FISH & RICHARDSON P.C.

1425 K Street, N.W.
11th Floor
Washington, DC 20005

Telephone
202 783-5070

Facsimile
202 783-2331

Web Site
www.fr.com

Frederick P. Fish
1855-1930

W.K. Richardson
1859-1951

ATLANTA
AUSTIN
BOSTON
DALLAS
DELAWARE
HOUSTON
MUNICH
NEW YORK
SILICON VALLEY
SOUTHERN CALIFORNIA
TWIN CITIES
WASHINGTON, DC

VIA EMAIL

February 24, 2014

Mr. John S. Kern
Mr. Robert C. Mattson
Oblon, Spivak, McClelland,
Maier & Neustadt, L.L.P.
1940 Duke Street
Alexandria, VA 22314

SERVICE OF SIGNED TRANSCRIPT AND ERRATA FOR THE DEPOSITION OF RICHARD C. JUERGENS

Re:	Inter Partes Review of U.S. Patent No. 7,348,575
Case No.:	IPR2013-00363
Our Ref.:	24984-0056IP2

Dear Messrs. Kern and Mattson:

Attached are the signed transcript and errata for the deposition of Richard C. Juergens on February 13, 2014 in IPR2013-00363 and the following documents that Mr. Juergens refers to in his errata:

1. A Code V file provided to Mr. Juergens by Fish & Richardson prior to his declaration;

2. The Mann application as filed with the USPTO.

If you have any questions, please let us know.

Sincerely,

/Edward G. Faeth/

Edward G. Faeth
Patent Paralegal

40953642.doc

ZEISS 1135
Zeiss v. Nikon
IPR2013-00363

A π EXHIBIT 1135
Deponent Sasian
Date 5/8/14 Rptr. nm
WWW.DEPOBOOK.COM

CERTIFICATE OF SERVICE

Pursuant to 37 CFR §§ 42.6(e)(4) and 42.205(b), the undersigned certifies that on February 24, 2014, complete and entire copies of the transmittal letter, Signed Deposition Transcript and Errata of Richard C. Juergens, a Code V file provided to Mr. Juergens by Fish & Richardson prior to preparing his declaration, and the Mann application as filed with the USPTO were provided via email to the Petitioner by serving the correspondence email address of record as follows:

Mr. John S. Kern
Mr. Robert C. Mattson
Oblon, Spivak, McClelland,
Maier & Neustadt, L.L.P.
1940 Duke Street
Alexandria, VA 22314

Email: CPdocketKern@oblon.com
Email: CPdocketMattson@oblon.com

/Edward G. Faeth/
Edward G. Faeth
Fish & Richardson P.C.
60 South Sixth Street, Suite 3200
Minneapolis, MN 55402
(202) 626-6420

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

CARL ZEIS SMT GMBH	
Petitioner	Case IPR2013-00363
v.	Patent 7,348,575
NIKON CORPORATION	
Patent Owner	

CROSS-EXAMINATION BY DEPOSITION
OF RICHARD C. JUERGENS

THURSDAY, FEBRUARY 13, 2014
9:02 AM

FISH & RICHARDSON
One Marina Park Drive
Boston, Massachusetts 02210

Sandra A. Deschaine, CSR, RPR, CLR, CRA

A P P E A R A N C E S

ON BEHALF OF NIKON CORPORATION:
OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, L.L.P.:

John Kern, Esquire
Robert Mattson, Esquire
1940 Duke Street
Alexandria, Virginia 22314 U.S.A.
T. 703.412.3000 F. 703.413.2200
jkern@oblon.com
rmattson@oblon.com

ON BEHALF OF CARL ZEISS SMT GMBH:
FISH & RICHARDSON, P.C.

Kurt Glitzenstein, Esquire
Marc Wefers, Ph.D., Esquire
One Marina Park Drive
Boston, Massachusetts 02210
T. 617.542.5070 F. 617.542.8906
glitzenstein@fr.com
wefers@fr.com

INDEX

WITNESSES:		PAGE
Richard C. Juergens		
By Mr. Zern		4/114
By Mr. Glitzenstein		110

EXHIBITS

EXHIBITS:	DESCRIPTION	PAGE
Exhibit 2001	International Technology Roadmap for Semiconductors	8

(Exhibits retained by Attorney Kern.)

P R O C E E D I N G S

RICHARD C. JUERGENS, Deponent, having first been satisfactorily identified by the production of his Arizona driver's license and duly sworn by the Notary Public, was examined and testified as follows:

CROSS-EXAMINATION

Q. Good morning, Mr Juergens.
A. Good morning.
Q. Do you know why you're here today?
A. Yes.
Q. Are you here for -- are you here as an expert witness for Karl Zeiss?
A. Yes, I am.
Q. Are you here for Inter Partes Review IPR2013-00363?
A. Yes.
Q. Is that involving U.S. Patent Number 7,348,575.
A. Yes.
Q. I'd like to ask you a few questions about your background to start off the day.
A. Okay.

Q. Would you please begin by telling me about your education.

A. I have a Bachelor's degree in Physics from California State College of Fullerton, and that is in Fullerton, California, and I have a Master's degree in Physics from University of California, Irvine.

Q. And did your studies in physics focus on optics?

A. They did not.

Q. Would you please tell me where you learned about lithography technology?

A. I picked it up over the course of my career. On-the-job training, you might say.

Q. Can you give me some examples of on-the-job training?

A. My actual employment has never really impinged upon microlithography. Where I learned about the techniques of microlithography were from conferences that I attended where I have listened to papers and talks, and from work that I've done for Fish

& Richardson.
Q. So just for clarity, have you worked at any time as a lens designer in microlithography?
A. Well, there's two questions in there.
I have worked as a lens designer, but I have not worked as a lens designer specifically in microlithography.
Q. So would you consider then microlithography more of a hobby than a profession?
A. Optics is my profession, and microlithography is part of that profession.
Q. I see.
Do you have any publications in the field of microlithography?
A. Not specifically in the field of lithography, no.
Q. Do you have any publications in the field of optics generally?
A. Yes, I do.
Q. Can you list those or just reference them generally?

A. They are listed in my CV, which is one of the exhibits submitted in this discussion.

Q. Fair enough.

Do you know what the acronym ITRS stands for?

A. No, I do not.

Q. Would you agree that it stands for the International Technology Roadmap of Semiconductors?

MR. GLITZENSTEIN: Objection, foundation.

THE WITNESS: I would accept that.

BY MR. KERN:

Q. Do you know what a technology node is in the context of resolution?

A. I've never come across that exact term, no.

Q. Say, for example, a half pitch of 90 nanometers, does that help your understanding?

A. A half pitch.

Q. A half pitch of 90 nanometers as

an example of a technology node.
A. No, that does not help.
Q. Would it help if I had told you that it was related to the resolution of a rejection lens system?
A. It does not help much, no.
MR. KERN: I'd like to introduce a document and mark it Nikon 2101.
(Exhibit No. 2001, International Technology Roadmap for Semiconductors, marked for identification.)
MR. GLITZENSTEIN: 2001.
MR. KERN: 2101 corresponds to your Zeiss exhibits.
(Off-the-record discussion.)
BY MR. KERN:
Q. Could you read the title of this document, Mr. Juergens?
A. It is called the International Technology Roadmap for Semiconductors.
Q. And it's the 2003 Edition, Lithography?
A. Yes.
Q. And are you familiar with this

publication?

A. I am not.

Q. Would it surprise you to learn that this publication is published every year?

A. It would not surprise me.

Q. Would it surprise you to learn that this publication sets forth the industry expectations for the future of semiconductor devices?

MR. GLITZENSTEIN: Objection, foundation.

THE WITNESS: I accept that.

BY MR. KERN:

Q. So could you please turn to Page 16 of this document and look at Figure 53. What is the title of the graph shown in Figure 53.

A. It's labeled, "Lithography Exposure Tool Potential Solutions."

Q. And do you see the years across the top of the graph?

A. Yes.

Q. And what is the range of the years

shown on the top of the graph?

A. It starts at 2003 and goes to 2019.

Q. Thank you.

And the next line below that is labeled "Technology Node."

Do you see that?

A. Yes.

Q. And can you read the range of half pitches shown corresponding to the years 2003 through 2019 shown in that row?

A. Okay. It starts under 2004. It says, "hp90."

And then under 2019 it lists hp16."

Q. So what is your understanding of a half pitch in nanometers?

A. I would assume that this is the half spacing between two individual, separate lines.

Q. And what is your understanding of a graphic, such as the one shown in Figure 53, showing a half pitch changing from -- a half pitch of 90 nanometers in 2004 to a half pitch of 60 nanometers in 2019?

A. Could you clarify what the question is?

Q. Sure. What is your understanding of this graphic when it indicates that a half pitch is 90 in year 2004 and is being reduced year by year to a half pitch of 16 in 2019?

MR. GLITZENSTEIN: Objection, foundation.

