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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

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

v.

LUMENCO, LLC,
Patent Owner

IPR2024-00836, Patent 10,189,294 B2
IPR2024-00838, Patent 10,901,191 B2
IPR2024-00839, Patent 11,448,863 B2

Held: August 26, 2025

BEFORE: MEREDITH C. PETRAVICK, BENJAMIN D. M. WOOD, and NABEEL U. KHAN, Administrative Patent Judges.

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The above-entitled matter came on for hearing on August 26, 2025, commencing at 1:00 p.m., via video teleconference.

P R O C E E D I N G S

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JUDGE PETRAVICK: Good afternoon. If you could please be seated, we're going to take a minute to log into our computers, so we have your demonstratives in front of us.

Good afternoon. I'm Judge Petravick. And with me on the bench is Judge Wood. Appearing from our Dallas location is Judge Khan. And we are happy to have you here today to provide some information for us. I guess I should say that this is a hearing for IPR2024-00836, -00838, and -00839.

I'm sorry. My microphone does not appear to be on. Can you hear me better now?

MR. TENNANT: Yes.

JUDGE PETRAVICK: All right.

We'll have appearances now. For Petitioner, please.

MR. TENNANT: David Tennant on behalf of Petitioners and Jacob Rothenberg on behalf of Petitioners.

MR. ROZIER: Good morning. Matt Rozier, Jonathan Hardt, and Kristin Whidby on behalf of Patent Owner, Lumenco.

JUDGE PETRAVICK: Thank you. All right. So just a couple of reminders. Because Judge Khan is appearing from Dallas, when you give your presentation, please stand directly in front of the podium and speak into the microphone, and then do not move from the podium in order for him to be able to hear and see you.

We do have your demonstratives and the entire record in front of

us. If you could, during your presentation, refer to any slide numbers that you are speaking about so that those appear in the record. That would be much appreciated.

So, I believe today that there has been one LEAP request by the Petitioners, and I'd like you to confirm that, Patent Owners, you did not submit a LEAP request.

MR. ROZIER: That's correct. We did not.

JUDGE PETRAVICK: Thank you. So, we have 75 minutes for Petitioners and 60 minutes for Patent Owners. And because we are now appearing in person and we have this lovely clock behind us, I will not ask you how much time you'd like to reserve for rebuttal. I am just going to set the clock for the entire amount of time, and, whenever you finish your argument in principal, that will be the time remaining, although I will remind Petitioner that you cannot reserve more than half your time for the rebuttal and you have the burden of proof.

With that, we will get started, if Petitioner would like to approach the podium and begin when they're ready.

MR. TENNANT: I have paper copies of the demonstratives. Do you need those --

JUDGE PETRAVICK: We do not. We actually have your demonstratives right in front of us on the screens. Please begin when you're ready.

MR. TENNANT: May it please the Board, my name is David Tennant with Petitioners. Jacob Rothenberg is with me today also with Petitioners. I'm showing Slide 1 on the screen. I will be discussing three

1 IPRs and three patents today. I will present arguments on the '836 and '838
2 IPR, and Mr. Rothenberg will present on the '839 IPR, as well as the issues
3 related to the POSITA level and Dr. Hesselink, which is Petitioner's expert.
4 So, the technology at issue today relates to anticounterfeiting and
5 security elements that go on pigments typically. This technology has been
6 around for a while. It started in the 1980s with optically-variable devices,
7 and those early devices used diffraction patterns on banknotes. By the
8 2000s, counterfeiting became more sophisticated, and so did security.
9 Petitioners pioneered the technology in the 2000s.
10 And can we go to Slide 19 and just show you briefly the grounds,
11 as you're familiar with them, at issue today. Petitioners rely primarily on
12 Fuhse262 and secondarily on Fuhse925. And this is for the '836 IPR.
13 Going to Slide 20, you see the same references, as well as during
14 secondary references. There's also Fuhse395. And, lastly, I will go to Slide
15 21, which identifies Fuhse847 and Fuhse925.
16 Fuhse is the same inventor across all patents. He is an employee of
17 Petitioners. His name is Dr. Christian Fuhse. He's the head of optical
18 effects in their processing at Papierfabrik Louisenthal, which is one of the
19 Petitioners. He's a revolutionary. He really revolutionized this technology
20 and is the inventor of all the Fuhse patents that we are relying on today.
21 I will go to Slide 3 now, and I just want to briefly discuss the
22 challenged patents. It began with the '294 Patent that was filed in 2016 and
23 claimed priority to a provisional in 2015. Dr. Fuhse invented the Fuhse262
24 patent, and that was filed in 2010, so five years prior to the first patent that is
25 at issue today in the series of patents.

Lumenco, as you will hear from our friends on Patent Owner's side, Lumenco was started actually in 2012. So, Dr. Fuhse developed and filed for the patents prior to Lumenco was even formed. The '191 and the '863 Patents are also continuations of the '294, so they all share the same specification.

I'd like to go to Slide 7 now. And Slide 7 depicts Figure 1 and Figure 2 of the challenged patents. And you're probably familiar with this; I'll be very brief. Figure 1 shows a single micro mirror, and it receives ambient light at vector 130. Ambient light strikes the entire surface of the micro mirror surface, and that is reflected and that is denoted as 134.

Figure 2 shows a fuller embodiment where all the micro mirrors are formed on the surface of the substrate. And the idea of the invention, the alleged invention, is to form a plurality or multiple pixels. Each of the pixels combined in one image plane form a first image and combined in a second image plane form a second image.

I want to move to Slide 12. Actually, Slide 10. Correction, Your Honor. Slide 10 is the Figure 2 of the Fuhse262 patent, and, again, this predates the patent figures that we just saw by five years. And Fuhse262 is identical to the disclosure of the challenged patents in that it has a security element, which is a substrate; it receives light from an ambient light source 34; that ambient light source is incident on the concave surfaces 24; and that is reflected towards light spots 32. In Figure 2, there are three light spots illustrated, and they are all at different heights. These are also called pixels, in the art.

One of the innovations of the Fuhse262 patent was to replace

-- and I'm going to go to Slide 12 now. One of the innovations of the Fuhse262 patent was to replace those concave mirrors with micro mirror array structures, and that is seen in Figures 8a through 8b. What you're seeing, the dark squares represent pixels or micro mirrors that are all oriented at the same pixel. In 8b, the dark squares are all oriented at the same pixel, and the white squares, or the light squares, are oriented at a different pixel. So, that gives you the ability to orient each micro mirror at selected pixels that are above the substrate.

I want to go to Slide 19, which you saw before. And Slide 19 shows the grounds that are asserted in the petition for the ‘294 Patent, and Slide 20 also shows the grounds. Despite the number of grounds for these two IPRs, there are very limited issues in dispute at this time. And I'll go to Slide 22. There are only two issues in dispute now. All other issues are not in dispute by the parties. The first issue is what is a voxel or whether a voxel is disclosed by the Fuhse262 patent, and the second issue is the second image plane in a -- I’m sorry. The second image in the second plane that is spaced apart from the first image in that plane.

I'm going to start with voxel. And let's go to Slide 25. Slide 25 shows Claim 1, which is representative of the independent claims that are challenged here. It's the same claim language that's used in each independent claim. Claim 1 of the ‘294 Patent requires a voxel, and that is created by points, each of the points on the plane when there is an intersection of two or more beams of reflected ambient light, and that is from the surface of the micro mirrors.

Now, preliminarily, I want to go to Slide 26, the parties agree with

the understanding of what a voxel is. A voxel is a pixel with volume. Both experts have observed what a voxel is, and both experts have agreed to this interpretation. So, there's really no issue between the parties what a voxel is. The issue between the parties is whether or not Fuhse262 discloses voxel.

I also want to give you some background just by going to Slide 27. Voxel is a term that is not used in any of the challenged patents. It's not in the '294 Patent, it's not in the '191 Patent. It only appears in the claim.

JUDGE WOOD: Mr. Tennant, does the term voxel appear anywhere in the prior art of record?

MR. TENNANT: No, sir, it doesn't.

JUDGE WOOD: Was it known in the art? Is it a term of art that was known in the relevant art at the time of invention?

MR. TENNANT: Very well known. And the reason why is we can see Figure 2 on Slide 27. Each of the pixels, as the '294 and '191 Patent calls out, are floating above surface of the substrate. When they're floating above the surface of the substrate, those pixels are created by converging beams of light. In the art, that is what is referred to as a voxel.

Let me go to Slide 28. During prosecution of these patents, voxel was introduced into the claims to get over the prior art. The prior art, I believe, was Raber, and Raber is directed to a different technology. It's directed to television sets, and you're projecting images in a television set on different planes to create a 3D image. Very different from what the challenged patents disclose and the way to create a pixel that is floating above the surface.

JUDGE WOOD: Mr. Tennant, would a pixel not have volume? I

mean is there a way to create a pixel that doesn't have volume?

MR. TENNANT: A pixel is generally on a plane, on a plane that's on a surface of the substrate. So, in that context, it's on a surface –

JUDGE WOOD: I see.

MR. TENNANT: -- which is two dimensional.

JUDGE WOOD: If it's on a surface, it can be a pixel.

MR. TENNANT: Sometimes, in the art, even in the patents, they refer to a pixel that is floating above the surface of the substrate. When it's floating above the surface of the substrate and the pixel is or the voxel is formed by convergence of two or more beams, then a volume is formed.

JUDGE WOOD: So, it's safe to say that when pixel is used in the prior art references of record, they mean -- it should be read as voxel?

