the hydrogen, and the Neodymium-rich phase, for all intents and purposes, is basically pure Neodymium.

And so you can imagine the reaction as being Neodymium reacting with hydrogen, in which case Neodymium is going to be -- lose the electrons to hydrogen, which is oxidation. And so in the context of hydrogen pulverization, the hydrogen gas is going to be an oxidizing agent.

And so going back then to the passage from Ohashi on slide 8 here, we see that because Ohashi prescribes as the means for accomplishing its goal as using non-oxidizing or inert gas, the conclusion that follows from that is that one skilled in the art viewing this passage would not have been motivated to use hydrogen pulverization.

JUDGE OSINSKI: Mr. Irie, could you correct me if I'm wrong, but are we just substituting hydrogen pulverization for mechanical pulverization, and is hydrogen pulverization a well known and common technique used to crush the alloy more easily? Is there anything unpredictable about substituting hydrogen pulverization for mechanical pulverization?

MR. IRIE: Your Honor, to answer your first question, yes, the combination of switching a mechanical pulverization of Ohashi to the hydrogen pulverization of Hasegawa.

As to the second point, as to whether it would have been predictable, there is testimony from Dr. Lewis that if you were to switch from a mechanical pulverization process to a hydrogen pulverization process, then you would, for example, have to change your starting alloy composition in order to take that into consideration. And this is at paragraph 90 of Dr. Lewis' declaration.

JUDGE OSINSKI: And Dr. Lewis' declaration is Exhibit 2002, correct?

MR. IRIE: That's correct, Your Honor.

JUDGE OSINSKI: Okay. Thank you. Just for the record, thank you.

MR. IRIE: Now, another problem with the Petitioner's proposed combination for Ohashi with Hasegawa is that in their original papers they state that the motivation to make this combination is because the "non-oxidizing or inert gas" environment language in Ohashi suggests the use of hydrogen, which is a non-oxidizing gas.

But when Dr. Ormerod was questioned about this point during his deposition, he essentially admitted that he did not have an opinion as to whether hydrogen is actually an oxidizing gas in the context of hydrogen pulverization.

JUDGE TIERNEY: Again, couldn't that be interpreted as Dr. -- again, the name -- Ormerod, Dr. Ormerod testifying that basically what he understood Ohashi to mean was don't put it in an oxygen atmosphere because oxygen is what they are trying to avoid?

MR. IRIE: We respectfully submit that in terms of the questioning and answering that Dr. Ormerod was presented with during his deposition, he was asked specifically is hydrogen gas accepting electrons from the Neodymium --

JUDGE TIERNEY: I'm referring to the direct testimony, not the deposition. I understand in a deposition you would understand that you are asking if hydrogen is an oxidizing reagent.

But for purposes of his declaration, though, his direct testimony, wasn't he merely indicating that Ohashi indicated to him don't use it with atmospheric oxygen?

MR. IRIE: No, Your Honor, because Dr. Ormerod is relying on the passage non-oxidizing or inert gas, the means portion of the Ohashi passage. He is not referencing the goal portion of Ohashi.

I would like to then move to the second portion of claim 1. This is the particle removal portion which is reproduced on slide 10. And there are two colored portions here, because I want to emphasize --

JUDGE TIERNEY: I'm just going back to his direct testimony, paragraph 71, and he is talking about using -- Ohashi suggests using a non-oxidizing gas, such as hydrogen.

Not to quibble too much, but I believe what I'm taking away from his direct testimony is he understood Ohashi to say don't use atmospheric oxygen.

He was not focused on the second part of the sentence, what you are saying was just oxidizing-type reagents but, rather, avoiding the presence of oxygen itself.

MR. IRIE: Your Honor, paragraph 71?

JUDGE TIERNEY: I'm looking at 71, Exhibit 1002.

MR. IRIE: Yes, Your Honor. For that paragraph, though, on line 6, Dr. Ormerod again refers back to Ohashi as disclosing a non-oxidizing gas, and references hydrogen in that context.

And so we respectfully submit that he is talking about the non-oxidizing or inert gas language of Ohashi.

JUDGE TIERNEY: Again, I think it goes to the question of what is Ohashi referring to? Are they referring to the genus of oxidizing agents or are they referring to just the species, which is oxidizing agent, meaning they don't want atmospheric oxygen?

I guess that is a point I would like to hear a little bit more about from your expert, your point of view, why that would be a -- why it would have to say it refers to the species element or, rather, the genus as a whole and not the species.

MR. IRIE: I apologize, Your Honor. I'm trying to find the paragraph in her declaration in which she talks about the process here.

Your Honor, Dr. Lewis' opinion on this -- this is going to be Patent Owner's Exhibit 2002, paragraph 92, where she is talking about the relevant passage here from Ohashi -- in her opinion she reads this to mean that the Ohashi reference is, again, teaching that you want to use a non-oxidizing or inert gas and that, therefore, you would want to not combine the Ohashi process with hydrogen pulverization.

I would like to then move on to slide 10. This is where we have the second half of claim 1 and the dispute over the particle removal limitation. And specifically there are two portions, two claim ranges that are within this limitation. There is a particle size limitation and there is a particle quantity limitation.

On slide 11 we have a side-by-side of claim 1 of the '765 patent versus the Ohashi passage that is going to be talking about the particle removal. And as you can see, both of these are talking about a particle size limitation and a particle quantity limitation.

However, these two ranges are intertwined ranges and the ranges are overlapping. They are not fully subsumed by the other, that is, that there will be examples that would fall within the scope of claim 1 but would not fall within the scope of Ohashi and, vice versa, there would be examples of Ohashi that would not fall within the scope of claim 1.

And perhaps one way to think about this is, if you have a -- imagine a two-dimensional graph where your horizontal axis is the particle quantity and then your vertical axis is a particle size.

In terms of particle quantity claim 1 is going to be a short, a short box that is very wide. It is going to cover the particle quantity range from zero to 10 percent and a particle size from zero to one micron.

In comparison, the Ohashi box is going to be a taller box but much narrower in size. The particle quantity is only going to go from zero to 1 percent, but the particle size is going to be double that of claim 1. It is going to go from zero to two microns.

And so there is going to be basically these two overlapping ranges, and the overlapping portion is just going to be this small portion here. So given the two overlapping ranges, the case law says that if the Patent Owner can make a showing of unexpected results, then that will lead to a conclusion of non-obviousness.

JUDGE OSINSKI: Mr. Irie, can I stop you before you go on, just to clarify? You know, when I look at Ohashi I understand that it is disclosing more than what is in your claim so it's, you know, it is getting rid of particles that are two microns or less rather than just those that are one micron or less, and that it is kind of trying to eliminate those particles rather than retain some undefined amount.