THE WITNESS: The graph appears to indicate that over time, between 2004 and 2019, that the half pitch will be steadily decreasing from 90 to 16.

BY MR. KERN:

Q. So do you understand that this graph is showing the industry expectation for resolution moving forward from 2003 past, present into the future?

MR. GLITZENSTEIN: Objection, foundation.

THE WITNESS: That's what it appears to be, yes.

BY MR. KERN:

Q. So based on the 2003 ITRS

document, would you say that it's reasonable that it was the plan for the semiconductor industry to achieve better resolution in the future?

MR. GLITZENSTEIN: Objection, foundation.

THE WITNESS: I could not answer that since I have not read this document.

BY MR. KERN:

Q. Fair enough.

Per our prior discussions, do you agree that resolution is an important design feature of a projection lens?

A. Yes.

Q. And without having the benefit of reading this document and looking at the graphs shown in Figure 3, would you agree that the graph -- I'm sorry, scratch that, 53, would you agree that the graph shown in Figure 53 is at least indicating that, in the future, expectations are that the half pitch will be reduced?

MR. GLITZENSTEIN: Objection,

form, foundation.
THE WITNESS: Yes.
BY MR. KERN:
Q. Are you aware of some of the leading technologies in lithography at the time of filing the '575 Patent?
A. Is this question, Am I aware of the technology at that time, or the question is, Was I aware at the time of the filing?
Q. At the time of filing, did you just list some of the leading technologies in microlithography? Roughly 2003.
A. About that time is when immersion technology was being applied to lithography, and catadioptric technology was also being applied to lithography.
Q. When you say "applied," were they leading technologies in the field at that time, or were they still in their design phase?
MR. GLITZENSTEIN: Objection, form.
THE WITNESS: They were probably still in their design phase.

BY MR. KERN:
Q. And what about EUV lithography, would you agree that was available in 2003 and a leading technology?
MR. GLITZENSTEIN: Objection, form.
THE WITNESS: That was not available back in 2003.
BY MR. KERN:
Q. What about 157 nanometer lithography, was that a leading technology in 2003?
A. I would say yes.
Q. Fair enough.
Have you personally designed any reduction projection lens for lithography?
A. No.
Q. Have you managed the design of a projection lens for photolithography?
A. No.
Q. So I want to look at Exhibit 1129, and that's your CV.
Could you look at the second paragraph and refresh your recollection of

that paragraph?
(Witness reviewing document.)
A. Okay.
Q. For the record, could you please read aloud the last full sentence in that paragraph?
A. "He worked eleven years at Optical Research Associates, the suppliers of CODE V, and went around the world giving seminars, lectures, and technology support on how to use CODE V effectively for design and analysis of all kinds of optical systems including lithography systems."
Q. So is it the intention of that last sentence to imply that you designed lithographic systems while at Optical Research Associates?
A. No.
Q. I want to ask you about some of the authors of several articles and lens designers and whether you're familiar with their work or them personally.
Are you familiar with Mr. Willi Ulrich in the field of lithography?

A. Yes.
Q. You're personally familiar with him?
A. Yes.
Q. And you are familiar with his works as far as publications?
A. I'm familiar with some of his works. I would not say I'm familiar with all of them.
Q. Fair enough.
Are you familiar with Mr. Ulrich's design in the field of optical lens design, particularly related to lithography?
A. I'm only familiar with his designs that have been expressed or shown in the patents that I've been working with Fish & Richardson on.
Q. Fair enough.
How about the same questions with regard to Mr. David Williamson? Are you familiar with Mr. Williamson?
A. I am.
Q. Are you personally familiar with Mr. Williamson?

A. Yes.
Q. Are you with familiar any of Mr. Williamson's publications?
A. I have heard him give some talks at conferences. I could not now tell you what they are on, other than probably touched on lithographic topics. But I would not say that I'm intimately familiar with his complete history of publications.
Q. And Mr. Williamson is a lens designer in the field of lithography; is that accurate?
A. Yes, he is.
Q. Are you familiar with any of Mr. Williamson's optical designs in the field of lithography?
A. No, I'm not.
Q. Same questions with regards to a Mr. David Shafer.
Do you know Mr. David Shafer?
A. Yes, I do.
Q. And do you know him personally?
A. Yes, I do.
Q. And are you familiar with

Mr. Shafer's publications or a subset of his publications?

A. I am familiar with his -- with some of his publications. I actually have a complete set of his publications, but I have not read all of them.

Q. Okay. Fair enough.

And Mr. David Shafer is an optical lens designer in the field of lithography?

A. Yes, he is.

Q. And are you familiar with some or all of Mr. Shafer's optical designs in lithography?

A. I'm familiar with some of them.

Q. Okay.

What about the same questions for Mr. Yashuhiro Omura. Are you familiar with Mr. Omura?

A. Yes, I am.

Q. And do you know him personally?

A. I have met Mr. Omura personally, yes.

Q. And are you familiar with some or all of Mr. Omura's publications in the field of lithography?

A. Only through the patents that I've seen in conjunction with this task.

Q. Fair enough.

Would you agree that Mr. Omura is an optical lens designer in microlithography?

A. Yes.

Q. Are you familiar with all or some of Mr. Omura's optical designs in lithography?

A. Only as shown in his patents.

Q. In the '575 Patent?

A. In particular, yes.

Q. And you also studied the similar continuation in the '870 patent?

A. Yes.

Q. Are there any other patents of Mr. Omura that you studied?

A. There is another patent that we are using as an example of prior art to his '575 Patent.

Q. Okay. In this proceeding?

A. In this proceeding.

Q. Okay. Fair enough.
Are you familiar with Mr. Warner Tabarelli?
A. No.
Q. So you never met Mr. Warner Tabarelli?
A. I have not.
Q. Do you agree that Mr. Warner Tabarelli is an optical lens designer?
A. I could not say of my own knowledge.
Q. Are you aware of any publications by Mr. Tabarelli?
A. I am aware of a publication that he has that describes the use of immersion fluids.
Q. Okay. Fair enough.
Are you familiar with all or some of Mr. Tabarelli's optical designs in the field of lithography?
A. No, I'm not.
Q. Okay. Fair enough.
Do you consider the people I just mentioned to be experts in the field of

optical design for projection lenses and microlithography?

A. With the exception of Tabarelli, whom I do not know, I would say yes.

Q. But you are familiar with Mr. Tabarelli's work in the form of his patent?

A. Yes, but that work was not related to optical design. That was related to immersion fluids.

Q. Okay. Fair enough.

Would you consider those persons to be persons of ordinary skill in the art?

A. Yes.

Q. Can you tell me about your main responsibilities at Optical Research Associates?

A. I was in the marketing and customer support group, and I did technical support through faxes, e-mails, and telephonically to customers on CODE V. I gave seminars on the use of CODE V, both at the -- beginning, and intermediate, or advanced levels, and I went almost literally around the world visiting various countries giving technical support, doing marketing, and giving seminars on CODE V.

Q. And during your employment at ORA, or Optical Research Associates, did you ever lecture Nikon?

A. I have visited Nikon several times, yes.

Q. And that was Nikon in Japan?

A. In Japan, yes.

Q. Have you ever visited their U.S. subsidiary?

A. No, I have not.

Q. And do you recall what the topic of the lecture was when you visited Japan, with Nixon in Japan?

A. I visited them several times. The first time I visited them was to give demonstrations of CODE V and describe it, because at the time they were not using CODE V, and it was in an attempt to convince them to start to use CODE V.

Subsequent visits to them were to meet with them and help answer technical questions that they had on CODE V.

Q. Does Nikon currently use CODE V?

A. Yes, they do.

Q. Do you remember what group you had met with when you visited Nikon or groups, plural?

A. At least one time or more times the groups I visited were managed by Mr. Omura.

Q. So how long have you or did you work at Optical Research Associates?

A. It was almost eleven years.

Q. And from when to when?

A. From 1988 to 1999.

Q. So going back to your responsibilities at Optical Research Associates, what percentage of your time at Optical Research Associates would you say was devoted to the sales of CODE V software?