MR. TENNANT: You have to look at how to -- yes, generally speaking, Your Honor, that's correct. But you also have to look how it's used in context. If that pixel is floating above the surface of the substrate and it's created by convergence of beams, yes, it is a voxel.

JUDGE WOOD: Thank you.

JUDGE PETRAVICK: Counsel, is there a difference in the way the mirrors make voxels, as opposed to 2D pixels? Like, what is the structure of the mirror that makes a pixel or a voxel with volume or height, as opposed to a 2D pixel? Is it just that the cone of light is narrower for a 2D pixel and wider for a voxel? What is the structure of the mirror that makes the difference?

MR. TENNANT: So, that's a good question, Your Honor. If a mirror is, hypothetically, if a mirror is projecting that beam onto another

surface and that beam receives the reflected light, that would be, generally, a 2D pixel.

I'm on Slide 30, and I'm showing you an annotation by Dr. Hesselink, and also all of these features are unrebutted and not in dispute between the parties. And Figure 10 shows how a voxel is formed.

To answer your question, what is the structure of the mirror, in the Fuhse262 patent it is a flat surface, and Fuhse262 also discloses that the area of that surface is 50 microns square.

JUDGE PETRAVICK: So, a small mirror makes a 2D pixel and a large mirror would make a 3D voxel? The mirrors were larger in the cone.

MR. TENNANT: Actually, it's where you observe the pixel. So, looking at Figure 10, if the pixel is in space and the light spot is created by convergence of two beams of light, the point where they converge, on Slide 30, which is pixel 110 or light spot 110, that's a bright spot. And as you can see with the annotation, all of those beams of light overlap each other. That shows the intensity of light around that center point, which is a pixel, and it becomes brighter and brighter.

JUDGE PETRAVICK: Okay. I understand, like, the difference between the results of the pixel and the image. But what is the structure that makes it? I've read the patents at issue, and I know the term voxel is appearing in the claims, and I know that there's an argument that, you know, certain structures don't make voxels. But what is that structure, and do you know where it is in the patents at issue that it's described?

MR. TENNANT: It's in the claims, and I can go back to -- let me see what slide. I think it’s -- I'm on Slide 25. What creates the voxel is the

orientation of each micro mirror. And so, when you have two micro mirrors that are oriented to reflect light to the same spot in space, the orientation of those micro mirrors is what creates the voxel. And you need ambient light, of course, reflecting off of the surfaces.

So, when you look at Claim 1 of the '294 Patent, it refers to the orientation of the micro mirrors. Those micro mirrors are all pointed at a specific point.

I'll go back to Slide 10.

JUDGE PETRAVICK: So it's -- I'm sorry.

MR. TENNANT: Go ahead.

JUDGE PETRAVICK: It's purely the orientation of the mirrors. So, for example, if there's the cone of light pointing at the spot from the different mirrors, a voxel will have a wider cone of light or a smaller cone of light? Can you explain that in more detail?

MR. TENNANT: So, the cone of light -- so, if you put the apex of the cone where the voxel is in space, and the base of the cone sits on the mirror, that is a circle that is projected on the substrate base and the micro mirrors are all oriented within that cone and they're all pointed at the same spot. So, they're pointed at the same spot and let me show you on Slide 30 this would be -- if you imagine, for the reflected vector on the left-hand side and the reflection vector on the right-hand side, that is an outline of a cone. And the apex of the cone is the pixel. The base of the cone is the surface of the substrate.

And this is, obviously, a slice, but if you were looking at it in plain view, at the base of the cone, you would have a micro mirror array sitting in

the base of the cone. And the mirrors in the base of the cone would be oriented with respect to the pixel and with direct light towards that pixel.

So, staying on Slide 30, I want to focus on the non-dispute between the parties. The parties do not dispute that there's a set of micro mirrors. They're each oriented towards a particular pixel. They don't dispute that there is an ambient light source in Fuhse262, and that ambient light source creates a reflection, as we've shown here on Slide 30. And, last, they don't dispute that there is a plurality of pixels that all float through space, and these pixels are where the beams of light overlap, and that forms the volume, which is a voxel.

I want to advance to Slide 31. I want to address some of the counterarguments by Patent Owner. They have raised that Fuhse262 only discloses the light converging at an image point, and they characterize that as a 1D spot in space. That's not correct. If you look at the claim of the patent, the claim of the patent simply refers to the image point as the coordinate in space where the voxel is created.

And going back to Slide 30, 110 is an example of a voxel. That is a point that has X, Y, and Z coordinates. That coordinate is the point in space in which the light beams converge, and that makes a voxel.

Going to Slide 32, there's also been arguments by Patent Owner that this is an inherent disclosure, and I wanted to dispel this because it is not an inherent disclosure. Voxel is a well-known term of art. It is not disclosed in the challenged patents. That express term is not disclosed in Fuhse262. But you don't interpret disclosure of patents as a layperson might. You interpret patents as one with ordinary skill in the art would understand it.

And just because the term is not used identically as it's in the claim does not make it not disclosed. There's very clear disclosure of voxel in '262, and we do not rely on inherency because inherency is a statement that is not expressly disclosed. It is expressly disclosed in Fuhse262. It refers to the voxel as a light spot. It also refers to -- it points out that the voxel is created when multiple beams converge.

JUDGE KHAN: Counsel, I have a question. In the Fuhse reference, when it refers to light spots, is it your position that every reference to light spot in the Fuhse reference is a reference to a voxel?

MR. TENNANT: I'd have to go back and look at every reference; but, generally speaking, if a light spot is floating above the surface of the substrate that is created by multiple beams converging, that is a voxel.

JUDGE KHAN: Okay. So, if the light spot is floating above in space, that is a voxel. What would be -- what's the distinction there? What's the other position, a voxel that's on -- sorry -- a light spot that's on the substrate itself?

MR. TENNANT: Right. If you had a surface, a flat surface that is receiving light, that's a two-dimensional surface. That could be a pixel. I wouldn't, I don't think that -- that's not a light spot. I mean, colloquially, it is a light spot, but the way Fuhse262 refers to light spots, they are the ones that are floating above the surface of the substrate.

JUDGE KHAN: Okay. And the same is true for those light spots that are floating below the surface? Because I think Fuhse also mentions that the light spots can be below the surface.

MR. TENNANT: Correct, Your Honor. Fuhse is very

sophisticated, so the substrate can be opaque. It can also be transparent. If it's transparent, then the light spot will be below. JUDGE KHAN: Okay. Thank you.

MR. TENNANT: You're welcome. On cross-examination, we deposed Dr. Lindstrand, Patent Owner's expert. He's in full agreement with how voxel is created in the patents itself. Even though the term voxel is not used in the patent, he provided testimony, methodical testimony, agreeing fully with the way light spots are created, or voxels, are created in the challenged patents, and I'm on Slide 34 that demonstrates this.

I won't belabor the point because it is in our briefs. I think what's important or what's helpful is Slide 35. Slide 35 shows the Figure 10, which is annotated by Dr. Hesselink and Figure 1, which is annotated by Dr. Lindstrand, both show that ambient light strikes the entire surface of the mirror and is reflected towards the viewer's eye. In Figure 10, the viewer observes the convergence of light beams at 110. Figure 1 is a single mirror, so they don't show the convergence, but it demonstrates that the entire surface of the mirror reflects light towards the viewer, and the viewer then can discern the intersection of light being a bright spot, and that is voxel.

On Slide 36, and this is in our brief, and I will be very brief, there's been a lot of argument by Patent Owner about the technical challenges of creating a voxel, but on cross-examination of Dr. Lindstrand, he didn't recall these technical challenges being in the challenged patents, and these supposed technical challenges are not in the Fuhse262 patent. This is really a non-issue. We do not believe that there are technical challenges, and, if they were, they most certainly would have been disclosed by the challenged

1 patents, but they weren't.

2 I'm going to pivot to the next issue that I'm going to discuss today.
3 Is there any remaining questions on voxel before I pivot? Okay.

4 So, the second issue I'm going to discuss is the second image in the
5 second plane, which is apart from the first image in the first plane, and this is
6 only with respect to the '294 Patent. On Slide 39, I've shown Claim 35, and
7 the language at issue is highlighted. And as you can see, the second image is
8 spaced apart from the plane that has the first image.

9 Moving on to Slide 40, there's actually very minor issues in
10 dispute, and this is because the way the claims were drafted. Claim 1
11 requires a single image in a single plane, and that floats above the substrate.
12 Claim 28 requires two images in a plane, and that is also above the substrate.
13 Claim 35 simply requires that there be two images, and they're separated
14 apart from each other and they are both above the substrate.

15 Patent Owner has not disputed Claim 1. They have not disputed
16 Claim 28. So, on Slide 41, we can narrow down the issue to a very simple
17 issue: it's whether or not Fuhse262 discloses multiple images that are spaced
18 apart. Again, there is no dispute that Fuhse262 discloses multiple images.
19 The only dispute is whether or not they are spaced apart. We believe they
20 are. There's clear disclosure of that.

21 I'm going to advance to Slide 44 briefly. And as I told you, there
22 are really very few issues here. To give you some background, we've
23 outlined this at our reply at pages 14 to 17. There's very clear description in
24 the petition of these multiple images being spaced apart. The petition at
25 pages 8 talk about the concave mirrors being replaced by micro mirror

arrays, and these enabling to produce multiple images.

In the motivation to combine section at pages 13 and 15, there's also a discussion of the generation of multiple images, and the combination of the various embodiments of Fuhse262 arrives at this. Then at page 21 of the petition, we refer to element 1b.2 of Claim 1. That is the single image on the single plane. At page 36, that is the beginning of the section where we talk about two images in the same claim.