But I look at claim 1 and I don't see any, number 1, kind of any upper threshold on the particle size that is removed, or a lower threshold on the amount of small particles that have to remain in the powder.

So when I look at Ohashi it does look as though it necessarily discloses what is set forth in claim 1 without really any modification of Ohashi necessary.

MR. IRIE: We respectfully submit that there are examples of what things that would fall within Ohashi but would not fall within claim 1.

For example, if you have an alloy and then you jet mill it, and then your resulting powder distribution had zero powder between the size of zero and one micron, and, for example, we will say 2 percent powder from between one and two microns, you would do part powder removal under Ohashi because you have particles between the size of one and two micron that you have to reduce down to under 1 percent.

But if you put that same powder sample into claim 1, you see that you don't do the first half of claim 1, which requires removing particles of a size one micron or less.

And so for that reason that example where you have zero percent powder between zero and one micron, 2 percent from one to two micron, is not going to fall within the scope of claim 1 but would fall within Ohashi.

JUDGE OSINSKI: But there is some --

MR. IRIE: I was just going to say --

JUDGE OSINSKI: Well, go on, Mr. Irie. I'm sorry.

MR. IRIE: I was just going to say and so for that reason there are overlapping ranges in that they are not fully -- one does not fully subsume the other.

JUDGE OSINSKI: But there would be at least some embodiment in Ohashi where if you necessarily remove particles smaller than two microns, you are removing those that are also one micron, and if you are seeking to get down to 0.5 percent, you are less than 10 percent?

MR. IRIE: That is correct, Your Honor.

JUDGE OSINSKI: Okay. Okay.

MR. IRIE: And I would like to segue to the discussion of the unexpected results that we have shown in Table 1 which is reproduced on slide 13 here.

The unexpected results that are shown here in the table is the fact that your magnetic properties do not decrease as you go above 1 percent super-fine powder. In fact, your magnetic properties are more or less stable as you go to 3 percent super-fine, 5 percent, 7 percent, and all of the way up to 10 percent super-fine powder.

And it is only once you go beyond the 10 percent threshold that you start to experience significant deterioration of magnetic properties.

We have reproduced the coercivity magnetic property on slide 14 here to graphically demonstrate the deterioration or, I should say, lack of deterioration of the magnetic properties.

So as you can see from this graph, your coercivity is going to be more or less stable up to 10 percent, and then beyond 10 percent it will drop, rapidly drop off. This is unexpected in view of the prior art because, if you go back to the Ohashi reference, Ohashi says you want to avoid oxidation.

And in order to avoid oxidation you remove almost all of your super-fine powder. That is, you want to be 1 percent or less, preferably 0.5 percent or less, or, according to their embodiment, 0.1 percent or less.

And so really what Ohashi is saying relative to this graph on slide 14 is that your magnetic properties should drop off after you go beyond 1 percent super-fine powder.

But as we see from the results that are shown, that's not the case at all. Your magnetic properties remain constant as you go all of the way up to 10 percent super-fine powder.

JUDGE TIERNEY: And you are referring to Table 1?

MR. IRIE: Yes, Your Honor.

JUDGE TIERNEY: Okay. So I would like to stop at Table 1. I think you heard some of the questions I was asking the Petitioner today.

There's a -- I just want to point out from a question, from looking at Rule 37 CFR 42.65 regarding Expert Testimony, Tests and Data, and, as part of it, Part (b) of the rule, it says: "If a party relies on a technical test or data from such a test, the party must provide an affidavit explaining: (1) why the test or data is being used; (2) how the test was performed and the data was generated."

MR. IRIE: Your Honor, this test data that we are relying on, Table 1, and the coercivity graph which is derived from Table 1, is material that is directly from the patent.

And according to In re Sony it is fully permissible to rely on data that's within a patent specification in order to make a showing of unexpected results.

JUDGE TIERNEY: Okay. This is an inter partes proceeding and we have a specific rule on this point.

I would like to have it addressed today how you have complied with the rules we have, in particular 42.65(b), have you provided a declaration that explains how the test was performed and how the data was generated?

MR. IRIE: We have not, Your Honor.

I would like to then move to slide 15 and just briefly note that Dr. Ormerod also agrees fundamentally that you don't see the significant deterioration in your magnetic properties until you go beyond the 10 percent threshold and that, according to Dr. Lewis, these results that are shown in Table 1 are, in fact, showing unexpected results because in Ohashi and Hasegawa one would have expected the magnetic properties to drop off at a much earlier point than what's shown in Table 1.

JUDGE TIERNEY: Okay. And going back to Dr. Ormerod's testimony -- I'm looking at Exhibit 2004, page 73, starting at about line 5 -- it talks about, the witness, "given this setup, I don't know exactly if the parameters that were used produce these."

Was Dr. Ormerod questioning how the results were -- how the data was obtained?

MR. IRIE: I don't know exactly what was going through Dr. Ormerod's mind when he made those answers, but I would like to point out on slide 17 that, when Dr. Ormerod was asked about unexpected results, he simply replied that he did not consider unexpected results as part of his analysis.

JUDGE TIERNEY: But when shown Table 1 he did question -- and I would like you to explain -- when he was saying I don't know exactly if the parameters that we used produced these, do we have that information present in this case?

MR. IRIE: There is information in the patent specification from approximately column 10, line 47, through column 11, line 27, where the patentee is talking about how the magnet samples were prepared and how the data that is shown in Table 1 was derived.

I would like to then move to claim 4 of the '765 patent. And for the '765 patent -- I'm sorry, for the claim 4 the dispute really turns on two parts.

The first question is, is residual oxygen inside of the milling chamber sufficient to meet the limitation of claim 4? And then the second part, if the prior art references talk about having oxygen in the classification chamber.

And before I get to that I just wanted to briefly go through the structure of claim 4, and this is on slide 19 here. So claim 1 requires a second pulverization step, which is sort of the big, overarching step that is basically the jet mill.

Within the second pulverization step, there are two sub-steps that are required. There is a finely pulverizing material alloy sub-step and then a second sub-step where you are going to be removing your powder particles.

Claim 3 and claim 4 are talking about the high speed flow of gas that's used to finely pulverize the alloy. So it is referring to what is going on in your first sub-step inside of that milling chamber.

And this is consistent with figure 2 of the '765 patent shown on slide 20, where this is a depiction of a jet mill and we've labeled the pulverizing chamber 14, which is a chamber that is going to be doing the first sub-step of finely milling the powder, and the second chamber, cyclone classifier 16, which is going to be doing your particle classification.