A. Zero.

Q. What percentage of your time was devoted to demonstrating CODE V software to potential clients?

A. Probably 5 to 10 percent.

Q. Fair enough.
What percentage of your time then was devoted to customer support of clients using CODE V software?
A. 75 to 80 percent.
Q. And what percentage of your time at Optical Research Associates was devoted to optical design, specifically optical design of microlithography?
A. Zero percent.
Q. And can you tell me what your main responsibilities are at Raytheon?
A. I am considered as a senior -- what's called a subject matter expert in opticals, and I am involved in overseeing the technical aspects of the various optical products that are included in Raytheon products.
Q. How long have you worked at Raytheon?
A. I started in 1999 up to the present time, so it has been just over 15 years.
Q. And do you do optical design for

Raytheon?
A. I do.
Q. What type of optical design?
A. It has been primarily infrared type systems.
Q. So infrared sensors? Infrared emitters? What type of infrared?
A. Infrared image sensors.
Q. Image sensors. Okay.
And what percentage of your time at Raytheon is devoted to optical design of microlithography systems?
A. Zero percent.
Q. So have you been involved in Sematech, S-e-m-a-t-e-c-h?
A. No, I have not.
Q. Do you know what Sematech is?
A. I cannot say right now what it is. It sounds familiar, but I do not know what it is.
Q. Okay. Fair enough.
So prior to your involvement in this litigation and the prior interference of the '870 Patent to Omura, have you ever

examined patents related to lens systems
before?
A. Yes.
Q. Have you ever examined patents
related to projection optical systems before
in the field of microlithography?
A. No.
Q. Can you define what a lens unit
would mean to a person of ordinary skill in
the art?
A. Usually that would be considered a
group of lenses that is doing some specific
function within the overall operation of the
lens.
Q. Can you define what it means to be
a lens group to a person of ordinary skill in
the art?
A. A lens group is simply a
concatenation of multiple lenses that are
called a single group for whatever reason the
namer of that group had. It would probably
tend to have the same general meaning as a
lens unit but not exactly the same name.
Q. So people would generally

include -- scratch that.

Back to the definition of a lens unit.

Lens unit was a grouping of lenses that had a similar function; is that accurate?

A. No, that had a specific function. For example, if I had a telescope followed by a scanner, followed by an imaging unit, then I would -- I can call a telescope one unit; I can call the imager one unit; I can call the scanning system one unit and so forth.

Q. So a lens unit could fairly be described as a group of lenses that functioned together to achieve a function?

MR. GLITZENSTEIN: Objection, form.

THE WITNESS: Yes.

MR. GLITZENSTEIN: Just pause for a moment, give me a moment to object, please.

BY MR. KERN:

Q. So are you familiar with the objective lens in a pair of binoculars?

A. Yes, I am.
Q. Is the objective lens in your definition a lens unit?
A. It could be considered as a lens unit.
Q. And why would it be considered a lens unit?
A. Because the objective lens is -- the elements in an objective lens are close together, and they are relatively separated from other portions of the overall lens system.
Q. And what is the function of the objective lens unit in a pair of binoculars?
A. To collect the incoming light and focus it.
Q. And does that function play a role in defining it as a lens unit since the lenses cooperate together to collect and focus light?
A. It could.
Q. It could.
Why might it not?
A. The "could" implies that it could

be called a lens unit for the reason that you stated.

Q. I see. Okay.

So are you familiar with the eyepiece lens in a pair of binoculars or lenses in a pair of binoculars?

A. Yes.

Q. Is an eyepiece unit a lens unit?

A. It could be called a lens unit.

Q. Why could it be called a lens unit?

A. Because they tend to be grouped together and form a separate function from the objective lens unit.

Q. And what is the function of the eyepiece lens unit in a pair of binoculars?

A. It is to recoluminate the light so that the human eye can see the light easily.

Q. I'd like to turn to your Declaration. It's Exhibit 1101. Scratch that. I believe it's Exhibit 1116.

So in your expert report at Paragraph 15 there's a section about legal standards.

Do you agree with that?
A. Yes.
Q. And did you write this section of your expert report?
A. I had help from Fish & Richardson in writing it.
Q. What portion or percentage of that section was written by Fish & Richardson?
MR. GLITZENSTEIN: I'm going to just, before you answer, Mr. Juergens.
Counsel, I want to make sure I understand your position on inquiring on this issue. So you know, Federal Rules of Civil Procedure 26 protects the types of questions that you're asking right now from discovery.
I'm curious as to your position on the discoverability of this type of information in view of that.
MR. KERN: Sure. I just want to see what percentage of the report was actually written by Mr. Juergens.
MR. GLITZENSTEIN: Right. I understand the question.

My question for you is, how do you view -- do you view the limitations on the ability to take discovery of experts set forth in Rule 26 of the Federal Rules of Civil Procedure as operative in this proceeding?

MR. KERN: Of course.

MR. GLITZENSTEIN: You do.

MR. KERN: Yes. Okay. Given that, I'll allow you to answer, but I am a little concerned about --

MR. KERN: Let rephrase the question if it's causing consternation.

BY MR. KERN:

Q. What percentage of Paragraph 15 did you draft, Mr. Juergens?

A. I would say that I did not have to draft any of it. I did not draft any of it. I did proof read it. I did read it and verify that I could understand it and knew what it meant.

Q. Sure. Fair enough.

Could you please read Paragraph 15

aloud?

A. "I understand that when it comes to interpreting the scope of a claim, the claim's terms should be given their broadest reasonable interpretation consistent with the specification and the prosecution history of the application or patent. If the specification provides a definition of a claim term, the claim term should be interpreted based on the definition."

Q. And so what does the language "consistent with the specification" in that paragraph mean to you?

A. It means to me that the interpretation of a term must be consistent with how it is used in the specification of the patent.

Q. By "used," would you include how it is described in the specification? Is that what's meant by "used" in your last answer?

A. That's -- yes.

Q. And would you generally agree that the drawings are part of the specification in

the U.S. Patent?
A. The drawings?
Q. The drawings, the figures are part of the specification in the U.S. Patent?
A. Yes.
Q. What do you understand "the prosecution history" to mean in that paragraph?
A. I understand that to mean that if previous discussions or histories of the application have -- indicate a different interpretation of a term, then that is the interpretation that should be used.
Q. And what is the prosecution history?
A. For example, an interference.
Q. Okay.
Would you agree that interaction by the applicant with the U.S. Patent and Trademark Office during examination of the application, the record of that is a prosecution history?
A. I could accept that.
Q. Okay. Fair enough.

So do you generally agree with Paragraph 15?
A. Yes.
Q. Did you apply Paragraph 15 in your analysis of what a third lens unit is in paragraph -- I'm sorry, Claim 55?
A. Yes.
Q. And do you believe that the '575 Patent defines various lens units?
A. Yes.
Q. Fair enough.
I'd like to turn now to the Mann Application, which is Exhibit 1110.
Do you recognize the Mann Application, Mr. Juergens?
A. Yes, I do.
Q. Did you read the Mann Application or review the Mann Application in its entirety?
A. Yes.
Q. How did you come to know about the Mann Application?
A. Through Fish & Richardson.
Q. Were you told anything about the

Mann Application when you were given the Mann Application for the first time?

A. It looks like -- I'm not sure what you mean by was I told anything about it.

Q. Did anybody describe to you the purpose of the Mann Application when they gave the application to you for the first time?

A. I was asked to look at the Mann Application, in particular the embodiment of Figure 2, to ascertain whether or not it appeared to be a prior art to the '575 Patent application.

Q. Did anybody give you any guidance in ascertaining whether Figure 2 was prior art to the '575 Patent?

A. I discussed the issue with Fish & Richardson.

Q. Okay. Fair enough.

I'd like to look at annotated Figure 2 of the Mann reference in your expert report. And I believe that's Paragraph 94 of your expert report.

A. Okay.

Q. Do you recognize this figure?
A. Yes.
Q. Did you annotate this figure?
A. Yes, I did.
Q. Did you annotate that figure with help from others?
A. I discussed the annotations with Fish & Richardson.
Q. So did you have any assistance in separating the various lens units shown in this figure?
A. I would not call it assistance. I would certainly say that I discussed the separation of the lens units with Fish & Richardson.
Q. So were you given any guidance in how to divide the various lens units of the Mann Figure 2?
A. No.
Q. So nobody suggested to you or showed you where the breakpoints should be between the various units in Figure 2 Mann?
A. We discussed where the breaking should be.

Q. Do you recall where and when you annotated this figure?
A. It was last year, maybe summer time frame. I don't recall exactly when.
Q. And I notice your annotations are typed on this figure.
Did you generate that graphic?
A. I did not.
Q. Do you know who did generate that graphic?
A. I assume somebody at Fish & Richardson generated this graphic.
Q. Was that graphic based on your direction?
A. Yes.
Q. And how did you communicate that graphic to be generated?
A. I took a similar diagram that I created from CODE V and put that into PowerPoint, and annotated that drawing and submitted -- with these annotations, and submitted that drawing to Fish & Richardson.
Q. Do you still have a copy of that drawing?

A. I probably do somewhere.
Q. So this graphic then was generated by Fish & Richardson at your direction?
A. Yes.
Q. Were there any changes made to the drawing after you submitted the instruction to modify the graphic?
A. Yes.
Q. So you had submitted an original marked up version and instructions to modify Figure 2, a graphic was generated, and then it was later modified?
A. I submitted to them a drawing that broke this up into units, and we discussed -- I discussed with Fish & Richardson the breaking of the units and then I submitted later a second drawing that had a slightly different breakdown of the units.
Q. And what had changed in the breakdown of the units between the first and second drawing?
A. It involved whether or not lenses E11 -- well, in particular lens labeled E11 was to be considered as part of the third

unit or not.
Q. So am I to understand that initially lens E11 was to be considered part of the third unit based on your initial analysis?
A. I thought that lens E11 could be construed to be part of a third unit, yes.
Q. Why did you think E11 was part of a third unit initially?
A. Because there is a slight separation between lens E11 and lens E12.
Q. So referring to the Figure 2 of Mann, there is an air space present between E11 and E12; is that accurate?
A. Yes. There is air space between every element in this lens.
Q. Okay. Fair enough.
But there is a relatively larger air space between E11 and E12 in Figure 2 than other lenses in the system?
A. Yes.
Q. And in the field of optical design, when there is a relatively large lens space separating lens units, is that a

natural location to separate lens groups in a complex optical system?