And so, ultimately, when we get to element 30b.5, we've already established that Fuhse262 discloses multiple images. We've already established that those multiple images are spaced apart. We add the additional disclosure from paragraph 117 that simply indicates that there are foreground images and background images. And this is simply additive to the prior arguments that we presented in the petition. And also, in the element for 30b.5, we've also incorporated by reference all of our prior arguments. So, we do not believe there is a legitimate dispute here regarding whether or not the images can be spaced apart from each other.

What becomes confusing in the briefing is Patent Owner doesn't respond to this showing. Rather, they respond only to an alternative argument that Petitioner presents. To the extent the Board finds there is adequate disclosure, as Petitioners argued, it's dispositive. You do not have to consider the alternative argument that Petitioner presented. The alternative argument is simply referring to the two-dimensional and three-dimensional combination in paragraph 117.

There's been a lot of argument by Patent Owner in the surreply, only in the surreply, about this combination. In the Patent Owner response,

they presented arguments around hyperplanes. On cross-examination, we disabused Dr. Lindstrand of the argument on hyperplanes, and that was not really preserved in the surreply. The primary argument, as best as I can tell, is that 117 describes motifs that are in an image.

For the record, motifs are images. A motif is a logo, and we've indicated that in the petition. Also, Dr. Hesselink has indicated that in his declaration. Motifs are generally layers of an image you can think of. If you have an image that has a logo, that has a layer. You have an image with the background, that is a layer. You put the two motifs together, you form a bigger image. And so, in the computing environment, think of different images stacked on top of each other forming bigger images. That's what paragraph 117 refers to.

And 117 also refers to those images, there's a three-dimensional image and also a two-dimensional image. Those both have planes associated with them, and, by definition, when one is in the foreground, one is in the background, they are spaced apart.

JUDGE KHAN: Counselor, I have a question here. So, your position is that for Claim 35 you're relying, in part, on your contentions for Claim 1 and Claim 28, at least for one of your alternative theories. And then you're bringing in paragraph 117 for the idea that two images, if you have two images, one of them can be in the foreground, one of them can be in the background. Have I kind of summarized your position accurately?

MR. TENNANT: Almost, Your Honor. I would add that the motivation to combine section refers to there being multiple images in Fuhse262. And that is also shown in Figure 2 of Fuhse262 with those light

spots being at different heights above the substrate.

Those are different images.

For element 1b.2, the paragraph at page 21 of the petition refers to a truly three-dimensional image in a two-dimensional image. For element 1b.2, we rely on the 2D image. So, when we refer back to 1b.2 for element 35b.2, we were referring to the truly three-dimensional discussion that falls under that element. Also, 1b.2 talks about how to set the height of the voxel for the 2D image. That is also relevant to 35b.2 because when you have two different images, you have two different heights, and that is the teaching for setting the height to create two images spaced apart.

Element 25b.2 refers to two images, but they're in the same plane. And, again, that 25b.2 relies on 1b.2 in that you have to set the height of those two images to be the same. And when we do that, they're in the same plane. So, all these teachings together are relevant to 35b.2 because it teaches how to set the heights of the two images that are set apart from each other.

JUDGE KHAN: Okay. And then, so for all of these teachings that you're relying on, eventually you get to 35b.1, are they coming from the same embodiment in the Fuhse reference, or are they coming from different embodiments in the Fuhse reference?

MR. TENNANT: This is one of the reasons why we combined embodiments for Ground 1. Ground 1 is a combination of the embodiments of Fuhse262. So, to the extent they are coming from different embodiments, we have combined those embodiments for Fuhse262, and that is one of the reasons for the motivation.

JUDGE KHAN: Okay. And where have you given the motivation to combine those embodiments?

MR. TENNANT: That is at, at least, page 13, page 15 of the petition for the '836. I'll have to go back and get precise page numbers, but I believe it's around page 13 and 15 for the motivation to combine. The reasonable expectation of its success follows that section.

JUDGE KHAN: Okay. So, this motivation to combine section applies to Claim 35?

MR. TENNANT: Yes, sir. And Claim 1 and Claim 25 because it's a combination of embodiments.

JUDGE KHAN: Okay. Thank you.

MR. TENNANT: You're welcome.

JUDGE KHAN: Oh, sorry. One other question. So, your alternative theory is, I believe, that these two images mentioned in paragraph 117, one in the foreground, one in the background, can be two two-dimensional images; is that correct?

MR. TENNANT: Correct, Your Honor.

JUDGE KHAN: Okay. So, that's your alternative theory. To the extent we're just focusing on that alternative theory, because paragraph 117 doesn't actually mention two two-dimensional images, it mentions a two-dimensional image and a three-dimensional image, do you have a motivation or a reason to make this modification to go from a two-dimensional and a three-dimensional image to two two-dimensional images? Have you provided that somewhere?

MR. TENNANT: No, because that's not the argument that we

made. And for the alternative argument, we are not modifying the embodiment of paragraph 117 of Fuhse262 to make that 3D image a 2D image. Rather, we are relying on the teaching of that paragraph when it refers to an image in the foreground and an image in the background. And that is simply additive to the other teachings under element 1b.2 and also 28b.2 with respect to where we've shown there are two 2D images in Fuhse262.

So, when you get to paragraph --

JUDGE KHAN: No, go ahead.

MR. TENNANT: When you get to paragraph 117, it refers just to the concept of foreground and background. And that teaching is what -- that additional teaching, even if it's necessary, just confirms the prior teaching elsewhere in the patent of two 2D images being spaced apart.

JUDGE KHAN: Okay. So, either way, you're relying on some of the contentions from the prior claims here?

MR. TENNANT: Correct, Your Honor. And I want to go back to Slide 10 briefly. This is Fuhse262, Figure 2. And the micro mirror array would be in place for the context areas, and that's not in dispute. Each of those light spots is one instance of a pixel or a light spot, or voxel, form an image. And each of those images are at different heights. Our position is that Fuhse262 discloses multiple images at different heights, and that has been established under the arguments for 1b.2 and also 28b.2. The paragraph 117 merely refers to foreground and background to reemphasize or to further emphasize that these light spots can be at different heights above the substrate, and they are first spaced apart.

Seeing how I'm at time, I want to give my colleague an opportunity to present arguments. Are there any further questions on this issue?

JUDGE PETRAVICK: I do have a question. There seems to be a dispute about what a person of ordinary skill in the art is defined as. Do you think there's a difference, the outcome is different, based on which one we choose?

MR. TENNANT: There is -- no, I don't think it matters for this proceeding. There is materially no difference, and it's not determinative, like if you pick one or the other, it's not going to affect the outcome of this proceeding. And Mr. Rothenberg is prepared to discuss that, as well.

JUDGE PETRAVICK: Great. Thank you.

MR. TENNANT: Thank you.

MR. ROTHENBERG: May it please the Board, my name is Jacob Rothenberg for Petitioners. As Mr. Tennant mentioned, I'll be discussing issues related to the ‘863 Patent, as well as issues related to the level of ordinary skill in the art and expertise of Dr. Hesselink, which is Petitioner's expert.

As you can see on Slide 48, there's three disputed issues with respect to the ‘863 Patent, corresponding to one issue per independent claim, as well as an issue, although not raised by Patent Owner specifically, regarding a claim for mapping as to its dependency and inclusion in Grounds 1 and 2.

Moving to Slide 49, I'll be discussing issues related to Claim 1 first and Limitation 1a is the sole disputed limitation by Patent Owner with respect to Claim 1. Moving to Slide 50, more specifically, Patent Owner

1 makes two general arguments about element 1a, the first being that
2 Petitioners allegedly misconstrue the first object in the starting digital image
3 to correspond to the same teaching in the prior art; the second being that
4 Petitioners do not provide an explanation of how the first object and the
5 second object are in the same starting digital image.
6 Moving to Slide 51, I'd like to address Patent Owner's first
7 argument. So, Patent Owner has alleged that the first object in the starting
8 digital image are incorrectly mapped to the same teaching in the prior art,
9 which violates well-known presumptions of claim interpretation. However,
10 if you look at the petition itself, and it is proper to look at the petition here
11 because Patent Owner isn't disputing anything about the prior art itself or
12 any narrow interpretation of the patent, it's more just referring to the petition
13 and how the petition has presented those teachings. And so, what the
14 petition clearly delineates is that there's, what Fuhse847 calls a body. It can
15 be a multiple bodies, which corresponds to an object, and then that body is
16 placed into a digital image. It's digitized. It may be digitized to begin with.
17 It may be -- start as a real-world object and then digitized through laser
18 scanning or a similar technique.
19 But what is clear is that the petition lays out three different
20 examples of ways to provide that body into a starting digital image. And the
21 body in the starting digital image is what the claim requires. And so when
22 the claim says a first object in a starting digital image, you have to read that
23 in context and that one element is in the other one, and so they're not
24 completely detached, such that we're reading two completely separate
25 teachings onto the same claim language or vice versa, but rather that the