So as you can see here, these are two distinctly separate chambers within the jet mill, and so that matches up with the reading of claim 4 where you have, again, the high-speed flow of gases talking about what is going on in your first of those two chambers.

Now, going to the Petitioner's first argument on claim 4, the question about whether residual oxygen is enough, as Dr. Lewis testified on slide 21, residual oxygen is simply insufficient to meet the limitation of claim 4. And that's because it is not enough oxygen in order to actually carry out the invention of claim 4.

And for that we go to slide 22 where we have excerpted a passage from the '765 patent, column 2, lines 42 to 47, where the patent talks about why you were using this trace amount of oxygen inside of your jet milling chamber.

To take a step back, the powder that you are going to be putting into the jet mill chambers is highly pyrophoric, and so ordinarily you would not want to expose it to oxygen.

Here in the '765 patent we see the description by the inventors is that you are adding in a small amount, a trace amount of oxygen in order to intentionally coat the surfaces of your finely-pulverized powder.

Now, under the Petitioner's construction, where any amount of oxygen should suffice for claim 4, you run into a problem because, for example, a single, lone molecule of oxygen that may be remaining in your jet mill chamber would not be sufficient to actually perform this function that's described in the patent of the '765 patent. You just would not have enough oxygen in order to do the formation of the thin oxide coat.

And this is because when you operate the jet mill, before you put the jet mill into operation, you have to evacuate all of the oxygen that is in there to begin with. And you will go through purging cycles using some sort of inert gas such as nitrogen or argon, and so as a consequence you simply don't have sufficient amount of oxygen left over in the milling chamber when you start your jet mill and so, therefore, you're not going to be able to -- residual oxygen will not be sufficient to meet the limitation of claim 4.

JUDGE OSINSKI: Mr. Irie, but the claim, though, doesn't include any information about the amount of oxygen, and aren't we reading in something from the specification by saying that it has to be enough oxygen to be able to use these oxide coating techniques?

MR. IRIE: That's correct, Your Honor. The claim literally states that the high speed flow of gas comprises oxygen. However, that claim needs to be read in view of the specification where it says that the amount of oxygen that's being introduced is in order to accomplish this purpose.

And as I stated earlier, if you have only a single, lone molecule of oxygen inside of the oxygen tank, then that would not be sufficient in order to carry out the actual invention described in the patent. And so a claim construction that would include that scenario would be inconsistent with the patent specification.

JUDGE OSINSKI: So, Mr. Irie, when I look at column 9 of the '765 patent, it talks about basically reducing the amount of oxygen to a range of 0.05 percent to 3 percent by volume, I mean, and that seems like a very small amount of oxygen to me.

MR. IRIE: Your Honor, there is a distinction between residual amounts of oxygen and trace amounts of oxygen that are described in the passage on slide 22. The residual amount of oxygen is the leftover oxygen that may remain in your jet milling chamber after you have attempted to evacuate the oxygen from the jet milling chamber before you actually use it.

The trace amount of oxygen that the patent is talking about is the oxygen that you are attempting to, basically intentionally put in in order to coat the particles. And obviously the claim doesn't require intentionality but it does require a sufficient amount of oxygen in order to form your thin oxide coats.

And to briefly address the claim differentiation argument that was raised by Petitioner, I would point out that the claim 4 -- sorry, claim 5, which is talking about a narrower oxygen concentration is 0.05 at 3 percent, but here in column 9, around line 14, we see that the specification also describes an additional embodiment that is broader than that, which has the oxygen range from 0.02 to 5 percent.

JUDGE OSINSKI: How do we know in claim 4 that we're not talking about the residual oxygen and that we're talking about this oxygen that is intentionally put in the system?

MR. IRIE: Your Honor, the residual amount of oxygen, as Dr. Lewis opined, is simply insufficient in order to actually carry out the formation of the thin oxide coat, and that you need more than that in order to actually perform the invention that is described or that is covered in claim 4.

JUDGE OSINSKI: Okay. Thank you.

MR. IRIE: I would like to move to slide 23 and point out that, again, since this is a combination that is fundamentally based on the Ohashi reference, we have to go and look at what Ohashi is talking about. And Ohashi says, as its fundamental teaching, that you want to prevent against oxidation by the atmospheric oxygen.

And so this is, again, suggesting that you want to get all of your oxygen outside of the milling chamber, and, if you have a significant amount of oxygen inside of the milling chamber, you will be going against Ohashi's explicit teaching here. Sorry, my apologies. That was slide 23.

Moving then to the Petitioner's second argument about the oxygen in the classification chamber, I would like to briefly discuss what the classification, sorry, the milling and the classification procedure is for the Ohashi reference.

Ohashi has a step A where you do a pulverization of your alloy and then in a separate step, step B, you are doing removal classification, that is, you are removing particles in the step B.

Moving to slide 25, the Petitioner relies on the language "air-stream particle size classifier" of Ohashi as support for oxygen disclosure, but we see that the only reference to what the gas composition is for the air-stream particle size classifier in Ohashi is the passage here on slide

25 from Ohashi, column 6, line 54 to line 62, where it says that nitrogen is the carrier gas.

And, again, it makes sense that Ohashi is talking about classifying a nitrogen, when you think back to its initial commandment that you avoid oxidation by using a non-oxidizing or inert gas.

Turning then to the Hasegawa reference, the Petitioner relies on the passage the wind power classification in order to argue that there is oxygen that's shown here. But Hasegawa, the rest of the Hasegawa reference is silent as to whether that wind power actually contains any oxygen.

I would like to then move to claims 11 and 12.

JUDGE OSINSKI: Before you move on, what is your position with respect to the Petitioner's contention that basically fine pulverization includes both the milling and the particle classification, so that that reference to the classification, the, you know, the air-stream during the classification step is sufficient?

MR. IRIE: We believe that is an improper reading of the claim in view of the specification, Your Honor. If we go to slide, I believe 20 would probably -- let me go to slide -- I'll jump between slide 19 and slide 20, which 19 is the claim and slide 20 is figure 2.

The claim 3 says that you are talking about the high speed flow of gas that is doing your fine pulverization.

And we see in claim 1 that the fine pulverization of the material alloy is one of the sub-steps of the second pulverization step.

The claim 1, though, says that there is a second subset where you are removing your fine powder. That's the removal/classification step that the Petitioner is referencing for the second argument.

And our reading of the claim would be consistent with how the jet mill is described in figure 2 of the '765 patent, where you have two entirely separate chambers. The first pulverization chamber 14 is doing the fine milling. Your second chamber, the cyclone classifier 16, is going to be doing the particle removal and classification.