A. Not always.

Q. So could you please explain why in this case you at least initially considered it to be a place to break between the third lens unit and fourth lens unit?

A. It has to do with the purpose of the different units. The third lens unit is, in general, a negative lens unit, which is diverging the light to form a virtual object point, and then lens E11 and forward to the image form a positive group that re-images that virtual object onto the wafer.

Q. So your selection of E11 as part of the fourth lens unit, was based on your assessment that it began to diverge the beam passing through the projection system; is that accurate?

A. That was -- no. E11 is the start of the group that is beginning to refocus the light back onto the wafer.

Q. Oh, I see. Okay.

Could you explain to me why you

chose to divide the design in Figure 2 of Mann, the Mann Application, into four lens units?

A. Because the '575 Patent broke lenses -- broke their lenses up into four lens groups, and I looked to see whether or not this lens could also be separated into four groups that had individual functions.

Q. And why not break Mann into two lens units, three lens units, four lens units, five lens units?

A. Well, it certainly could be broken into fewer lens units, obviously. I could consider the first and second unit together to be a unit and so forth. I looked to break it up into four to see if the four units would correspond to the four units in the '575 Patent.

Q. So that I understand, in Figure 2 of Mann, you separated the units to match the number of units in Claim 55 of the '575 Patent?

MR. GLITZENSTEIN: Objection to form. Mischaracterization.

THE WITNESS: I would say that I divided the lenses up into the groups based upon their obvious function in this lens and as described in the '575 Patent.
BY MR. KERN:
Q. So did the '575 Patent, Claim 55, guide your separation of the projection lens shown in Figure 2 of Mann?
MR. GLITZENSTEIN: Objection to form.
THE WITNESS: It guided it in the sense that it describes negative groups, positive groups, and so forth.
BY MR. KERN:
Q. Did you feel that it was in any way unnatural to break the Figure 2 of Mann projections lens into four units?
MR. GLITZENSTEIN: Objection to form.
THE WITNESS: No.
BY MR. KERN:
Q. Did you have difficulty dividing the Figure 2 projection lens of Mann into

four units?

A. No.

Q. Could you explain the process you went through to separate the units E6 through E20 into separate units?

It's the latter portion of the projection lens.

A. These lens systems tend to follow a similar form where they have a waist group, which tends to comprise larger negative lenses, followed by a bulge group comprised predominantly of positive lenses. And almost every form that we have looked at in the various patents that we looked at in this proceeding, show similar design form, and it was natural to break this group of lenses into two groups along that -- those ideas.

BY MR. KERN:

Q. So I'm sorry, you said it was natural. Why was it natural? Maybe I didn't follow you.

A. Because there is an obvious set of lenses that sort of form the waist group, and it's obvious which lenses formed the bulge group.

Q. So which lenses in Figure 2 form the waist group?

A. That would be the lenses E6 through E10.

Q. And which lenses form the beam bulge group?

A. Lens E11 through E20.

Q. And where, roughly, is the waist located in Figure 2 of the Mann Application?

A. The actual smallest diameter point is located around lens E10.

Q. And where would you say the beam bulge portion is formed in the projection lens in Figure 2 of the Mann Application?

A. The maximum diameter appears to be around lens E15.

Q. Again, could you please explain why you divided E6 -- lenses E6 through E20 at -- or between lenses E10 and E11?

A. Because the bulge group, the back end is imaging a -- what I would refer to as a virtual object point into the wafer. That virtual object point is generated by a negative group of lenses that is diverging the light coming from the front part of the lens.

Q. Mr. Juergens, how much time would you estimate you spent studying the Mann Application in preparation for this Inter Partes Review?

A. Maybe an hour.

Q. And that's in preparation for drafting your expert Declaration as well; does that include that time?

A. No.

Q. How much time would you have spent studying the Mann Application in preparation preparing your Declaration?

A. That would have been several hours.

Q. Okay. Fair enough.

I want to take a look now at Claim 59 in the '575 Patent, and that's in this IPR Exhibit 1101. And if you'd like, you can use the exhibit from yesterday's IPR as well.

A. Yes, I have that.

Q. So could you please read aloud the

ratio in the middle of the claim for -- dependent Claim 59?

A. It refers to a projection optical system satisfying the condition at 0.17 times Ma, divided by L, is less than 0.6.

Q. Is that ratio a standard equation in the art of photolithography?

A. I could not say whether that was a standard equation or not.

Q. What does that equation mean to you?

A. The equation means to me that a distance of Ma divided by another distance, L, times .17 has to be less than some value.

Q. What is the variable Ma and the variable L in that equation?

A. Variable Ma is the distance -- it says, in the claim, it says, "Is a distance on an optical axis between the third reflecting mirror and the second surface," which is also the wafer.

Q. Are you aware if the '575 Patent discloses that equation in the specification?

A. I believe it does, yes.

Q. Could you please show me where?
A. It is on Page 30, Column 13, Line 4.
Q. And could you please read that condition at Column 13, Line 4 aloud?
A. It says, "The projection optical system satisfies the following condition: 0.17 is less than Ma, divided by L, and that is less than 0.6. Where Ma is a distance on optical axis between the third reflecting mirror and the second surface."
Q. So is that the same as the condition shown in Claim 59?
A. No. There is a "less than" sign that is missing or has been added, depending upon which way you look at it.
Q. Did you notice this discrepancy in Claim 59 when you prepared your Expert Declaration?
A. I do not remember if I actually noticed it or not.
Q. Do you know at this time which formula is correct or the intended formula?
MR. GLITZENSTEIN: Objection to

form.

THE WITNESS: I cannot claim which is correct. I only know which one is in the claim.

BY MR. KERN:

Q. Fair enough.

So did you perform your analysis then based on the equation as shown in Claim 59?

A. I did.

Q. Do you believe that an expert in lithography might have noticed the discrepancy between Claim 59 formula and the specification formula?

A. He may have done so.

Q. So I'd like now to turn to Paragraph 107 of your Expert Declaration, that's Exhibit 1116.

A. Okay.

Q. Could you please refresh your recollection of that paragraph, and let me know when you're ready.

(Witness reviewing document.)

A. Okay.

Q. So in that paragraph you explain that you use the lens prescription table in Table 2 of the Mann Application and CODE V to determine the distance between mirror M3 and wafer 220.

Do you agree?

A. Yes.

Q. And that you found that M over -- I'm sorry, Ma over capital L, is 0.474. Is that accurate?

A. That's correct.

Q. So it's my understanding that Exhibit 1130 shows the CODE V sequence data corresponding to Table 2 in the Mann Application, and let me get you the exhibit, 1130.

So do you agree that that shows the CODE V sequence date corresponding to Table 2 in the Mann Application?

A. It does not.

Q. What does it show?

A. It shows a macro that I wrote to identify which lenses are negatives and which are positives.

Q. Do you have Exhibit 1130?
A. I was handed 1131.
Q. Well, that's unfortunate. Let me correct that.
MR. GLITZENSTEIN: It's an aberration.
BY MR. KERN:
Q. Do you now have Exhibit 1130 in front of you?
A. Yes.
Q. So would you agree that that shows the CODE V sequence data corresponding to Table 2 of the Mann Application?
A. Yes.
Q. And could you please simultaneously look at Table 2 of the Mann Application? I believe it's on Page 8.
A. Actually, it begins on -- oh.
Q. Table 2, Paragraph 63.
A. Page 11 or -- the 8 up at the top, okay.
Q. My apologies.
So could you please tell me what the -- well, stepping back.

Could you please describe what is shown in Table 2 of the Mann Application?

A. Table 2 shows the surface numbers, the radius of curvature, the thickness, and name of the glass, the refractive index of material, and the semi-diameter of each surface in the system.

Q. And the labels of each of the columns are not in English; is that accurate?

A. That's accurate.

Q. Do you recognize the language?

A. I do not -- I am not fluent in German.

Q. Very good. Okay.

So how did you come to know the titles in the various columns shown in Figure 2?