1 body, in and of itself, as required by the claim, must be in the starting digital
2 image. And Fuhse262 describes exactly that in that it's depicted in a CAD.
3 It's provided in a CAD. It can be depicted in a computer-aided drawing, or it
4 can be depicted in a 3D laser-scanned digital image of real-world bodies.
5 Moving on to Patent Owner's second disputed issue, Patent Owner
6 alleges that there's no first and second objects in a starting digital image.
7 The claim, of course, says a first object in a starting digital image; and when
8 it moves to a second object, it says the starting digital image. And so, we
9 understand that those two objects are provided in the same starting digital
10 image.
11 What Patent Owner does, similarly to the first issue, is simply
12 misconstrue the position provided in the petition, which we've indicated at
13 the bottom of Slide 52. We've excerpted page 19 from the petition, and we
14 see here that it says that the assigning of the body in the image to the first
15 image display plane involves defining light spots in the digital image and
16 data sets. And so, for that one body, it is fully digitized in that each point on
17 the body represents a pixel in the eventual depicted, Fuhse calls it a few
18 different things but, light spot image or image. But there's no statement here
19 that every single image in the starting digital image is comprised of light
20 spots from the first object. It simply says that light spots for the first object
21 are all light spots that are then provided in the first image plane. And so,
22 under the clear explanation of the petition, there is no inconsistency as to the
23 first object and the second object and how those are provided in the starting
24 digital image.
25 One other point to note about element 1a is that it's unsupported by

1 Dr. Lindstrand, and so there is no evidence or support behind these
2 arguments. And at various times, the Patent Owner response essentially
3 refers to what a POSITA would understand or what is well known to a
4 POSITA, but we'd like to emphasize that those are attorney arguments
5 disagreeing with the declaration of Dr. Hesselink.
6 And if there's no questions on the Claim 1 issue, I'd like to move to
7 the Claim 12 issue. Independent Claim 12 recites a number of elements.
8 What has been disputed is element 12b, and we're now on slide 54. Element
9 12b discusses generating a design output file, and that design output file
10 includes two characteristics, or we can call them pieces of data, one being
11 angular orientation and one being the location coordinates in the array for
12 each of the micro mirrors.
13 And we're now moving to Slide 56. What slide 56 shows is
14 generally the flow of the Petitioner's mapping. As I've indicated earlier,
15 there's multiple independent claims that often repeat itself, and 12b is one of
16 them. It generally tracks the language of 1d. And so, Petitioner's position,
17 as described in the petition on page 42, refers back to element 1d. What 1d
18 describes is the design output file of Rich in relationship to the angular
19 orientations of the micro mirrors and how the combination relies on each of
20 those elements to show the combined teachings of each of those two
21 references, as well as with the motivation to render obvious this limitation.
22 And so, just to note here is what Petitioners have relied on for the
23 angular orientation. Patent Owner's arguments generally involve simply
24 misrepresenting what Petitioner's argument was in terms of which elements
25 are relied on by which references in the combination and then attacking a

combination that Petitioner's never presented. What Petitioners did present is that Rich's orientation calculations are implemented according to the mathematics and optics of Fuhse262 as shown here. And this, again, on Slide 58 shows petition at Slides 29 and 30, showing clearly what is the combination, what is being relied on, and what elements correspond, what elements are allotted for each reference for the combination.

And just quickly, the location coordinates. Patent Owner disputes that Rich describes location coordinates. This, we believe, is clearly described by Rich's map, which really the POSITA would understand has location coordinates.

If I can now move to the selected randomly limitation, which is part of Dependent Claim 3, as well as Independent Claim 7. On Slide 61, we see Claim 3, which is generally the same as Claim 7, and it recites the details about how the micro mirrors for a given set are selected and provided for a given pixel. And so, just to recap what that requires, you have an array of micro mirrors and what is referred to as the base of the cone is a section of that array. And those micro mirrors in that cone are the ones that are available for selection for a given pixel. And so, the set of micro mirrors for a given pixel are the ones selected for that pixel. And then, as you have a plurality of pixels, that single set turns into multiple sets and you have the image comprised of a plurality of pixels.

All of the elements here are undisputed except the term randomly. And Petitioner's combination has relied on Fuhse847 as teaching all of the elements shown here except the term randomly. And so, it's undisputed that Fuhse847 selects sets of micro mirrors for a plurality of micro mirrors

1 located in the base of a cone. And so Fuhse847 describes a sphere of
2 influence through which the micro mirrors are selected for a given pixel. All
3 of that is undisputed, as well as, the motivation to combine Fuhse847 with
4 Fuhse925. Fuhse925 describes more details regarding how those individual
5 micro mirrors are oriented to reflect light to the given pixel to which it's
6 been assigned.
7 And so, what Fuhse925 teaches is that that orientation, among
8 other things, it teaches a lot of mathematical details of how to properly
9 orient a planar micro mirror to reflect light to whatever pixel it's been
10 assigned to. And so, on Slide 62, you see here that one of the advantageous
11 teachings of Fuhse925 is that, in that orientation process, you can break
12 down the normal vector of the mirror, which is how it's sloped in 3D space,
13 break it down basically into parallel and perpendicular components. And so,
14 you angle it one way and then you angle it the other way, and those two
15 angles correspond to the 3D normal vector that Fuhse847 describes.
16 Fuhse925 states that one advantageous teaching is that, in one of
17 those parallel, it says the parallel component can be assigned a random
18 number. And so, in the art of security elements and anticounterfeiting, you
19 know, randomness is a concept that's used a lot. But in this case, it's also
20 specifically so that you have a random variation in one direction. You have
21 a wider viewing angle in terms of the pixels won't be narrowly focused onto
22 a very specific viewing angle. It sort of spreads out, and you can view that
23 image from a wider variety of angles.
24 And so, the combined teachings disclose all of the elements of
25 Claim 3, as well as the undisputed motivation. And so, when you take that

1 random orientation teaching of Fuhse925 and you implement it in Fuhse847,
2 you have -- a POSITA would understand when that resulting orientation
3 process results in a randomized orientation, which results in a randomized
4 distribution of micro mirrors. And that is part of the selection process.
5 JUDGE PETRAVICK: Can you explain that in more detail? Why
6 does a random orientation at parallel mirrors end up in a random selection of
7 micro mirrors, specifically in a design file that you're going to use to make
8 the mirrors? Like, why do those two things follow from each other?
9 MR. ROTHENBERG: Your Honor, that's a very good question,
10 and it is a fine point. But according to the combined teachings, what the
11 petition and Dr. Hesselink has explained is that, in the resulting orientation
12 process, we would consider that part of the selection process as a whole.
13 And so, once you're introducing randomness into the orientations, a POSITA
14 would consider that part of the overall selection process such that we would
15 not say a mirror is fully selected until it's, you know, chosen, and whatever
16 other requirements it has, and then properly aimed at its given pixel. And
17 then, once that occurs, it's fully assigned and selected for that given pixel.
18 And so, the orientation process, whether it be -- the randomized
19 orientation process, is part of the overall random selection, such that, if you
20 look at the claim language --
21 JUDGE PETRAVICK: So, what you're saying is that random
22 selection occurs by randomly designing the orientation of the mirror?
23 MR. ROTHENBERG: More or less, yes.
24 JUDGE PETRAVICK: Therefore, that mirror is, quote, selected.
25 MR. ROTHENBERG: Correct, Your Honor.

JUDGE PETRAVICK: Because it's designed with a random orientation.

MR. ROTHENBERG: Correct, Your Honor. And I think it's instructive to look at the overall motivation of what is taught by Fuhse847 verse 925. And the motivation for combining them is the further details about the orientation process itself. And so, on Slide 62, we see that Fuhse925 provides these further details about how to actually orient micro mirrors.

And so, in the combined system, we don't believe there's anything in the claim that specifically says that the quote/unquote selection narrowly requires that an individual micro mirror be in image A or B, and that's it, it's part of the claim language itself. If you look at Slide 61, it says that the sets of micro mirrors are selected randomly. And so a random selection of a set, we would argue, is not a set of micro mirrors for a given pixel until they're all identified, assigned, and oriented towards a pixel. And at that point, you can either have an ordered set of micro mirrors or a randomized set of micro mirrors, whether it be by using a random number generator to say, this pixel is assigned to -- this micro mirror is assigned to this mirror or by using some other selection process and then introducing randomness before all of the micro mirrors, as you said, in that data file are sent to the photolithography tool that then creates those micro mirrors.

JUDGE PETRAVICK: Thank you.

MR. ROTHENBERG: And just briefly looking at a few rebuttal points, and I'll go quickly through this unless Your Honors have any questions about it, but Patent Owner, again, relies on what we would call

1 bodily incorporation, which is attacking elements of secondary reference
2 that were not relied on for the combination, here talking about Fuhse925's
3 facets as micro mirrors. Again, they haven't challenged motivation or
4 reasonable expectation to success to the extent this argument is relevant to
5 that. But it's not relevant to whether the randomness teaching, which has
6 been relied on, is applicable to Fuhse847.
7 Another argument is that Patent Owner -- we're on Slide 65 now,
8 looking at Patent Owner response, page 25 -- criticizes Fuhse925 as having a
9 regular grid with the same width and arranged in even increments of its
10 micro mirrors. However, looking at Slide 66, that's exactly what's shown by
11 the patent and, actually, exclusively what is shown by the patent. And Dr.
12 Lindstrand admitted that whether a grid is regular has nothing to do with
13 whether selection is random.
14 Lastly, Patent Owner says that the fact that Fuhse925 uses all of its
15 mirrors is indicative of whether selection is random, but again, that's simply
16 not a requirement of the claim, and it's not clear how that's relevant to
17 random selection. Dr. Lindstrand did state that this is part of his
18 interpretation, which only confirms he's applying a rather narrow view of the
19 term.
20 Lastly, for 863, there was a typographical error, as the Board noted
21 in its decision about the claim mapping. We request that the Board correct
22 that error, and we believe that is the customary practice.
23 Quickly moving to POSITA and Dr. Hesselink, we believe this is
24 really not a legitimate argument. Patent Owner brings up the POSITA
25 definition both in the attack of the claim mapping and in attacking Dr.