I would like to then move to claims 11 and 12 of the '765 patent. These are the cooling rate and the strip cast alloy limitations. And moving to slide 28, the Petitioner, we believe the Petitioner is fundamentally misinterpreting the argument that the Patent Owner has put forward here.

The reason why we are saying that yield matters is not because it is something that's in the patent. The reason why is because it is a question of the suitability of the proposed combination of the Petitioner. The Petitioner is proposing that you take Ohashi with its particle removal process and then combine that with Hasegawa's hydrogen pulverization process, as well as Yamamoto's strip casting process.

One skilled in the art who would attempt to make that combination would first think of, well, what is that combination going to look like and is that combination actually going to be something desirable or not?

And what it turns out is if you were to make that combination, then, in fact, you are going to suffer a significantly-diminished yield, so significant that one of ordinary skill in the art would be discouraged from making the combination to begin with.

Turning to slide 29, again, the combination is fundamentally based on the Ohashi reference as your primary reference. So we have to look at the teachings of Ohashi to see what it is talking about. And Ohashi says that a great improvement could be obtained in the magnetic properties because you are decreasing your oxygen content of the alloy by removing these extremely fine particles from the powder with only a minor material loss.

And so Ohashi also recognizes that yield does matter. And in the specific context of Ohashi, in its embodiments, it has an embodiment where you are going to be having approximately 5 percent of sub-two micron powder that you will then remove down to approximately 1 percent or less. And so Ohashi is, in effect, saying that minor material loss of about 4 percent is okay.

So in order to look at what the combinations are going to look like for the Ohashi/Hasegawa/Yamamoto combination, I would like to turn to slide 30 and just briefly recap Ohashi's particle removal process which, again, is saying that you want to remove particles of a size two microns or less that is going to constitute 1 percent or less of your final powder.

Moving to slide 31, this is an expert from the Hattori reference which we relied on to show what a representative sample would look like if you were to, for example, take a strip cast alloy, subject it to hydrogen pulverization, and then perform Ohashi's particle removal process on it.

And so powder samples 1, 2 and 3 that are shown on slide 31 here, they have, respectively, average particle sizes of 1.6, 2.6 and 4.6 microns. And what is shown on the graph here, on the horizontal X axis, d50 is the average particle size. What is shown on the vertical axis, the Q3 50 is the cumulative powder content.

So, for example, a Q3 50 means that 50 percent of your powder has that particle size or less. If we look at the powder 1, that corresponds to 1.6 micron. If we then move on the X axis over to where the two micron mark is, and we go up to see what the Q3 number is, we see that it is about 80 percent. So that means that for powder sample 1 approximately 80 percent of your powder is going to have a particle size of two microns or less.

We have now converted on slide 32 the data that was shown on the Hattori reference that we have as a function of the average particle size on the X axis, the amount of sub-two micron powder in the vertical Y axis.

And we can see from this graph, the sample 1, 2 and 3, basically what your -- how much of your powder you are going to be throwing out if you were to perform Ohashi's particle removal process on the combined process of Ohashi, Hasegawa, and Yamamoto. And we see the amount of powder that you are going to be throwing out can be anywhere from 20 percent all of the way up to 80 percent.

And in the case of Ohashi, since we were talking about an average particle size for Ohashi's embodiments of about three microns, that's going to result in discarding approximately 30 percent of the powder if one were to make the combination.

Ass Dr. Lewis has testified on slide 33, this amount of powder removal would be unacceptable to one of ordinary skill in the art. And it would be such a significant amount of diminished yield that they would be dissuaded from making the combination to begin with.

Now, in response to this line of argument, we believe the Petitioner under-supports their position. They go back to this basic concept of, well, it was known in the art that you could, for example, turn the knob on your rotary classifier in order to effect a different particle size distribution and that, as a consequence, one skilled in the art would be able to compensate for any yield loss.

But we disagree with that, and that's fundamentally because magnet manufacturing is a far more complicated process than the Petitioner's arguments make it out to be.

Magnet manufacturing, as shown on slide 35, has a number of steps in it. You have to make your alloy. You have to perform course pulverization on it. You have to perform fine pulverization on it.

And then there are going to be subsequent pressing, sintering and finishing steps that you are going to have to perform on the magnet in order to finish it.

And the thing about rare-earth magnet manufacturing is that if you make a change in any part of this total process, then you are going to have to look and investigate to see do you need to make compensations in other parts of the process as well. And that simply is going to be beyond what one of ordinary skill in the art would be able to do here.

For example, as I mentioned earlier, Dr. Lewis testified that if you were to switch from a mechanical pulverization to a hydrogen pulverization process, you would need to change your composition of your alloy in order to compensate for that. And that is, again, paragraph 90 from Dr. Lewis' declaration, Patent Owner's Exhibit 2002.

Furthermore, as Dr. Lewis opined in her declaration, manipulating the recipe for a magnet manufacturing process is not trivial. This is on slide 36. It involves many different factors and knowing which steps to optimize, and how to effectively optimize those steps is not a trivial task given the large number of variables that are at issue here.

Now, in response to this point, the Petitioner we believe oversimplifies the problem. And they go -- they oversimplify it so that they say -- that by quoting Dr. Lewis' rather unspectacular testimony that, yes, if you turn the knob on a rotary classifier, what comes out of it is going to be something a little different.

And they go further and oversimplify the parameters that their own expert says are important for considerations in making rare-earth magnets.

Exhibit 2008 is an article that's written by Dr. Ormerod. And in their paper they quote him as saying "critical parameters to be controlled during milling are particle size and particle size distribution."

But the actual publication, if you go there you see that Dr. Ormerod further identifies that damage to crystal structure and oxidation are additional critical parameters that one needs to consider when making modifications to a rare-earth magnet manufacturing process.

And we submit that this is simply going to be all beyond the scope of what one of ordinary skill in the art would be able to do.

And moving to slide 38, this is the issue where the definition of the level of ordinary skill is going to make a difference. The Petitioner's definition of the level of ordinary skill is a bachelor's degree with the relevant background plus two to four years of experience or a master's degree plus one to two years of experience.

By comparison, the Patent Owner's definition is a bachelor's degree in the relevant art with one to two years of experience or a master's degree with one year of experience.

And Dr. Lewis has a -- did you have a question, Your Honor?

JUDGE TIERNEY: Yes. I'm looking at paragraph 61 of Exhibit 2002. I thought it was a master's degree and one to two years work.

MR. IRIE: For Patent -- or for Petitioner? Yes. I thought I said master's with one to two.