A. Because this is in the form that every other lens prescription I've ever seen is in. It was fairly obvious.

Q. Fair enough.

A. Plus radiant sounds like radius, Dickin, is clearly similar to thickness and so forth.

Q. Fair enough.
Could you please tell me what the thickness then is of the first lens in Table 2?
A. It is 38.10000000.
Q. And why are those values -- scratch that.
Why did the values shown in that column have so many significant digits?
A. Because that's what Mann chose to put in his table. I cannot say why Mann chose to do that.
Q. Is that standard in the art? Would a person of ordinary skill in the art normally describe lenses to that level of detail?
A. I oftentimes see lenses described to that level of detail, yes.
Q. Fair enough.
So is there a reason why a lens is described at that level of detail?
A. When you optimize a lens in CODE V, for example, oftentimes radii and thicknesses will be computed to many digits,

typically to 17 significant digits, and the output of the program will list those data to however many significant digits you choose to list it out to. And whether all of those digits are significant is a different question.

Q. Okay. Fair enough.

So, again, what was the value in Table 2 for the first lens?

A. It is 38 -- Table 38 point -- and with seven or eight zeros.

Q. Okay. Fair enough.

And what is the value for the first lens in the CODE V sequence data shown in Exhibit 1130?

A. Well, it shows it as 28.0.

Q. Do you agree that those numbers should be the same?

A. They should be the same.

Q. So is that an error in the CODE V sequence data?

A. It appears to be an error, yes.

Q. So back to Table 2.

Could you please tell me what the

thickness of the fourth lens is in Table 2?
A. It's 29.923376607.
Q. And could you please tell me what the thickness of the fourth lens is in CODE V sequence data in Exhibit 1130?
A. It is 25.7835 and some following digits.
Q. Is that different from the thickness shown in Table 2 of Mann for the fourth lens unit?
A. Yeah, it is different.
Q. Do you agree that both of these instances are examples of errors in the CODE V sequence data?
A. Yes.
Q. So would these errors affect the CODE V computations in any way?
A. They could.
Q. And how might they?
A. If you were computing some characteristics, such as magnification or wavefront error, it would have a significant impact on that.
Q. On any other calculations would it

have an impact?
A. If you're referring to, let's say, the spacings or distances elsewhere in the prescription, it might not have an impact at all.
Q. Would about on the accuracy on the calculations, would it have an exact on accuracy?
A. It depends upon what you're calculating.
Q. Can you give me an example of a calculation where it would not have an impact on accuracy?
A. If I were to try to calculate, for example, the focal length of a lens or a lens group that did not include these errors, then it would have no impact on that.
Q. Are you aware of any other errors in the CODE V sequence data?
A. I'm not aware of them, no.
Q. Are you aware of any errors in your Expert Declaration?
A. No.
Q. Okay. Fair enough.

I'd like to turn back to the Mann Application.

MR. GLITZENSTEIN: Sorry to interrupt. When we get to a convenient stopping point.

MR. GLITZENSTEIN: I think now is a convenient stopping point.

MR. GLITZENSTEIN: I would be happy if you wanted to play this out.

THE WITNESS: I would like to make one comment.

And that is, when I submitted these sequence files to Fish & Richardson, I took the files that I was using and I edited them to sort of look very similar, and there may have been an error introduced in that editing. So I cannot be -- I cannot say with certainty that this is the exact sequence that I used in the analysis.

BY MR. KERN:

Q. So you may have used a different set of data to perform your analysis than in this exhibit?

A. That is possible. It's possible.
Q. And did anybody instruct you to do that?
A. No.
Q. And you submitted this set of data as a cleaner version of the data you used to perform the analysis for aesthetic purposes only?
A. Yes.
Q. Do you still have the original data that you used to perform the analysis?
A. I probably do.
MR. KERN: Now is a good time for a break then.
(Recess taken at 10:17 AM to 10:31 AM.)
BY MR. KERN:
Q. Mr. Juergens, could you please take a look at 41 of the Mann's application. And when you find it, could you please read it aloud?
A. "Now, referring to Figure 2 in which a catadioptric multi-mirror projection reduction objective 200 according to a second embodiment is illustrated. Figure 2 is a

schematic optical diagram of the system 200 illustrating the system 200 in a manner to generally show the arrangement of the elements. The system 200 includes a plurality of the mirrors and a plurality of lens elements that are arranged in distinct groups and in predetermined locations relative to the mirrors."

Q. Do you agree that that paragraph is referring to Figure 2 of the Mann Application?

A. Yes.

Q. And do you agree that Mann in that paragraph is specifying that there are lens groups?

A. Yes.

Q. And is Mann's -- is Mann's application defining lens groups in that paragraph?

A. He says that the lenses are arranged in distinct groups.

Q. So the sentence, "The system 200 includes a plurality of mirrors and a plurality of lens elements that are arranged in distinct groups," what does that mean to you?

A. It means that they are separate groups.

Q. So does that mean that the plurality of the mirrors are a group, and the plurality of lenses are a group, and that they were distinct from one another?

A. It could mean any of those.

Q. Do you believe that one of ordinary skill in the art would understand that to mean any of those?

A. I think of one of ordinary skill in the art would read further to see how he breaks them up into groups.

Q. Were you aware of how he breaks them up into groups?

A. I would have to review the patent.

Q. Are you aware that Mann, in its specification, does break the lenses into particular groups?

A. Okay. I accept that.

Q. Okay. Could you turn to Paragraph 50 of the Mann Application now, and please read that -- well --

A. "The system 200 is designed so that there are a group of lens elements that are both physically and optically behind the mirror M3 and the lens elements E6. According to one exemplary embodiment, there are fourteen lens elements that are disposed optically behind the lens element E6, and more specifically, lens elections E7 to E20 are disposed along the optical axis and optically behind the lens element E6 and optically and physically in front of the wafer 120."

Q. That's actually enough, Mr. Juergens. Thank you.

In that paragraph, the portion you have read, what is the group of lens elements that Mann is referring in the first sentence of that paragraph?

A. He's referring to the entire group of lenses, from E6 to E20.

Q. Okay. And he's referring to that as a group of lenses?

A. Yes.

Q. So would you generally agree with the statement that Mann discloses -- or the Mann disclosure teaches that the lens elements of that group are both physically and optically behind the mirror M3 and the lens elements E6?

A. Yes.

Q. Would you agree that the Mann Application refers to lenses E7 through E20 as a group?

A. He just refers to lens elements E7 through E20. He does not use the word "group" associated with those lenses particularly.

Q. So Paragraph 50, first sentence, when he's referring to "there are a group of lens elements that are both physically and optically behind M3," is he referring to lenses E7 through E20?

A. I see what you're referring to. Yes, that would imply that he's referring to E7 through E20.

Q. So would a person of ordinary skill in the art understand a "group of

lenses" to be same as "the lens group"?
A. The wording is similar.
Q. Does it generally have the same meaning as to one of ordinary skill in the art?
A. Actually, I would say that a lens group and a group of lenses do have slightly different connotations.
Q. And how, in your understanding, are they different from one another?
A. Well, a lens group implies a function of a group of lenses. A group of lenses just implies a collection of them.
Q. So then a group of lenses, under that interpretation, would have more of an arbitrary grouping, as opposed to a lens group, which would group lenses together based on a common function?
MR. GLITZENSTEIN: Objection to form.
THE WITNESS: Yes.
BY MR. KERN:
Q. So in your understanding, would a person of ordinary skill in the art

understand there to be a difference between a lens group and a lens unit?

A. Those are more similar in -- fairly similar in meaning.

Q. Okay. Fair enough.

I want to look at Paragraph 98 of your expert report, and I'll give you a moment to refresh your recollection of it. Please let me know when you're ready.

(Witness reviewing document.)

A. Okay.

Q. So in Paragraph 98 of your expert report you state that the focal length of the elements E6 through E10 is negative 662 millimeters; is that correct?

A. That is correct.

Q. Do you still have the CODE V files that you used to determine the focal length of that lens collection?

A. Probably.

Q. Have they been made part of any exhibit currently part of this Inter Partes Review?

A. Well, I had submitted a sequence,

Exhibit 1130.

Q. So that calculation was based upon the data in Exhibit 1130?

A. No, I cannot for sure say that.

Q. So would it have been a separate analysis to calculate the focal length of lens units E6 through E10?

A. What do you mean by "a separate analysis"?

Q. Did you run an independent and separate simulation to determine the focal length of the lenses -- or the lenses E6 through E10?

A. I did.

Q. And is that part of any exhibit currently included in this Inter Partes Review?

A. As I said earlier, there may have been mistakes in the exhibit that I submitted for the sequence of the -- of the CODE V sequence. But I would say that the calculation was based upon the correct prescription.

Q. So the calculation, though, to

determine the focal length of the elements E6 through E10, was based upon the prescription table shown in Figure 2 of Mann; is that accurate?

A. It was based upon a CODE V sequence for that -- was for the prescription in Table 2 that was submitted to me by Fish & Richardson.

Q. So when you say that it was submitted to you by Fish & Richardson, do you mean that it was prepared by somebody else and given to you?

A. Yes.

Q. So the data entry portion of the table was prepared by somebody else, and you imported that data into the CODE V program?

A. That's correct.

Q. Okay. Did you personally review the data that was given to you and compare it to the table of Figure 2 of Mann prior to running the simulation?