1 Hesselink's expertise. Both have no basis.

2 If I could first quickly dispel any notion that this is relevant to the
3 claim language, I'd like to go just quickly back to the '191 and '294
4 discussion. Just to be clear, Patent Owner does not dispute that Fuhse262
5 teaches ambient light or even diffuse light. Clearly, it teaches sunlight,
6 indoor light like ceiling lamps. That is not disputed, and so there is no issue
7 with respect to whether the prior art maps onto the claims.

8 Here's the two competing definitions on Slide 72. As you know,
9 Patent Owner is infusing a requirement that the field relates to diffusive light
10 at the exclusion of all other forms, including ambient light. But moving to
11 Slide 73, just very quickly, ambient light is not diffusive light. This is
12 clearly stated by Dr. Lindstrand in his deposition. Ambient light includes
13 components of parallel light and diffuse light. There's quite a lengthy
14 discussion about this. There's multiple different ways you can think about
15 this, but, in any case, there is no such thing as an ambient light that is purely
16 diffuse or purely collimated. It always has a combination of the two.
17 Diffuse light is not a term used in the patent. The light environment in the
18 patent, as well as the prior art, is always ambient light.

19 And so while Petitioners don't even allege that the field of
20 invention should be limited to specifically a term about the light condition,
21 to the extent it is, it should be ambient light and not diffusive light. And just
22 to close out this discussion, not only should it not be limited, limiting it to
23 diffuse light, if anything, is directly contrary to the teachings of the patent.

24 If you look at Figure 1, ambient light vector 130 has a single
25 vector, beta. And so if you just look at the simple law of reflection, beta is

the angle between the ambient light and the normal vector. That equals the beta, which is the vector of the normal and the reflected light. And so any light that is forming pixel 142 has that angle beta.

And so that is why Dr. Hesselink said in his declaration, while ambient light has components of multiple diffuse and parallel, for the purposes of the claim, he interprets ambient light to be those parallel components because that is what forms the voxels floating in space. That is the same thing with the prior art.

And if there's no further questions --

JUDGE PETRAVICK: I mean, it would seem like these things have to work under ambient light. People are not probably going to take their security holographs and put them in a dark room under a task light that's specifically for if it's going to be on a note. Everything seems to have to be able to work under ambient light, which is sort of described in all the references.

MR. ROTHENBERG: Correct.

JUDGE PETRAVICK: So that kind of makes no sense that you wouldn't be able to use Fuhse's items in ambient light to create these motifs.

MR. ROTHENBERG: Correct. Fuhse teaches ambient light. Ambient light has parallel and diffuse components. There's no dispute about that. What is clear is that Fuhse teaches exactly what the patent teaches. You use this in ambient light environments, and diffuse light really isn't a concept described or even referred to.

But I'd like to hold the rest, unless you have any further questions.

JUDGE PETRAVICK: I do not. Judge Wood?

JUDGE WOOD: No thank you.

JUDGE PETRAVICK: Judge Khan?

JUDGE KHAN: None from me.

MR. ROTHENBERG: Thank you.

JUDGE PETRAVICK: You have about, I'm going to round it up to eight minutes so that I can set my clock.

MR. ROZIER: I'm ready when you are, Your Honor.

JUDGE PETRAVICK: You can begin.

MR. ROZIER: Thank you. Good morning. I'm Matt Rozier for Patent Owner Lumenco. Before fully diving in, I just want to highlight here that, as everyone in the room knows, the standard is preponderance of the evidence. This is the Petitioner's burden to carry. The question is what's in the references, and what is supplemented by their expert that's reliable and that there's ample evidence for, as compared with the evidence on the other side.

What I think has happened here, we don't argue that Dr. Fuhse is knowledgeable. Giesecke+Devrient -- I hope I'm pronouncing that right -- Petitioner, has been in the business of currency security for more than 100 years, so we know they know what they're doing. The question is what the art says, and what I think we have here is that we've got some references that Dr. Fuhse invented and they're really using that as a jumping off point and trying to fill in the gaps and saying, well, this is close and everything else was known. And that does not meet the preponderance of the evidence standard.

Fuhse262 doesn't use the term voxel. They don't argue it shows a

voxel. I'm hearing for the first time today that a light spot itself is a voxel. That's not an opinion from their expert. There's no evidence that light spot always means voxel.

I also want to clarify, the Lumenco Patents do use the term voxel. It's in the claim. That's in the patent. You just heard Petitioner's Counsel admit --

JUDGE PETRAVICK: Can you tell me where it is?

MR. ROZIER: It's in the claim.

JUDGE PETRAVICK: Just in the claim.

MR. ROZIER: In the claim, which is part of the patent. I just heard Petitioner's Counsel admit that Figure 2 shows cubes, it shows voxels. When voxel was added during prosecution, the examiner said the same thing. There was no new matter rejection. And, again, Figure 2 shows cubes, not flat points like is shown in the Fuhse reference.

I heard that there's no evidence for what Counsel said, which is that every pixel in a micro mirror system is a voxel. Dr. Lindstrand doesn't provide that opinion. There's no evidence for it.

In fact, in Dr. Lindstrand's opinion -- or, sorry, Dr. Hesselink, referring to Petitioner's expert. Petitioner's expert, over and over again, talks about 2D images. We have no explanation of how you get a 2D image if only 3D voxels exist, that there is no projecting pixels. And we should not be left to guess about this is our point with the preponderance of the evidence.

JUDGE WOOD: Counsel, let me cut you off real quick. You referred to Figure 2 and the cubes, the three-dimensional cubes.

MR. ROZIER: Yes.

JUDGE WOOD: I'm looking at Figure 2, and I noticed that they're referred to as pixels.

MR. ROZIER: Correct.

JUDGE WOOD: So the inventor meant voxels when the inventor used the term pixels.

MR. ROZIER: It's a genus species type issue here. A voxel is a type of pixel. And so a pixel, by saying pixel, it encompasses voxel, though does not necessarily disclose voxel importantly. So it's analogous to a genus species issue, Your Honor.

JUDGE WOOD: So if the prior art uses pixel, it's possible that the prior art -- uses the term pixel, it's possible that the prior art is referring to a voxel?

MR. ROZIER: It's possible it could be, but it doesn't disclose a voxel, just as a genus wouldn't disclose a species.

JUDGE WOOD: Okay. Thank you.

MR. ROZIER: Thank you for hearing me out on that. I will go to the voxel limitation first since we're discussing that. Counsel went through the various claims that have voxel. I'll just address that they all talk about creation of voxel from reflected ambient light. We ended with some talk on ambient light. We think this is very important, and so I want to go through the POSITA's definition, what each expert said and what each expert seems qualified to opine on.

As highlighted by Counsel, Petitioner's definition is that a POSITA would need two years in micro-optics design. I think we all realize that's a

broad category. It includes lasers. It includes television sets, cameras. It does also include micro mirror rays used to display images in ambient light. Dr. Lindstrand believes the experience should be in diffusive light environments. There's ambient light. Dr. Lindstrand testified an ambient light environment is a diffusive light environment, the fact that it may have some parallel rays in it. The whole point of diffusive is that there are rays coming from different angles; that's what it refers to. So it's not exclusive. Nobody's saying that diffusive light environments don't have some rays that would hit parallel to any surface, but that is a diffusive light environment. The key issue is the rays that aren't parallel interfering with the rays that are parallel.

JUDGE PETRAVICK: Does your patent talk about that?

MR. ROZIER: It doesn't describe the issue in detail.

JUDGE PETRAVICK: And it uses ambient light?

MR. ROZIER: It uses the term ambient light; yes, ma'am. My understanding is the random selection is to help with the interference, but that's not in the patent. We didn't expound on that in our papers.

I'm on Slide 20. My colleagues reminded me to say the slide numbers.

JUDGE PETRAVICK: Actually, can we go back to the expert issue? The expert, the issue of the expert dispute about what a POSITA would have. Your expert has a degree in computer science.

MR. ROZIER: Correct.

JUDGE PETRAVICK: Within his degree, does he have any classwork related to optics or optical design?

MR. ROZIER: I believe he did have optics coursework and has now worked in the field analyzing these types of arrays for 15 years.

JUDGE PETRAVICK: Okay. So your definition, you'd like to change Petitioner's definition to be more similar and then you sort of just tell us why computer science should be included because universities may have required relevant coursework. Can you tell me where his relevant coursework is in the record?

MR. ROZIER: I don't have that before me, I admit, Your Honor. I will say mechanical engineering, to my knowledge, doesn't have any coursework in optics, I know --

JUDGE PETRAVICK: Well, that isn't in dispute. You agree to that. You said or similar, and then you said your guy has computer science and that's similar. And I'm asking you where the evidence is that that's similar.

MR. ROZIER: I don't have that before me except that I know he had some physics coursework, et cetera. I'd have to look back at his declaration, Your Honor. I can gather that.

JUDGE PETRAVICK: Does it make a difference which definition we choose?

MR. ROZIER: I don't think it does as to the degree because not -- these degrees, as I said, there's no requirement in here that there's actual coursework. Mechanical engineering, to my knowledge, doesn't, and so as to degree --

JUDGE PETRAVICK: But you do put forth that there needs to be an education component.

MR. ROZIER: Correct. Correct. Yes, Your Honor.

JUDGE PETRAVICK: And as to the issues in this case, does it matter which expert we opine on? They both have quite a bit of experience on optics.

MR. ROZIER: We have not moved to exclude Dr. Hesselink's definition. I have no doubt he is experienced in optics. It's a question of understanding the particular light environment and whether that caused him to make some errors in his opinion. It goes to weight, we would say.