JUDGE TIERNEY: Okay. I'm looking at the Lewis declaration, Exhibit 2002, maybe I have it incorrect, but I'm looking at paragraph 61, page 26. I'm sorry, you're right, you're right.

MR. IRIE: That's according to Dr. Ormerod's level of ordinary skill.

So the Patent Owner, our proposed level of ordinary skill is lower than that of the Petitioner, and Dr. Lewis sets out a lengthy description in terms of her analysis as to how she arrived at the level of ordinary skill. This is in paragraphs, I believe, 59 through 66 of her declaration, in which she goes through the various factors in order to determine the level of ordinary skill in the art.

By comparison, Dr. Ormerod has a very, very brief description of how he arrived at the level of ordinary skill. And we think that this difference, based on this difference, more weight should be accorded to the level defined by Dr. Lewis.

And fundamentally, the reason why Dr. Lewis says that you don't need as high of a level as the Petitioner advocates for is because it is possible to practice this invention, the '765 patent, with a lower level of skill. However, in order to make fine-tuning or optimization of it is going far beyond that of the level of ordinary skill of both of what Dr. Lewis and of what Dr. Ormerod have defined.

And, furthermore, I would like to point out -- this is on slide 38. This is deposition testimony from Dr. Ormerod where Dr. Ormerod agrees fundamentally that, if the definition of the level of ordinary skill is, for example, a bachelor's degree plus one year, that his conclusions of obviousness would have been different, that is, that he would have concluded that the invention is non-obvious.

I would like to make one last point on claims 11 and 12 of the '765 patent, and this is as to the proposed combination.

Another problem with the proposed combination of Ohashi with Hasegawa and Yamamoto is that the prior art shows that, if you were to make that combination, then you would actually be rendering Ohashi unsuitable for its original intended purpose.

And on slide 39 here we have an excerpt from the Oota reference -- this is Exhibit 2014 -- in which Oota says that if you combine the strip cast alloy with the hydrogen pulverization process, this is actually going to be increasing your risk of oxidation.

And going back to Ohashi, Ohashi is quite clear that oxidation is the one thing that you want to avoid and that

that is why you want to avoid oxidation by atmospheric oxygen and use a non-oxidizing or inert gas environment.

And so if one looks at Oota, we see that, in fact, the proposed combination of Petitioner is again going to be rendering the combination Ohashi unsuitable for its original intended purpose.

If there are no further questions on the '765 patent, I would like to move to the '385 patent.

Moving then to the '385 patent, I would like to go to slide 41 here. This is where we reproduce claim 1 of the '385 patent. And I would like to focus on the rapid cooling method. I would like to first address the claim construction dispute that we have over this term and how that's going to be related to the combination of He and Yamamoto.

Fundamentally, our position is that the rapid cooling method of claim 1, when read in view of the specification of the '385 patent, is going to exclude melt spun alloys, and this is because the, as you see on slide 42, the specification of the '385 patent has two parts where it talks about what the rapid cooling method is.

The first part is the same portion that is referenced by the Petitioner, but the Petitioner did not identify the second subsequent paragraph where it goes on to say that in the rapid cooling method the molten alloy is cooled at a rate in the range between -- and this is a typo -- it should be 100 degrees Celsius per second and 10,000 degrees Celsius per second.

And so based on this disclosure within the '385 patent as to what the rapid cooling method is, one skilled in the art would not interpret rapid cooling method to include melt spun alloys, and that's because melt spun alloys are alloys that are made with a cooling rate far in excess of 10,000 degrees Celsius per second. It is upwards of approximately 10 to the fifth to 10 to the seventh degrees Celsius per second.

Moving to slide 43, we see that Dr. Lewis concurs with our proposed definition, that a rapid cooling method is going to be a cooling rate that is not so slow that it includes ingot cast methods, and these are going to be cooling methods that are on -- cooling rates on the order of a few degrees Celsius per second.

But it's also, the rapid cooling method is also not going to be so fast that it includes super-rapidly cooled methods, such as melt spinning, which are, again, on the order of 10 to the fifth and 10 to the seventh degree Celsius per second.

And so really you can think of the cooling rate as sort of on a spectrum. And on the lowest rate, the slowest cooling rates you have ingot cast alloys. On the far extreme portion you have the melt spun alloys, super-rapidly cooled alloys. And in the middle you have rapidly-cooled alloys. And that's what the '385 patent is talking about when it is talking about a rapid cooling method.

Turning to slide 44, we see that fundamentally Dr. Ormerod agrees with this interpretation. In his declaration he uses the word strip cast method and rapid cooling method synonymously. And so he also appreciates that the rapid cooling method is really talking about the middle range of this cooling rate spectrum.

And this is evident from, for example, slide 45 where Dr. Ormerod during his deposition agreed that super-rapid cooling is talking about melt spinning, and that these are cooling rates that are beyond that of just simple rapid cooling.

This is also corroborated by Dr. Ormerod's publications, one of which we've reproduced on slide 46, where he says that cooling rates in excess of 10 to the sixth degrees Kelvin per second are obtained for melt spun alloys.

And, again, these are cooling rates that are going to be far in excess of the cooling rates that are disclosed in the '385 patent.

JUDGE KOKOSKI: Is it your position that the rapid cooling is limited to the 100 degree to 10,000 degree range that is listed in the specification?

MR. IRIE: No, Your Honor, we are interpreting the rapid cooling method to be more of it is not ingot cast method and it is not melt spun alloys. It is the alloys that are cooled at a rate that is, on the cooling rate spectrum, is in between those two extremes.

JUDGE KOKOSKI: So then what would the upper range of rapid cooling be temperature-wise?

MR. IRIE: Based on the evidence of record, it is probably something close to 10 to the fourth degree Celsius per second. Based on the evidence of record, it is probably something close to 10,000 degrees Celsius per second.

JUDGE KOKOSKI: Which is what the specification says?

MR. IRIE: That's correct, Your Honor.

JUDGE KOKOSKI: Thank you.

MR. IRIE: Moving then to slide 47, I would like to turn the discussion to what He is talking about. He is a reference, 1006, that is talking about a commercial magnet manufacturing process, and specifically the jet mill that is used in the commercial magnet manufacturing process.

The only portion of He that talks about the starting material is the portion that we've provided here on slide 47 where it says that magnet materials are made from the smelting method, quick quenching or reduction diffusion.

The smelting method is talking about a process in which you are extracting your metal ore from the ground, and so it has nothing to do with an alloy formation process.

Reduction diffusion is a solid-state calcium-based reaction and does not involve a cooling process.