A. I did not compare the data line by line with Table 2. I did compare the drawing of the lens to see that it looked similar to

Figure 2, and I verified that the magnification of the lens was proper and that it was in focus, and with the errors that are in Exhibit 1130, I would not have gotten the correct magnification, nor would it have been properly enough to.

Q. Do you recall why the data in Table 2 of Mann was prepared for you as opposed to you entering it directly into CODE V?

A. That was very commonly done in my negotiations with Fish & Richardson. They oftentimes and usually supplied me with the lens prescriptions.

Q. And was the primary reason for that cost savings?

A. I cannot say why they chose to do that.

Q. Was there any discussion to the extent that, we don't want you, Mr. Juergens, spending your time doing data entry, we want you to perform analysis for us?

A. There was no specific discussion along those lines, no.

Q. Do you know who at Fish & Richardson prepared the data in Table 2 for your analysis?

A. I believe the sequences were actually prepared by somebody at Zeiss, Carl Zeiss.

Q. Do you know if those prescriptions came from actual design data or whether they had been manually entered by somebody based on the Table 2 shown in the Mann Application?

A. I do not know.

Q. So do you have any other files that you're aware of that you used to carry out your analysis that are not part of an exhibit in this Inter Partes Review?

A. Not that I'm aware of.

Q. So there are no other files?

A. No.

Q. And how did you --scratch that.

What computer did you use to run the simulations in CODE V for preparation of your Expert Declaration?

A. Used my personal computer.

Q. And this is a personal computer

you have at your home?
A. At my home.
Q. At any time did you use a Fish & Richardson computer to perform any of these calculations?
A. No.
Q. At any time did you use a work computer to perform any of these calculations?
A. No.
Q. And do you personally have a copy of CODE V software on your home computer?
A. I do.
Q. And do you know what version of CODE V software is on your home computer?
A. I have three versions of the CODE V on my home computer.
Q. And what versions are they?
A. They are numbered 10.4, 10.5 and 10.6.
Q. Are those the latest three versions of the CODE V software?
A. They are.
Q. And what year, roughly, did those

three versions come out respectively?
A. 10.6 has come out since I did these analyses. 10.5 came out probably early in 2013, and 10.4 probably came out in 2012. I could not tell you the exact dates.
Q. Okay. Fair enough.
Did you make any printouts of the analysis or data entry that's not part of your Expert Declaration?
A. I don't recall having made any printouts, no.
Q. Before calculating the focal length of elements E6 through E10, did you speak with anyone about what the results of that calculation should look like?
A. I discussed the results with Fish & Richardson.
Q. So you discussed the actual results after you had performed the calculation?
A. Yes.
Q. Did you discuss, before performing the calculations, what the results should look like?

A. I did not discuss with them what they should look like. I discussed with them the idea that, do these lens groups, you know, have a positive and negative focal length, and that was the question I was asked to look into.

Q. So were you instructed to find a group of lenses that had a negative focal length prior to your calculations?

A. It was not -- I was not asked that in those specific words, no.

Q. Could you explain how you might have been asked that in other words?

MR. GLITZENSTEIN: Objection, mischaracterization.

THE WITNESS: I was asked to look at lens groups and identify what their -- what the focal lengths of those overall groups were. And those lens groups had to correspond to logical breakdowns of lens groups.

BY MR. KERN:

Q. And did you calculate the focal length of other lens groups?

A. I don't recall doing so, no.
Q. So during your analysis, would you have tried or run calculation simulations on various subsets on lens groups shown in the Mann Application?
MR. GLITZENSTEIN: Objection, form.
THE WITNESS: I don't believe that I experimented by trying different combinations to see if I could come up with a predetermined result. I looked at groups based on a normal function. I looked at, in particular, I looked at the -- what I labeled Group 3 or Unit 3, and that was to see if the group that contained two negative lenses had an overall negative focal length.
BY MR. KERN:
Q. So is it true that you did not experiment with other subsets of consecutive lenses to determine a lens unit division as shown in Figure 2 -- annotated Figure 2 of the Mann Application?
MR. GLITZENSTEIN: Objection,

form.

THE WITNESS: That's correct.

BY MR. KERN:

Q. So earlier you had mentioned that annotated Figure 2 had gone through at least one iteration where you had selected or I guess included lens element E11 in that grouping?

A. Yes.

Q. And that later it had been advised to not include lens E11; is that accurate?

A. That's accurate.

Q. Was the decision to not include lens E11 based on any simulation results?

A. The decision to include E11 in the other group was partially based upon calculations, yes.

Q. Okay. So then is it fair to say that you had performed a calculation on the group of lenses E6 through E11 to obtain a initial focal length result?

A. I did do that.

Q. And then later, when group -- when the group of lenses E6 through E11 was changed to the Group E6 through E10, you reran a simulation to determine the focal length?

A. That's correct.

Q. And was the determinations of the respective focal lengths of the group E6 through E11 and E6 through E10 the determinant in deciding which lens group to select as the third unit?

A. Could you repeat that question, please?

THE REPORTER: **.

Q. Was the changes to the illustration of the lens Group for E6 through E11 and lens group for E6 and E10 at least part of the determination to change the lens group selection?

A. Yes.

Q. And why was that?

A. If you include E11 into that group, the overall focal length of that group becomes positive. And without that, the overall focal length of that group is negative.

Q. And do you recall the limitation of the third lens unit in Claim 55 requires a positive or negative focal length?

A. It requires that group to have an overall negative focal length.

Q. So would you agree that the language of Claim 55 defining the third lens unit guided the decision to select the third unit in Mann as shown in annotated Figure 2 of your expert report?

A. The wording required a group that has at least two negative lenses, and so I looked at the fact that E6 -- sorry, lens E10 is the second negative lens, and then I looked to see if it was logical to include E11 in that group or in the next group. And I obviously chose, eventually, to include E11 into the second group. It actually does appear to logically fit into that group better.

Q. Had you received any guidance to change your initial determination that E11 was part of the third lens unit?

A. I discussed the issue with Fish &

Richardson, but I would not say that I received guidance on it.

Q. So, Mr. Juergens, in your opinion, would a person of ordinary skill in the art have understood to divide the lens units shown in Figure 2 of Mann -- scratch that.

Would a person of ordinary skill in the art have understood to divide the lenses shown in Figure 2 of Mann in the same fashion that you have shown in annotated Figure 2 of your Expert Declaration?

A. I would say that a person of ordinary skill would agree that there are logical and optical reasons for grouping the units as I showed in that Figure.

Q. Are there other logical and -- scratch it.

Are there other logical -- would a person of ordinary skill in the art have understood that there are other ways to divide the lenses in Figure 2 of the Mann Application that are equally as logical?

A. I would say that different optical designers may interpret where to break lens units. Their understanding -- or their selection may be different. That is certainly a possibility.

Q. So are there other reasonable ways that a person of ordinary skill in the art could divide the lenses shown in Figure 2 of the Mann's application?

A. Well, certainly. You could choose to identify all lenses behind the aperture stop, all lenses in front of the aperture stop and so forth. So there are other ways that you could choose.

Q. So sort of a recap. Was your selection of lenses E6 through E10, as a third unit, based on the fact that it had a negative focal length?

A. It was based on -- primarily on, as I described earlier, the function of how I identified the two groups. That the negative group was forming the virtual object of the positive, what I call the bulge group, and that appears, to me, to be the most logical and optical way to divide the groups.

Q. Do you feel that your selection of

lens units E6 through E10, as the third unit, was in any way arbitrary?

A. No, it's not arbitrary.

Q. And could you explain why again?

A. Because the lens Groups E6 through E10 are a negative group that diverge the light as though from a virtual object point, and that object point is then refocused by a positive group onto the wafer.

Q. So the Mann Application taught that there is a group of lenses, E7 through E20. Do you agree we discussed earlier?

A. Yes.

Q. Why did you ignore the teaching of the Mann Application, that the lens group was defined as lenses E7 through E20?

MR. GLITZENSTEIN: Objection, form.

THE WITNESS: It was clear that he was grouping them as -- to identify the lenses that are physically behind E6 and physically behind mirror M3 and for no other reason.

BY MR. KERN:

Q. And so why would the inventor group the lenses based on their physical location?

MR. GLITZENSTEIN: Objection, form.

THE WITNESS: That's one of the aspects of his patent that he felt was important to stress.

BY MR. KERN:

Q. In your understanding of the teaching of the Mann Application, is there a common foundation that lenses E7 through E20 perform?

A. They serve to re-image the intermediate image onto the wafer.

Q. So defining the function as you just stated, wouldn't it logically make sense to group lenses performing the common function together as one lens unit?

A. You could choose to do so.

Q. I want to now turn to the '575 Patent, which is Exhibit 1001 in this IPR, and I want to turn to Figure 5 of that patent?