JUDGE PETRAVICK: Thank you.

MR. ROZIER: So we talked about these all related to parallel or ambient light environment. And what we heard Counsel talking about or saying was that, in the ambient light environment, it includes diffuse and parallel, and so we didn't make an error.

JUDGE PETRAVICK: I'm sorry. So under Kyocera, in the case law, if we find that computer science or you haven't shown computer science is like or similar enough to the other stated or agreed-upon degrees, then what weight should we give your expert?

MR. ROZIER: He's the only expert of record with --

JUDGE PETRAVICK: But if we choose the POSITA definition and we find, even if we choose your POSITA definition, but we find that your expert doesn't have the necessary qualifications, the ones that you even put forward, why would we give him weight?

MR. ROZIER: But I think he does meet the qualifications that we put forth.

JUDGE PETRAVICK: As I'm saying, if we agree that he doesn't

have the education component of the definition you put forward because we find computer science is not similar enough or there's no evidence to show that computer science is similar enough, why would we give your expert's testimony weight as to what a POSITA would know from these references?

MR. ROZIER: Because he's the only expert of record that has experience working exactly in the field of the inventions. And if you find that, I guess that's a finding --

JUDGE PETRAVICK: I guess I'm wondering why you even decided to put the extra education component in there when it seems like your expert doesn't necessarily need it. Like, would it be education or experience, so why is the education experience important?

MR. ROZIER: I'm not sure it is the primary driver of expert qualification here. I don't think they've raised this, but if the dispute is whether computer science is similar to these --

JUDGE PETRAVICK: I mean, they did raise it in their papers, and that's what I'm asking about. One of the things they said was you provided no evidence to show that computer science was correct. The only thing you wrote in your papers was sometimes universities have overlapped or -- even in, I think it said, even in unrelated fields, provide relevant coursework; but that was it. I'm basically giving you an opportunity to sort of fill in the gap here.

MR. ROZIER: In my experience, the coursework is --

JUDGE PETRAVICK: Or at least point me into the record of where, I mean, not your experience, but I'm asking you to point me to the record as to why that would be.

MR. ROZIER: Again, Your Honor, I don't think they've, other than saying they don't think it's similar, they've not put in the record anything --

JUDGE PETRAVICK: But you're the one that's putting this position forward.

MR. ROZIER: I don't know, Your Honor, except I know that, when I took engineering courses, the computer science people were in half our courses. The coursework is overlapping for at least two of the four years at every engineering school I know about. And neither side here is focusing on coursework in micro-optics as a necessary item to qualify. It's more of a general technical background from education with experience specifically in this field.

JUDGE PETRAVICK: Okay. Thank you.

MR. ROZIER: Sorry. I hope I answered it as well as I could have, Your Honor. So turning back to Counsel's argument, their argument raised after the fact, after we pointed out the ambient light issue, is that now diffusive light isn't ambient light. There's no evidence for that on the record. And that diffusive light includes both parallel and diffusive light. And we don't disagree. Again, we agree that there are parallel light components in ambient light environments. There is parallel light. But that's not what their expert said. Their expert said that, in ambient light, it refers to parallel light. All the rays are parallel. They've admitted that's not true, our expert testified it's not true, and there's just no evidence of this. There's all the evidence that their expert doesn't understand or didn't factor in the diffusive light components of ambient light.

JUDGE PETRAVICK: So this image in your patent works under sunlight, correct?

MR. ROZIER: Correct.

JUDGE PETRAVICK: Right. And the prior art shows that image working under sunlight.

MR. ROZIER: For a pixel. Correct.

JUDGE PETRAVICK: Right. So they're both creating pixels at some point. What is it about your mirrors, the structure of your mirrors that allows the voxel creation under ambient light?

MR. ROZIER: Again, my understanding from the inventors is the random selection of the mirrors helps with the interference that is created in an ambient light environment. But again, I --

JUDGE PETRAVICK: And where is that disclosed in the patent?

MR. ROZIER: I acknowledge the patent doesn't describe that in great detail, but it's in no detail in the prior art asserted against us. The word voxel doesn't appear. There's no cube in a figure.

JUDGE PETRAVICK: So my next question. And I'm sorry, I'm going to keep pressing you on this.

MR. ROZIER: No problem.

JUDGE PETRAVICK: The fact that the word voxel doesn't appear is not a compelling argument to me.

MR. ROZIER: Okay.

JUDGE PETRAVICK: The fact that, you know, 3D image is not a compelling argument to me or 3D spot or I can't remember the last one you used in the petition because the standard is what the reference would tell or

1 understood to one of ordinary skill in the art. So if you didn't want to use
2 those terms, you can use other words to describe it or other things. So why
3 is what the reference shows as a whole, the prior art reference as a whole,
4 not giving me a voxel is what I'm really looking for, as opposed to the word
5 is not in there, it's not there. I mean, it could be something that is, you
6 know, taught to one of ordinary skill from the reference. You know, I've
7 described all these things, but that word is just not used. Just like in the
8 patent before us, the patent at issue, the word voxel is not used in the spec;
9 and, apparently, you know, the structure of the mirrors is not important or
10 it's not described in the spec and for the creation of this.
11 So why is it that things that look very similar between the prior art
12 and what's in the patent itself, under what you're telling me, result in
13 something different? And we both have ambient light in both of them.
14 MR. ROZIER: Your Honor, I think this is the problem with not
15 having art that says voxel or explains this thing applied against our patents.
16 We're all in a gray area. We don't have --
17 JUDGE PETRAVICK: Well, I mean, that's the point of the expert
18 testimony, right? The expert testimony is there to tell us what one of
19 ordinary skill in the art would know from the reference, and we have these
20 two experts telling us different things.
21 So I'm sort of, you know, trying to press you on telling me
22 something that is -- because they're obviously going to tell me there's no
23 difference. Obviously, that's not interesting to ask the Petitioner's side, but
24 the Patent Owner's side, like, what's the difference in the structure because,
25 obviously, if I put these two things under ambient light, there's going to be

1 something different in the structure of the micro mirrors or the mirrors or the
2 facets that makes one thing or the other thing, and I can't seem to find a
3 difference.
4 MR. ROZIER: Yes, Your Honor. I think I understand. The
5 problem is, this is why we're talking about the POSITA and expertise and
6 which of these POSITAs has ever worked on any diffusive light reflective
7 system, right? And we have an expert that says it would not create a voxel,
8 and it's a battle of the experts --
9 JUDGE PETRAVICK: But here's the thing, I'm just going to tell
10 you, your distinction between what we've got in the prior art is ambient light
11 and what we've got in the reference at issue is ambient light. So this
12 diffusive light thing, I mean, they're both being held up under the ambient
13 light in both of the references, which I agree has diffusive components but
14 also has, you know, collinear components, like, from the sun. And so what
15 I'm really looking for is why are these two things in the same environment,
16 so there must be something about the structure of the lights and the facets or
17 the facets, or the mirrors -- I'm sorry -- the mirrors or the facets on the
18 substrate that's going to either create a pixel or a voxel, and I haven't heard
19 that yet.
20 MR. ROZIER: Yes. It sounds like -- I don't have an argument for
21 why voxel is enabled in our patent, I don't think that's before the Board.
22 And I think I understand where you're coming from, and I have nothing to
23 rely on, other than I think our expert has worked in this field and there's an
24 opinion that Fuhse262 would not necessarily display a voxel, and I
25 understand their expert opines otherwise.

As to the structure, again, my understanding, it's not described in our specification, but my understanding is the random selection of the mirrors assists with limiting the interference that you get from the regular grid pattern, of Fuhse262, for example. But we haven't relied heavily on that because we don't talk about that in the specification in detail, Your Honor.

JUDGE PETRAVICK: All right. Thank you.

MR. ROZIER: Going back to the voxel, I take it we're done with the POSITA discussion, so I will move on. I want to point out, let's move to the -- if there are no more questions on voxel or the POSITA, we'll move to the images spaced apart. This is Claim 294 35b.5. This is the entirety of the evidence cited in the petition, and some of this is --

JUDGE KHAN: Counselor, can I just interrupt you before you move on to Claim 35?

MR. ROZIER: Yes.

JUDGE KHAN: One more thing on the prior claim. You know, you argue that Petitioner is relying on inherency. Petitioner says, no, they're not relying on inherency, it's obviousness. Can you point us to something that supports your argument that they're relying on inherency? Why isn't it just obviousness? Why can't we just say, hey, Petitioner's contentions are based on what's disclosed there and how that would have been understood by a person of ordinary skill in the art?

MR. ROZIER: Yes, Your Honor. We have some law on inherency in our Patent Owner response, but they're not saying it's obvious to modify this reference. I think they're saying it's there. They're not combining it with another reference. Common sense is off the table, and so

1 I don't know what they're saying if they're not saying it's necessarily
2 disclosing it. When I see, for example, the argument I see a light spot image
3 that's a voxel, I think that is inherency. I don't understand how they're
4 admitting that it's not necessarily disclosed, but it's still obvious when the
5 word is not expressly in there and it's not shown.
6 And so, if that's not inherency, I don't understand what the
7 obviousness analysis is that they're admitting it's not necessarily shown. So,
8 it's only shown sometimes and maybe it could make a voxel. I'm just not
9 certain what the standard is for something not expressly disclosed or shown
10 that they're saying is there and that it's always there such that you can read it
11 as if it was expressly in the reference.
12 JUDGE KHAN: Can you point us to any case law that could help
13 in terms of, you know, if it's not expressly there and they're not saying it's
14 common sense, then it must be that they're relying on inherency?
15 MR. ROZIER: I don't have any case law that says that directly,
16 Your Honor. I'm just understanding what they're saying is to be saying it's
17 necessarily disclosed, this discloses it. To me, it sounds like they're saying
18 it's necessarily there.
19 JUDGE PETRAVICK: And you're basing that based on the fact
20 that the word voxel is just not used?
21 MR. ROZIER: Not used and none is shown, Your Honor, yes.
22 Moving on to the second image in a second plane. Again, they're
23 relying on the foreground and background. I know they brought up -- I'm
24 going to switch for a second. They brought up -- I'm going to switch to
25 Petitioner's slides here. I'm on Slide 42. Let me see if I can zoom in here.