And so the only relevant portion of He is going to be the quick quenching portion, and what does quick quenching mean.

As we saw from Petitioner -- and this is on slide 48 -- Dr. Ormerod believes that quick quenching is strip casting. However, the evidence of record that has been submitted on, for example, slide 49 shows that the publication date of He is actually before the first use of commercial strip casting. He is a publication that's dated from 1990.

Here on slide 49 we have a Santoku website, a press release where it says that Santoku in 1991, one year after He, was the first to succeed in the mass production of commercial strip cast alloys.

Similarly, on slide 50, this is an excerpt from the Luo publication where we see that Luo commented that commercial strip casting was not likely to be available in China until early 2001.

And so if you put these on a timeline, we have the He publication in 1990, Santoku saying in 1991 that they were the first ones in the world to succeed in commercial strip casting, and in the Luo publication, 2001, where it says that commercial strip casting in China was unlikely to be available. Based on this evidence we think it is quite clear that the quick quenching of He is actually talking about a melt spun alloy.

And, again, Dr. Lewis agrees that He is most likely talking about a quick quenching or melt spinning process in which the cooling rates are going to be in excess of 10 to the sixth degree Celsius per second. And that's on slide 51.

In response to this, the Petitioner does not identify any specific evidence of commercial strip casting being available before the date of the He publication.

I would like to then move to claims 5 and 6 in the context of the He/Yamamoto combination for the '385 patent. For these two claims, we have a separate ground as to why the combination would be improper.

Turning to slide 54, this is an excerpt from the Flynn publication where we have a figure that is showing the cooling rate and what happens to your uniformity of your alloy as you change your cooling rate.

And we see that as you increase your cooling rate, you're going to be increasing your uniformity of your alloy. The opposite, of course, is that if you have, for example, a melt spun alloy and you go to a slower cooling rate alloy, such as strip casting, then you are going to be going from a more uniform alloy to a less uniform alloy.

And it is for this reason that the Petitioner's argument for claims 5 and 6 in view of He combined with Yamamoto does not make sense based on their proposed reason for combination, which is to obtain or use a more uniform alloy.

If you go from He's quick quenching, which is melt spinning, a melt spun alloy to a strip cast alloy, you are going to be going from a more uniform alloy to a less uniform alloy. And so you will be going -- the proposed motivation to combine set forth by the Petitioner doesn't make sense in view of these.

Assuming there are no questions, I would like to then move to the discussion of the Hasegawa and Yamamoto combination. This is going to be grounds over claims 1, 5 and 6 of the '385 patent.

And, again, the arguments here are going to be similar to what we were discussing in the context of the '765 patent.

Fundamentally, the Patent Owner's position on this is that the question about yield matters on, well, what is going to happen when you combine the Hasegawa reference with the Yamamoto reference, that is, what is going to happen if you take the Hasegawa process and switch your starting alloy to strip cast alloy and is one of ordinary skill in the art going to find the resulting combination something desirable or not?

JUDGE TIERNEY: Well, now, are we talking about desirable or are we talking about commercial feasibility?

MR. IRIE: This is desirable, Your Honor.

JUDGE TIERNEY: Okay.

MR. IRIE: In the sense that the evidence of record shows that, according to Dr. Lewis, for example, one of ordinary skill in the art, and this is skipping ahead to slide 59 --

JUDGE TIERNEY: And, again, that's referring to manufacturing yield, but what is implied to me is the commercial feasibility, though.

MR. IRIE: Your Honor, even if one were to interpret this to be in the context of commercial feasibility, both Dr. Lewis and Dr. Ormerod agree that both the '765 and the '385 patents are fundamentally talking about a commercial magnet manufacturing process, and that that is the context of these inventions, and that's how one of ordinary skill in the art reading these disclosures would approach the problem.

JUDGE TIERNEY: So does obviousness require a showing that it would be the commercially feasible combination?

MR. IRIE: No, Your Honor, if it was commercially infeasible -- no, Your Honor.

I would like to move then to slide 56, and I apologize for jumping around here, but the particle removal process, again, when we're talking about the combination of Hasegawa and Yamamoto, we have to investigate, well, what is going to happen when you combine Hasegawa's particle removal process with the strip cast alloy starting material?

And we see here on slide 56 that Hasegawa's particle removal process basically advocates for the removal of powder having a size five microns or less. And Hasegawa's particle removal process is a little wordy, and so I would just like to briefly discuss what is happening.

But you are taking your powder, putting it into a classifier and splitting it into a rare-earth rich pile and a rare-earth poor pile. The rare-earth rich pile has powder particles of which 90 percent or more are going to be a size of five microns or less. And you are going to proceed to discard that rare-earth rich pile.

Now, we would like to refer again back to the Hattori reference shown on slide 57 as a comparison point for what is going to happen when you do the combination of Hasegawa with Yamamoto. And these are referring back to the same powder samples that we talked about earlier.

And on slide 58 we've converted the graph of Hattori into a graph that is average particle size as a function of the amount of powder that is going to be a size of five microns or less. And this is on slide 58.

So we see that, for example, if your average particle size is 1.6, almost 100 percent of your powder is going to be a size of five microns or less, and that at 2.6 microns you are going to have about 90 percent.

And even if you go out to an average particle size of about 4.6 microns, you are going to have over, excuse me, 50 percent of your powder having a size of five microns or less, so approximately 60 percent according to this data here.

And based on Hattori, Dr. Lewis' conclusion on slide 59 is that one skilled in the art would not have found this combination to be acceptable because throwing out this much powder in a magnet manufacturing process would be unacceptable. And this is keeping in mind that this is talking about the yield loss that you suffer just at the jet milling step.

In addition, this does not take into consideration any yield loss that you might have in other parts of your manufacturing process.

JUDGE TIERNEY: And this goes to your claim: Do you require a specific yield?

MR. IRIE: The claim itself does not require a specific yield.

JUDGE TIERNEY: So are we reading in a commercially manufacturing acceptable yield must be resulting from this process to your claim?

MR. IRIE: No, Your Honor. The question of yield is, is the proposed combination, the combination proposed by the Petitioner suitable, and is it attractive to one of ordinary skill in the art.

JUDGE TIERNEY: All right. So let's back up. I asked a question earlier of the Petitioner, are these known elements being combined, are these steps known in the art for claim 1 of the -- let me make sure I get the patent number right on this one -- this is the '385 patent, are these steps known?

MR. IRIE: For the '385 patent the steps are disclosed in the various pieces of the prior art.

JUDGE TIERNEY: And are you using those steps for their known purpose?

MR. IRIE: Yes, Your Honor, they are being combined together in order to make a rare-earth magnet.