A. Okay.
Q. So I know we touched upon this yesterday, but for the record, in this matter, are you familiar with the concept of beam bulge and beam waist?
A. Yes.
Q. And what is a beam bulge?
A. A beam bulge is a region in which the ray paths diverge and then reconverge so as to form a bulge in the lenses.
Q. In your opinion, as a person of ordinary skill in the art, is what is shown in Figure 5 of the '575 Patent a large bulge?
MR. GLITZENSTEIN: Objection, form.
THE WITNESS: I would not characterize it as large or small. I would characterize it as a bulge.
BY MR. KERN:
Q. What is a beam waist again, for the record?
A. It's a region in the ray paths where the rays tend to be -- have their narrowest dimension perpendicular to the

axis.

Q. So would you agree that a lens waist is located, in a projection optical system, where the beam reaches its minimum diameter?

A. Yes.

Q. And conversely, would you agree that the beam bulge is located where the light beam passing through the projection system reaches a maximum diameter?

MR. GLITZENSTEIN: Objection, form.

THE WITNESS: That would be the peak of the bulge. Likewise, the waist would be the narrowest part of the waist. You still may identify a waist region and a bulge region as including areas near those points.

BY MR. KERN:

Q. Okay. Fair enough.

And why would a lens designer design a system having a large bulge?

MR. GLITZENSTEIN: Objection, form.

THE WITNESS: That was a lens
design form that was first propounded to
the industry by a person named Glatzle,
G-l-a-e-t-z-l (sic), and he described
that that was a useful method for
controlling the aberrations, in
particular the field curvature of a
lithographic type lens.
BY MR. KERN:
Q. And how does it control
aberrations, the large bulge?
MR. GLITZENSTEIN: Objection,
form.
THE WITNESS: To answer that
question, I would have to go through
Glatzle's paper in fair detail with you.
I think that's beyond the scope of this
proceeding.
BY MR. KERN:
Q. Fair enough.
Suffice it to say, though, the
beam bulge portion of the projection lens in
Figure 5 is controlling aberration?
A. Yes.

Q. And it is additionally fixing what aspect of the beam?

A. It's fixing several aberrations, including field curvature and probably chromatic aberration as well.

Q. So generally, in designing a in-line, off-access catadioptric system, do optical designers generally prefer a large bulge?

MR. GLITZENSTEIN: Objection, form.

THE WITNESS: Glatzle actually propounded his bulge concepts on all dioptric designs, and then that concept was later adapted to catadioptric designs.

BY MR. KERN:

Q. So in Figure 5 of the '575 Patent, what is shown, in your opinion, at the beam waist, what elements are present at the beam waist?

A. Elements L25 and L26.

Q. And what elements are present in the beam bulge shown in Figure 5, in your

opinion?
A. I would say that the bulge group comprises elements L27 through to the final lens L217.
Q. Okay. Could you please turn to Figure 9 of the '575 Patent?
A. Okay.
Q. Would you please identify what you understand to be the third unit in Figure 9 of the '575 Patent?
A. Based upon function, I would say that the third unit would be the group labeled G21.
Q. And what function are you basing that on?
A. It's the waist function of the negative portion that is diverging the light to form the virtual object point.
Q. And why, in your opinion, is the third unit located near a waist of the optical beam?
A. Putting negative lenses near waists is one of the techniques used to correct field curvature.

Q. As shown in Figure 9, do you agree that lenses L6 and L7 are separated from mirror M3 and lenses L8 by air spaces?
A. They are.
Q. Would you agree that the air spaces between mirror M4, and lens L6, and lens L7, and lens L8 are larger than the air spaces between lens Units L6 and L7?
MR. GLITZENSTEIN: Objection, form.
THE WITNESS: They are larger, yes.
BY MR. KERN:
Q. Do you agree that the lenses L6 and L7 are positioned near a waist?
A. Yes.
Q. And that waist is where the optical beam reaches its narrowest diameter, more or less?
MR. GLITZENSTEIN: Objection, form.
THE WITNESS: More or less.
BY MR. KERN:
Q. And assuming Figure 9 is drawn to

scale, could you estimate the ratio of the diameter of the waist to bulge as shown in Figure 9?

A. It appears to be in the vicinity of maybe 1.5 to 1.

Q. Maybe -- 1.5 to 1, what ratio is that?

A. The diameter of the G21 group to the diameter -- the diameter of the bulge group is one and a half times as large as the diameter of the waist group, roughly.

Q. Okay. Thank you.

What about the diameter of the beam in the respective waist and bulge sections, what would you say the ratio is?

A. Of a beam diameter?

Q. Of a beam diameter in that section is.

A. I would say that's in the range of probably around maybe 2.5.

Q. And that's basically taking into account the diameter of the beam roughly at the third unit, G21, and the diameter of the beam at the aperture stop, AS1?

A. Yes.
Q. And do you agree in Figure 9 that the aperture stop is located near the largest portion of the beam bulge?
A. Yes.
Q. Could you please explain the similarities of the third unit, G21, shown in the '575 Patent in Figure 9 with your selection of the third unit in the Mann's application?
A. In both cases, the group that I'm calling the third unit, composed of a negative group that is diverging the light into a positive bulge group.
Q. And are those the only similarities?
A. That's the major functional similarity.
Q. Referring to Figure 2 of the Mann Application, does the Mann Application have a beam waist?
A. Not as clearly defined as in Figure 9 of the '575.
Q. If you had to select a beam waist

in Mann, where might you place it?
A. Somewhere in the vicinity of E10 perhaps.
Q. Does the Mann patent have a beam bulge?
A. It has a slight bulge, yes.
Q. And where would you place that beam bulge?
A. I place the maximum diameter of the bulge at around element E15.
Q. And can you say from your understanding of Figure 2 and the specification of the Mann Application, what the function of the beam bulge is in the Mann Application?
A. The function of the beam bulge is to control certainly aberrations as described by Glatzle in his paper.
Q. And can you say what the function of the lens is in the beam waist area of the Mann Figure 2 projection lens is?
A. They are primarily controlling the field curvature, and their function is also described by Glatzle in his paper.

Q. And that function is, generally?
A. To control aberrations.
Q. And would you say that the lens E11 is located near the beam waist in Figure 2 of Mann?
A. It's near the beam waist.
Q. Do you have reason to believe that the Mann Figure 2 is not drawn in scale?
A. No, I believe it is drawn pretty much in scale.
Q. Let's just assume that it's drawn in scale for purposes of our discussion.
Can you estimate the ratio of a beam diameter at lens 7 to a beam diameter of the bulge as shown in Figure 2 of the Mann Application?
A. That appears to be perhaps in a range of 1.5 or less.
Q. Can you also estimate a ratio of beam diameter at lens E10 to the beam diameter of the bulge?
A. The bulge is larger by a factor of maybe one and a quarter to one and a half, in that ballpark range.

Q. Okay. Thank you.
I want to return to the '575 Patent. That's Exhibit 1101.
A. Which patent?
Q. '575 Patent. I want to look at Column 12, Line 14.
Could you please read aloud the sentence beginning on Line 14 and ending at Line 18?
A. "Since the projection optical system comprises the third unit having the negative refracting power, the total length of the catadioptric projection optical system can be decreased and the adjustment for satisfying the Petzval's condition can be readily performed."
Q. Do you agree that satisfying Petzval's condition corrects for Petzval field curvature aberration?
A. Yes.
Q. And we generally discussed this yesterday, but for the record, could you please explain what that means?
A. Petzval's condition of having a

zero sum implies -- or directs that the focal plane of best image quality is on a flat surface.

Q. And could you generally explain the formula for solving that?

A. The formula is -- it's the sum over all the surfaces, and the sum is proportional to the sum of one over the radius of curvature, times one over the difference in index of refraction on the two sides of the surface.

Q. So do you agree that the '575 then specifies that a third unit functions to satisfy this Petzval condition?

A. Yes.

Q. Could you please explain what it would mean, to a person of ordinary skill in the art, that the adjustment for satisfying Petzval's condition can be readily performed, as described in that paragraph?

A. One of the standard techniques for controlling Petzval, for driving the Petzval sum to zero, is to place negative lenses in a region where their diameter is smaller or is relatively small. And so he's saying here that by putting negative lenses in this unit, that you can readily control the Petzval.

Q. And why do you put it in a location where the beam width is relatively small?

A. It's because the impact on the Petzval does not depend upon where the beam diameter is large or small. But the impact on the focal length of a system does depend upon the beam diameter. And so by placing a negative lens in a region where the beam diameter is smaller, it has a lesser impact on the focal length but a large impact on the Petzval sum.

Q. So is it accurate to say that by placing the corrective lenses at a narrower portion of a beam width, one can reduce a length of the projection optical system?

MR. GLITZENSTEIN: Objection to form.

THE WITNESS: The placing of negative lenses near a waist is used to control Petzval, not necessarily to control the length of a system.

BY MR. KERN:

Q. Would a person of ordinary skill in the art understand that placing lenses at a narrow beam diameter in a projection optical system would decrease the length of the projection optical system?