Petitioner has an argument, I'm not sure was in the original petition, but they're now arguing that, as I understood it, arguing that, as we see here in Petitioner's demonstratives 42, that Fuhse262's undisputed disclosures show images in planes spaced apart from the substrate.

And from this slide, they were saying this shows that Fuhse262 discloses two images in separate planes spaced apart. And I just kind of went through it quickly, but it's not here. The evidence cited here is for a light spot images composed of a plurality of light spots. Paragraph 68, this is Fuhse262, talks about all light spots in the light spot image have the same floating height. And then paragraph 36 discussed a three-dimensional motif having image points and height values.

So, there is no express disclosure in Fuhse262 of two images on different planes spaced apart. If that's what they're arguing, there's no evidence for that. There's no evidence in their demonstratives, there's no evidence in the petition for that. I understand they have an argument in the papers that it would have been obvious to the extent that Fuhse262 only discloses two images in a single plane that it would have been obvious to put those images on different planes and space them apart. But there's no motivation to modify in the papers. There's no explanation of why you would want to do that other than to arrive at Lumenco's claims.

So, I can't tell if their argument is that it's expressly disclosed or that it's obvious to modify. But I wanted to hit their slide.

JUDGE KHAN: I think they're saying that it's obvious to modify. I think, as far as I understood their argument, they're saying Fuhse discloses, at least, that two two-dimensional images can be placed on the same plane.

1 Fuhse also discloses that you can vary the heights of images. And if you just
2 put that together, along with the teaching that you can have images in the
3 foreground and the background, you can then move one of the images, you
4 know, off of that plane to another plane. That's as far as -- I think that's how
5 I understand their argument.
6 You're saying that they don't have a motivation to combine for
7 that; is that correct?
8 MR. ROZIER: Correct. I do think they made that argument, by
9 the way. I thought they were making a different argument, too, today that it
10 was expressly disclosed. So, I agree they make the argument you're making
11 and correct that we don't think they have any explanation for why you would
12 do that and that's what a motivation to combine is. So, other than to arrive at
13 the claims of Lumenco, there's no explanation of why one of skill in the art
14 would make that modification to the reference, Your Honor.
15 JUDGE KHAN: Okay. Thank you.
16 MR. ROZIER: So, that's the argument on the motivation to
17 combine or motivation to modify. On the foreground and background,
18 there's no evidence here that foreground and background mean that they're
19 on different planes, much less that those planes are spaced apart. As an
20 initial matter, two planes, even if they were not on the same plane, they
21 could be planes together. There's no explanation that their foreground and
22 background means there's a distance between the two, that they're spaced
23 apart. And the words foreground and background are commonly used in
24 photography, painting, where you refer to a tree that looks closer to you in
25 the 2D painting or picture. There's mountains in the background, you see

1 the trees in the foreground, the mountains in the background, and there's no
2 indication that Fuhse262 means anything other than that, foreground and
3 background. It doesn't necessarily mean that they're in different planes or
4 that they're spaced apart. And the rest of Fuhse262, I think, clarifies that and
5 confirms that common understanding of foreground and background.
6 Here's Dr. Hesselink. This is the only opinion he has on
7 foreground and background, just that, if they're in the foreground and
8 background, they are spaced a distance apart. There's no explanation for
9 why he believes that, for why he thinks foreground and background always
10 mean not only that they're in different planes but that they're spaced apart.
11 And elsewhere in the petition, Petitioner admits that what Fuhse262 does
12 expressly disclose is displaying two images in the same plane and that those
13 two images, in their argument, those two images, the two images are in the
14 foreground and background of each other. We agree with that. That's what
15 Fuhse262 discloses. It's a single light spot image that has a 3D motif and a
16 2D motif.
17 I'm on page 39 now of Patent Owner's demonstratives. I'm going
18 to go back to page -- Slide 38 of Patent Owner's demonstratives, and as it
19 says here, this is from paragraph 117 of Fuhse262, which is the only
20 paragraph that mentions the foreground, background, those words, it talks
21 about that these are both in a single light spot image and that, if there's poor
22 light conditions, like those that cause you to get a pixel instead of a voxel, if
23 there are poor light conditions, the three-dimensional background motif may
24 disappear because of that interference and you can only see the 2D image;
25 and when that happens, you're reducing the light spot image from the 3D

down to the 2D, which implies there's no distance between these two motifs. They're sharing the same plane and, when there's interference, the image reduces to the 2D motif which is entirely consistent with the normal meaning of foreground and background.

JUDGE KHAN: If we go to their two two-dimensional image theory here instead of the 3D and 2D, and one of the 2D images was in the foreground and the other was in the background, how would they not be in separate planes? Is there any way that they could be in the same plane and still be in the foreground and background when we're talking about two-dimensional images?

MR. ROZIER: I think there is, just like the painting or photography example. This is how foreground and background are used. It's used to talk about how the images appear, and so they're appearing in the foreground and background, just as in the example a tree in the painting would appear in the foreground of the mountain that's on the same flat picture, Your Honor.

JUDGE KHAN: Okay. So, it's more like an optical illusion almost. They're in the same plane, but it just looks like one is in front of the other?

MR. ROZIER: Correct.

JUDGE KHAN: And that's what you say Fuhse's reference to foreground and background is referring to?

MR. ROZIER: There's no evidence it means anything else is really what we're saying.

JUDGE KHAN: Okay. Thank you.

MR. ROZIER: We've already addressed the motivation to modify to make it, which we think concedes that foreground and background doesn't actually disclose spacing these apart and putting them on different planes. We don't think there's a motivation to modify, and we don't think they've met their burden by preponderance of the evidence to show that the reference discloses two images in two planes and that they're spaced a distance apart between those two planes. Again, even if there's an inference to be made that they had shown that the two images are on different planes, those planes have to be spaced apart; they can't just be abutting each other. And it's their burden to show that the reference discloses that. This is a company that's been in this business for 150 years, and we don't have a reference that expressly discloses it, so we're relying on a battle of the experts here, as we are with some of the other limitations.

If there are no questions on that, Your Honors, I'll turn to Slide 44 of the Patent Owner's presentation. This is regarding the ‘863 Patent and the assigning a first object and assigning a second object from a starting digital image, so taking two separate objects from the same starting image and putting those on different planes. We don't think they've met their burden to show the references disclose or suggest this.

We're somewhat confused about what the actual mapping is from the papers, and I didn't hear today a clear argument of what the proposed mapping is. They were rebutting some of our arguments, so I'll do the best I can here. What we know is the petition argues that the body of Fuhse847 is both the first object and the starting digital image. I'm on Slide 46 of Patent Owner's demonstratives, and, as you see, this is a direct quote. Fuhse847

teaches a body, a first object, and, quote, the starting digital image. This body satisfies a starting digital image.

So, the body is, in their mapping, from what we can tell, both the first object and the starting digital image. That's improper because there's a presumption that different claim terms have different meanings, and it also affects the later mapping of the other elements of the claim, as we'll see.

The petition argues that, I'm on Slide 47 of Patent Owner's slides, that Fuhse847 teaches assigning the body in the image, the body, the one body in the starting image, to the first display plane by defining light spots for every single point, every point in the digital image. So, Fuhse847 isn't extracting different images from the same starting image. It's taking all the light spots for that image and putting it on a plane, displaying that image on a plane.

And turning into their mapping, this is Slide 48. As you'll see, when it gets to time to -- going back to the claim here for one moment. I'm on Slide 44. Claim Limitation 1a that talks about assigning a first object in a starting digital image to a first image display plane. So, that's one limitation. Separately, a second object in the starting digital image to a second image display plane.