JUDGE TIERNEY: And then the question becomes to us in the KSR framework, are you achieving a predictable result?

MR. IRIE: Your Honor, the problem with the combination is that the predictable result says that, for example, in the case of the Hasegawa/Yamamoto combination, you are going to throw out 50 percent of your powder.

JUDGE TIERNEY: Understood. But, again, when we're looking at the claim, that's why I keep coming back here, it says the claim required a commercially feasible manufacturing process yield.

MR. IRIE: The claim does not literally require that, Your Honor, you are correct.

I would like to then move to slide 60 where, again, we're talking about the Petitioner's rebuttal for the yield argument. And, again, they go back to the basic position that it will be obvious to make the modification in order to compensate for any potential yield loss.

However, this, of course, ignores, on slide 61, the complexity of magnet manufacturing processes. And I would like to point out that, for example, in the Petitioner's reply paper, where they are criticizing Hattori, they essentially admit that, for example, the jet milling parameters also affect the particle size distribution and that, for example, your rare-earth content is also going to affect your particle size distribution.

And these are all factors that are going to affect your particle size distribution that's going to come out. And so making adjustments onto this is not as easy as the Petitioner makes it out to be.

For example, another added point is that if you are making this combination and you are going to be, for example, shifting your particle size distribution so that it includes larger particles in order to minimize your yield loss, which I assume is what the Petitioner is arguing for, Dr. Lewis has opined that if you do that you are actually going to be decreasing the amount of the powder that you want to keep in your final magnet.

Dr. Lewis has opined that, for example, powder in the range of one to two micron is powder that is main phase powder. This is the stuff that makes your magnet a good magnet and you want to keep that powder in your final magnet -- in your final powder that you are going to convert into a magnet. And throwing that out would be bad for overall magnetic properties.

I would like to then, lastly, turn to the combination of Ohashi and Yamamoto. And just briefly, and this is going to be, again, essentially the similar argument to the Hasegawa/Yamamoto combination.

For the Ohashi/Yamamoto combination on slide 62 we have the excerpt that is again referring back to the minor material loss, because Ohashi fundamentally says that minor material loss is one of its achievements that you get from practicing the Ohashi invention.

And so in looking at the combination of the references we, again, have to go back and see, well, what is going to be your yield loss if you make the combination of Ohashi with Yamamoto, and is it going to be a minor material loss or not?

Again, on slide 63 we have Ohashi's particle removal process, because that's going to be sort of the baseline point that we would have to practice in order to do the combination. This is that your sub-two micron powder after particle removal is going to not exceed 1 percent of your final powder.

On slide 54, this is from the Li publication, Exhibit 2011, we have two exemplary powder particle size distributions with two different average particle sizes, and this is for samples that were made using strip cast alloy subjected to course pulverization, similar to what you would get from the Ohashi/Yamamoto combination.

And these two graphs have average particle sizes of 5.91 microns and 5.75 microns. And if we do the math to convert and see how much of your powder is going to be a size two microns or less, we see that it is going to be approximately 8 to 12 percent.

And so if you do the combination of Ohashi and Yamamoto, you are going to be throwing out between 8 and 12 percent of your powder, which is going to be roughly double that of what Ohashi stated is a minor material loss.

And, again, lastly, I would just like to point out that in connection with the combination for Ohashi and Yamamoto, here on slide 65, the Petitioner again points to -- tries to attack the Li reference, but in doing so effectively admits that magnet manufacturing is a complex process, and that, for example, the rare-earth content in your alloy is going to have an effect on your particle size distribution.

Now, if there are no more questions, I would like to rest.

JUDGE OSINSKI: No questions here. Thank you, Mr. Irie.

MR. IRIE: Thank you, Your Honors.

JUDGE OSINSKI: Judge Kokoski, could you kindly let Petitioner know how much time he has remaining?

JUDGE KOKOSKI: 37 minutes.

JUDGE OSINSKI: Mr. Kelly, when you are ready you have 37 minutes remaining for rebuttal.

MR. KELLY: Your Honors, I would just like to make a few follow-up points on rebuttal, and if it is okay I will refer to the Patent Owner's slides so I can be clear about which points I'm addressing.

I would start with slide 5 of the Patent Owner's demonstratives, and I will put that up here. We talked briefly about what the term non-oxidizing or inert gas in this passage of Ohashi would be. And this is slide 5 of the Patent Owner's demonstrative.

Just to be clear, the Petitioner's position is that the phrase non-oxidizing, within the phrase non-oxidizing or inert gas, would be understood by a person of ordinary skill to mean a gas that does not oxidize by atmospheric oxygen essentially.

So not all non-oxidizing gases in the broadest sense, but just any gas that would not cause an increase in the oxygen content of the alloy.

JUDGE TIERNEY: And help me out here. I understand there is a difference of opinion today on whether the paragraph requires to avoid oxidation reactions as a whole or just a species of oxidation reactions involving atmospheric oxygen.

If we were to interpret it as avoiding all oxidizing reactions, would it still be obvious to use a hydrogen process such as you have identified?

MR. KELLY: To be frank, Your Honor, if the construction of Ohashi is one should not use any gas that involves any oxidation at all, then, yeah, I think that would teach away from using Hasegawa's hydrogen pulverization.

But I would counter that point to note that the record indicates hydrogen pulverization was widespread at the time of the invention, which was significantly after the time of Ohashi's publication.

The next point I would like to make is in relation to the Patent Owner's slide 12.

On Patent Owner slide 12 there is a quote from the In re Woodruff decision from the Federal Circuit in 1990. This is at 919 Federal Reporter, Second Series, 1575 at page 1578.

The quote that is on the Patent Owner's slide states, and I will quote: "The law is replete with cases in which the difference between the claimed invention and the prior art is some range or other variable within the claims. These cases have consistently held that in such a situation, the applicant must show that the particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range."

As I understand the Patent Owner's argument, they suggest that the range that is claimed in the claims of the '765 patent are critical and, therefore, non-obvious.

The point I would like to make is that this quote in Woodruff, where it says the law is replete with cases in which the difference between the claimed invention and the prior art is some range, that refers to situations in which there is a difference between the prior art and the actual claimed range.

So there is some gap between the claimed ranges. It does not refer to instances in which there is an overlap.

And, for the record, I would just point to, in the In re Woodruff case, and this is at -- it is on page 1577 of this Federal Reporter. I would quote Woodruff, who is one of the parties in the case.

The opinion reads: "Woodruff argues with respect to claim 31 that there is not simply an overlap in ranges but a difference in ranges, since the McGill patent teaches a maximum concentration of 5 percent while the prior art teaches more than 5 percent."

So I just would like to be clear about what the phrase difference in that case means.

I would like to next point just briefly to our own slide 10. This is Petitioner's slide 10. I don't know how well you can read that. But in Petitioner slide 10 this shows dependent claim 4 in the '765 patent.

And we talked briefly during the Patent Owner's presentation about what the phrase "gas comprising oxygen" means and how much oxygen has to be there. And I understand the Patent Owner's position to be that it has to be more than a trace amount of oxygen.

I would just note -- and I don't mean to belabor the point because I'm sure the Board is familiar with this -- but the Trial Practice Guide emphasizes the importance of the broadest reasonable interpretation standard, and I will quote, "and encouraging a Patent Owner to fashion clear and unambiguous claims" and notes that the Patent Owner's opportunity to amend the claims in an IPR is intended to help resolve ambiguities and overbreadth.

There is no reason that this claim could not at least have been requested to be amended in order to more clearly focus on whatever aspect the Patent Owner believes is patentable.

The fact that it remains in its current state means that it needs to be construed broadly and reasonably in accordance with the law.

JUDGE TIERNEY: So what amounts do we read broadly and reasonably for that claim?

MR. KELLY: I think it is reasonable to interpret dependent claim 4 as including any amount of oxygen. And the reason the Petitioner thinks that is because there is no disclosure in the '765 patent of any range of oxygen outside of the range that is included in dependent claim 5.

I don't know that there is support for any other range, so it needs to be construed on its face to mean any amount of oxygen.

I would like to next refer, with respect to claims 11 and 12 of the '765 patent, I would refer to slide 32 of the Patent Owner's presentation.

The Patent Owner represents that this is a plot of the particle sizes as a result of, I believe, the Hattori disclosure, and indicates the amount of powder below two micron for the different powder sizes shown in Hattori.

As we noted before, and as is indicated on this chart, Hattori indicates particle size distributions for average particle sizes of 1.6, 2.6 and 4.6. It is clear -- the '765 patent itself says that the suitable average particle size is from two to 10 microns. And Dr. Ormerod and Ohashi agree that a suitable range is three to 10.

So if you extrapolate this curve out to the right to 10 microns, I think you can imagine where it would go and what the amount of fine powder would be.

And so I would just like to note that this graph is really only indicative of the amount of fine powder that would have to be discarded for not even half of the suitable range that is indicated in the '765 patent.

I would also like to note -- I don't have a demonstrative for this -- with respect to the level of ordinary skill, I would point the Board to Professor Lewis' declaration, which is Exhibit 2002 in the '765 patent, and I would point to paragraph 66.

To be clear, the Petitioner disagrees with the proposed level of skill that is offered by Professor Lewis, but I will note that in paragraph 66 of her declaration she states, and I quote: "Nonetheless, I have also endeavored to view the challenged claims from the perspective of one of ordinary skill as offered by Dr. Ormerod. I note that because Dr. Ormerod sets the level of ordinary skill to be higher than my definition, every finding that I have made as to non-obviousness under Dr. Ormerod's level of ordinary skill would necessarily apply under my lower level of ordinary skill, too."

The point I would like to make here is that there is no indication anywhere into the record as to which points of contention would be resolved differently under the different levels of skill.

It appears that the Patent Owner's position is that the answer to every issue in these IPRs is the same regardless of which level of skill you look at, and that seems to be the view of Dr. Lewis as well.

With respect to the '385 patent in the first IPR, I would like to turn to the Patent Owner slide 49. As you will see on slide 49, this is from Exhibit 2013 offered by the Patent Owner, and the Patent Owner suggests that this exhibit indicates that the Santoku Corporation succeeded in the mass production of unidirectionally solidified RE-Fe-B alloy flakes for the production of sintered magnets with the single-roll tundish strip casting method. And they suggest this was accomplished first in 1991.

The reason the Patent Owner offers this document is because they suggest that it means that He, the He references, reference to quick quenching, cannot be strip casting, because strip casting was not commercially used until 1991.

The point I would like to make is that this document, if it stands for anything, stands for the fact that single-roll tundish strip casting method was not commercially used for mass production until 1991.

It does not mean that that method of production was not known by anybody anywhere. It certainly doesn't mean that an academic wouldn't have known about it a year earlier.

And I would also note that the '765 patent, as we pointed out earlier, notes a number of different methods of strip casting, not just single-roll methods.

And I would also point, just to cap that, I would note that in Dr. Ormerod's deposition -- this is at page 108 of Exhibit 2004 of Dr. Ormerod's deposition -- he states, and I quote: "At the time of the invention, I would -- my opinion -- is most high volume manufacturers of sintered rare-earth Iron-Boron magnets were either -- they were either strip casting or buying material that was made by a manufacturer, an alloy manufacturer who used strip casting."

So the opinion of the Petitioner's expert, Dr. Ormerod, is at the time of the invention basically everyone was strip casting. And that is contrary to the suggestion that nobody would have known about it, at the time of the invention.

And I just really want to drive that home because I think, with respect to Yamamoto, the other references that are separate from He, strip casting was a widespread process that basically everyone was using.

Lastly, I just want to address one point that the Patent Owner made during their presentation, and that was that the discarding of particles between one and two microns would have -- would result in some sort of loss of magnetic material.

And in particular the Patent Owner suggested those particles between one and two micron are very important for the magnetic properties. And I think the term Mr. Irie used was that that is the stuff that you want in your alloy powder.

The point I would make in rebuttal to that is, number 1, the '765 patent has no disclosure of suggesting that those particles are particularly important.

And I would again note that it would have been very easy to amend the claims or at least try to amend the claims to specifically recite the retention of particles in that range, and the Patent Owner chose not to do that or at least not to attempt to do that.

And so I think any argument that particles between one and two microns somehow leads to the patentability of the existing claims should not carry very much weight.

I have nothing further unless there are questions from the Judges.

JUDGE TIERNEY: No further questions here.

JUDGE OSINSKI: I have no questions. Judge Kokoski, Judge Tierney, any questions?

JUDGE TIERNEY: No further questions.

JUDGE KOKOSKI: No.

MR. KELLY: Thank you.

JUDGE OSINSKI: Thank you. We thank the parties for your attendance and for your presentations today. The information presented has been helpful.

This matter is now submitted to the Panel for determination in preparation of a final written decision. We will issue a final written decision by February 13th, 2016.

This concludes oral argument in IPR2014-01265 and 01266. Thank you. We are now adjourned.

(Whereupon, at 3:02 p.m., the hearing was adjourned.)