And we'll see here, turning to Slide 48 of Patent Owner's demonstratives, at the bottom quote from petition page 21, the Petitioner argues that, other than being in the second image display plane, a second object in the starting digital image has only the same requirements as the first object and is, therefore, satisfied by the same teachings above. But, again, as we discussed, above on Slide 47, what Fuhse847 discloses is that

1 every single point in the digital image and the starting image is put on the
2 first plane. And so, you can't take that same image and put it on a second
3 plane. There's no disclosure of that, and the disclosure of using the whole
4 image on the first plane cannot satisfy the separate limitation of taking
5 something from that same first image and putting it on a second plane.
6 This is turning to Slide 49. Petitioner's last argument on this point
7 is that, if none of those other mappings stick, then a POSITA would have
8 understood that the second image is from a second object in the starting
9 digital image. As an initial matter, there is no second image, so the POSITA
10 would understand that the second image is from a second object. There is no
11 second image. Fuhse847 only talks about taking the full image, one single
12 thing, and displaying it on a plane. They have a quote that, from the
13 reference, that -- the reference does talk about a font or logo, that that's what
14 these images can be, but there is no disclosure in the reference of a single
15 image having a font and a logo and extracting those separately from the
16 starting digital image.
17 This is an expert saying you could do this. There would be a way
18 in the art to take an image, extract two, then put them on different planes;
19 but none of that is in the reference. There's no motivation identified to do
20 that, other than hindsight bias, the Lumenco claims. So, the expert
21 testimony here is just basically that I've seen the Lumenco claims and you
22 could modify this based on other teachings known in the art to arrive at the
23 claims, and we don't think that's a legitimate motivation to combine and the
24 reference does not disclose this feature.
25 If there are no questions on that limitation, I can move on to ‘863

1 Patent Limitation 12b. I'm on Slide 50 of the Patent Owner's
2 demonstratives. This is discussing the limitation of a design output file that
3 includes an angular orientation and location coordinates in the array. I want
4 to focus today on the location coordinates. What Rich discloses, what
5 Petitioner points to, is that Rich discloses a data file that has a map of a
6 pattern of features. So, a pattern is like a print pattern of a dress but not
7 location coordinates, not on the actual array of mirrors where each mirror,
8 which is what the claim requires, location coordinates in the array for each
9 of the micro mirrors.
10 What Rich doesn't disclose is that for each of the individual micro
11 mirrors there are location coordinates. This is a pattern you can overlay on
12 anything, and it's not -- there's no disclosure of the location coordinates
13 actually being applied by Rich. Any questions on that, Your Honors?
14 Thank you.
15 Turning to the last limitation contested here, this is the selecting
16 micro mirrors randomly from a plurality of the mirrors located in the base of
17 a cone. We think the decision on institution got this right in finding that
18 their arguments were not persuasive. This is largely because there's no
19 motivation to combine, there's no reason to combine the two; and even if
20 you had combined them, it would not arrive at the result of the Lumenco
21 patent. In effect, what they have is a reference that discloses groups of
22 mirrors and using groups of mirrors for a pixel; we don't argue with that.
23 But the other reference just happens to use the word, random. It's not in the
24 context of selecting mirrors. It's in the context of varying an angle of
25 mirrors across the entire array, and there's no explanation of why a POSITA

1 would have used the random inclination idea to use a random selection to
2 pick mirrors randomly in a set.
3 JUDGE PETRAVICK: So, do you think that the word selecting
4 the mirrors, that we should interpret it as that you have to select the
5 individual mirror, or can selecting be done by deciding that this mirror has a
6 random orientation?
7 MR. ROZIER: I think the selecting means you're picking mirrors
8 at random from the available mirrors in the column. You're saying --
9 JUDGE PETRAVICK: And can you point me towards something
10 in the specification that would support that, that it has to be picking the
11 mirrors as opposed to randomly assigning the orientation of a mirror? That
12 that's how you select it, by randomly assigning the orientation?
13 MR. ROZIER: I believe I can. I don't have it right here. I can do
14 that during my rebuttal, Your Honor, or I can --
15 JUDGE PETRAVICK: Sure. You can tell me later.
16 MR. ROZIER: Thank you. And that is all I had, unless there are
17 questions.
18 JUDGE PETRAVICK: I have no further questions.
19 JUDGE WOOD: No, thank you.
20 MR. ROZIER: Thank you, Your Honors.
21 JUDGE KHAN: Nothing.
22 JUDGE PETRAVICK: So, you have about 17 minutes but,
23 because I can only set the clock to a whole number, I'll give you 18.
24 MR. ROZIER: Thank you.
25 JUDGE PETRAVICK: You can begin when you're ready.

MR. TENNANT: I'm ready. Thank you, Your Honor. I'll try to be brief, I only have eight minutes. As for the POSITA definition, we've argued, Petitioner argued, that reply 21 and 22, there are paragraphs in those pages, that there's nothing in the record that shows computer sciences in a similar field. That wasn't addressed in the surreply. We believe the Board is perfectly capable of weighting the evidence. We don't believe that the POSITA level for Dr. Lindstrand has been met, but you can weigh the experts and weigh their opinions accordingly.

With respect to voxel, you know, we want to just reemphasize that voxel is understood by artisans as a pixel with volume. All that needs to be shown is there is volume. The challenged patents don't disclose the volume, don't disclose the word voxel, but the way you interpret patents, and I've heard from my colleague that there's nothing that explains voxel, but that's not the correct question. The correct question is how a skilled artisan understands the disclosure of the challenged patent and how that person understands the disclosure of the prior art. And that's how we base our opinion on whether or not something is disclosed or not, it is in the eyes of a POSITA. And the experts are in agreement how voxel is disclosed in the challenged patents and how voxel is disclosed in the prior art. There is a volume at the intersection of the various beams, of the beams that form the voxel.

I heard some discussion regarding 2D images. I want to make the record clear. A 2D image can be formed by voxel, and this is precisely what the challenged patents do. A 3D image where all the heights of the voxels are the same is a 2D image. What makes it a voxel is that it is floating above

the substrate. And we have put this in our petition and it's also in the declaration.

So, the question is, is the pixel floating above the substrate, or below it, in '262? And if it is, if it's floating in space, that is what a voxel is because a voxel is created by the convergence of light beams at a point in space. And that's a voxel.

I heard arguments regarding motivation to combine or purportedly lack thereof with respect to 35b.2. Correct? I just want to make clear for the record, at page 13 of the petition for the '294 Patent, it sets forth the combination. The combination is with Figure 2 and Figures 8, 9, and 10, and accompanying disclosures, and we provided the motivation to combine, which has not been disputed.

Paragraph 117, which we heard a lot about regarding foreground and background, is part of Figure 10, the Figure 10 disclosure. So, the motivation to combine has already addressed the combination that we have set forth.

There's been some discussion regarding disclosure of these multiple images, and I just want to make the record clear that Fuhse262 does disclose multiple images and that they are at different heights. And I'm going to give you page references to the petition, but there are also corresponding references to the expert declaration that are stated in the petition.

In the '262 description, page 8, page 10, all refer to Fuhse262 disclosing multiple images. Page 11 refers to Fuhse262 disclosing different images viewed at different angles. I just addressed the motivation to

combine, which combines the embodiments. In the element 1b.2, element 25b.2, if you look at those discussions, they both talk about multiple images. And for those two elements, we identify which images we are relying on for those distinct elements.

In Patent Owner's slides, I believe around 35, they quote, and they also do this in their surreply, they quote opinions from the petition and from Dr. Hesselink out of context. They allege that Dr. Hesselink only provided a single opinion, but, if you look at the petition for the element 35b.2 and read it in context, you see that we actually have sentences that follow the statement and explain the support for that statement. There's also cross-reference citations to other points in the petition. So, we disagree with Patent Owner that the opinions that are offered by Dr. Hesselink or the opinions that are stated in the petition are conclusory because they've been snipped out of context.

Also, I want to mention that foreground and background. The foreground or background pixels in the paragraph 117 of the Fuhse262 disclosure all concern floating pixels. So, one of the questions, I believe, from Judge Khan was regarding those pixels.

Those are in the context of being floating. When they are floating, as I said, that is a voxel because, once the image is floating in space, that represents a voxel or I should say a plurality of voxels that create the image.

Last, on selected randomly. Patent Owner argued there's no motivation to combine. That's nowhere in the record. We have not seen that argument from Patent Owner at all. That's a new argument and should be disregarded. Also, regarding random selection assisting with limiting

interference, again, we haven't seen that argument in the record, nor have we seen that stated in the challenged patterns.

I guess, last but not least, regarding the first object and the second objects, as we stated earlier in our arguments, in our primary arguments, those objects are different parts of an image. It's correct to -- you can't -- in the art, when you refer to an object, it's an image. But when you put those two objects together, they form another image. That is precisely what the prior art is doing because you have multiple objects, images, stacked on top of each other creating another image, a starting digital image in our case.

If there's no further questions, we --

JUDGE WOOD: No, thank you.

MR. TENNANT: We submit. Thank you for your time.

MR. ROZIER: Your Honors, first, since it was one of the last things Counsel said, I'm on the petition, the Patent Owner's response, Paper 13 in IPR '836, that is discussing the interference. There's ample testimony of the record in both Dr. Lindstrand's declaration and the petitions talking about the interference involved in ambient light environment. We've talked about it before but just confirm that is all in the papers, that it wasn't something we were talking about for the first time today on the issue of interference in the ambient light environment being what causes you not to get a voxel in the Fuhse system.

Your Honor, circling back on your question on the random selection and where in the specification it talks about specifically that that selection is selecting mirrors and not selecting inclination of mirrors, in the '863 Patent, column 12, lines 44 to 51 of the patent, it's in other locations, as

well. But as described here, a first mirror is chosen randomly. Any useful random selection may be used, and then this random process is repeated for the available mirrors until the set includes the number of mirrors needed for a complete set. So, it's talking about, from the base, picking one mirror, picking the next one randomly from the mirrors in the set until you have the number of mirrors you need for the pixel.

So, it's not talking about inclination. It's not talking about varying the inclination. That comes after you are selecting which pixel, which mirrors you want to use, and that is that selection that's done randomly, Your Honor.

The last thing, if there are no questions, is I would like to point out that Dr. Lindstrand's CV in discussing his educational experience, talking about his Ph.D. and master's degree in computer science, states that he had degree work in image analysis and had Ph.D. and master's projects on resolved optical electronics and measurement devices. So, he has evidence of course work in image analysis area.

And that's all I have unless there are further questions.

JUDGE PETRAVICK: I have no further questions.

JUDGE WOOD: No, thank you.

MR. TENNANT: Thank you for your time, Your Honors.

JUDGE PETRAVICK: Thank you. I want to thank you all for appearing here today and providing us with this very useful information to think about. We are adjourned.

(Whereupon, the above-entitled matter went off the record at 3:08 p.m.)

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