MR. GLITZENSTEIN: Objection, form.

THE WITNESS: It would appear to be relatively obvious that it would do that; namely, that it would reduce the overall length, although that's not the main function for putting negative lenses there.

BY MR. KERN:

Q. What is the main function again?

A. To control the Petzval sum.

Q. And again, could you explain what you believe it means to "be readily performed" in the context of the paragraph you just read?

A. It means that it's fairly easy to adjust the negative powers of those lenses so as to achieve a zero Petzval sum.

Q. Could Petzval's condition be corrected at a relatively wider portion of the beam projected through the system?

A. It can, but not as easily.

Q. And why not?

A. Because the -- of the reason that the -- the main way of correcting Petzval is introducing negative power, by adding negative power into the system. And if you add negative power in regions where the beam diameter is large, you have a significant impact on the focal length. So since you want to control the focal length, it just makes it more difficult to control Petzval at a bulge.

Q. How does the focal length of a lens system, like a third unit shown in element G21 of the '575 Patent, affect a length of the projection optical system?

MR. GLITZENSTEIN: Objection, form.

THE WITNESS: The fourth lens unit is a positive group that is imaging a

virtual object point to the image. If I
diverge the light steeper coming into
that group, then that will converge the
light at a closer point that is
effectively moving the object point.

And so by increasing the negative
power of the third group, you are
indirectly shortening the overall length
of the fourth group.

BY MR. KERN:

Q. So if the third unit lenses were
located at a relatively wider portion of the
optical beam, the length of the optical
system would increase?

A. No. It doesn't happen. It has no
bearing on the width of the beam at that
point. It has to do with the amount of
negative power that you're putting in that
third group.

Q. So if the lenses having the same
negative power were put in a larger portion,
larger diameter portion of the beam, would
they increase the length of the projection
optical system, all other things remaining

the same?

A. It may do so. I would not say that it necessarily does so.

Q. Okay. Fair enough.

Could you refer back to Column 12, Line 14, the paragraph that you just read?

In that paragraph, do you agree that it reads that "the total length of the catadioptric projection optical system can be decreased"?

A. It does say that.

Q. And is that in reference to having a third unit in the projection optical system?

A. Yes.

Q. Could you, again, explain why the total lens of the projection optical system could be reduced by the third lens unit?

MR. GLITZENSTEIN: Objection, form.

THE WITNESS: The fourth lens group is relaying a virtual object to the image, and by adding negative power to the third group, you are changing the location of that virtual object, and that affects the overall length to the image plane.

BY MR. KERN:

Q. Okay. Fair enough.

I want to refer back to the Mann Application, which is Exhibit 1110, Figure 2.

A. Yes.

Q. So I would like -- could you please confirm that it's your opinion that lenses E6 through E10 correspond to the recited third unit in Claim 55 of the '575 Patent?

A. That is correct.

Q. Could you please turn to Claim 55 of the '575 Patent?

A. I have it here.

Q. Could you please read the limitation of the third unit?

A. It says, "a third unit disposed in an optical path between the second unit and the second surface, comprising at least two negative lenses, and having a negative refractive power."

Q. In forming your opinion, did you only use the language of Claim 55 to define the third unit in Figure 2 of Mann?

MR. GLITZENSTEIN: Objection, form.

THE WITNESS: Not completely, no.

BY MR. KERN:

Q. So what else did you use to identify the third unit then?

A. The function of the third unit.

Q. And the function of the third unit again was?

A. To diverge the light going into the bulge group.

Q. Any other functions?

A. Well, it also helps to control the Petzval sum, as I've described earlier.

Q. Is there anything else?

A. Those were the two main functions of that group.

Q. Okay.

MR. GLITZENSTEIN: Counsel, we've been going for about an hour. When you get to a convenient stopping point, I request a break.

MR. GLITZENSTEIN: Actually, now is a convenient time. Let's take a break.

(Recess taken at 11:31 AM to I'd 11:55 AM.)

MR. KERN: Back on.

BY MR. KERN:

Q. So, Mr. Juergens, keeping in mind the legal standards you had set forth in your Declaration and we had reviewed, did you consider the function of the third group, as defined in the '575 Patent, in construing the third unit in Figure 2 of the Mann patent?

MR. GLITZENSTEIN: Objection, form.

THE WITNESS: Yes.

BY MR. KERN:

Q. And the third unit of the Mann patent includes lenses E6 through E10, correct?

A. That's correct.

Q. So once again, could you please explain the reasoning as to why you selected lenses E6 through E10 as the third unit?

MR. GLITZENSTEIN: Objection, asked and answered.

THE WITNESS: I selected that group to be a group because they formed the function of being a negative group that diverges light into a positive bulge group.

BY MR. KERN:

Q. And do you recall the paragraph we had ready in the '575 Patent beginning at Column 12, Line 14?

A. Yes.

Q. And that paragraph described two functions of the third lens unit; is that correct?

A. Yes.

Q. One was compactness, the other one was correcting for Petzval condition. Do you agree?

A. Yes.

Q. How does the lens group in Mann, identified as the third unit, perform each of those functions? Specifically, could you first explain how it corrects for field curvature?

A. It corrects for field curvature by having negative power in the group. It has a little more difficult time correcting Petzval in a similar group, in the '575, since their diameters are larger, but it can be done.

Q. So the lens group identified as lens unit -- or third lens unit in your annotated Figure 2 corrects for Petzval condition?

A. That's one of its purposes, yes.

Q. And that is correcting for field curvature, correct?

A. Yes.

Q. So could you please explain how the third unit, E6 through E10 in Figure 2 of Mann, reduces system length?

A. By diverging the light out. If you look, for example, at the rays between E10 and E11, you see that as they exit E10 they take a sharp divergence outward and then are brought back or -- or closer to being parallel to the access by lens 11, and you can see that without the action of lens E10,

that that the group from E11 forward would
have to be further out to collect those rays.
"Further," I mean further in length.
Q. So how does that reduce the length
of the projection optical system?
A. It keeps the group from E11
through E20 from having to move further in
the wafer direction.
Q. So referring again to Figure 2 of
Mann, could you explain why you did not
choose lenses E7 through E20 as a third unit?
A. There were several reasons. One
was the fact that the lenses that I
identified as Unit 3 have a different
function than the lenses identified as Unit
4. And another reason is that the '575
refers to a group that has two negative
lenses and has -- or has negative power; and
so I chose to look to see if the group that
has two negative lenses indeed has negative
power.
Q. Do you know whether the lenses E7
through E20 correct for field curvature?
A. All the lenses in the system have

some impact on field curvature.

Q. Including the lenses before the mirrors?

A. Yes.

Q. Do you know whether the lenses E7 through E20 operate to reduce the length of the projection optical system?

MR. GLITZENSTEIN: Objection.

THE WITNESS: It's not clear that that's their function.

BY MR. KERN:

Q. And why isn't it clear?

A. Well, I haven't totally studied that group from that viewpoint, so I can't answer that.

Q. Okay.

So did you take into account the functions of correcting field curvature and reducing system length when you selected the third lens unit shown in annotated Figure 2 of the Mann Application?

THE WITNESS: Could you repeat that, please?

THE REPORTER: "So did you take

into account the functions of correcting
field curvature and reducing system
length when you selected the third lens
unit shown in annotated Figure 2 of the
Mann Application?"
THE WITNESS: I considered the
reduction of the Petzval, but I did not
take into consideration the effect
shortening the overall length.
BY MR. KERN:
Q. So, Mr. Juergens, do you know
whether the lenses E7 through E20 correct for
field curvature?
A. All the -- every lens in the
system has an impact on field curvature, and
I would say that the lenses between E7 to E20
were certainly chosen in such a way as to
make the Petzval sum equal to zero.
Q. So referring to Figure 2 --
scratch that.
In your opinion, Mr. Juergens,
would one of ordinary skill in the art have
understood that the third lens unit could
include lenses E6 through E9?

A. I do not believe that a person of ordinary skill would break at that point.
Q. Why not?
A. Because it's so obviously a division between a negative group and a positive group, that the break point would not put the most powerful negative lens in with the positive group.
Q. Which lens is -- in lens Group E6 through E9 are positive and which lenses are negative?
A. Just by looking at the ray diagram, I would say that E6 is positive, E7 negative, E8 I can't tell but it's probably positive, E9 is definitely positive, E10 is negative.
Q. And do you know whether the lenses E6 through E9 correct for field curvature?
A. All the lenses have an impact on field curvature. And these being negative lenses are serving to correct for field curvature.
Q. When you say "that all the lenses have an impact on field curvature, some of

them increase the problem of field curvature and some of them correct the problem of field curvature; is that accurate?

A. If you think in terms of elements and not in terms of surfaces, the Petzval curvature can be thought of as the sum of the power of element divided by its index. And so positive lenses lend positive curvature to the Petzval sum, and negative lenses had negative contributions to the Petzval sum, and therefore negative lenses can help flatten the field against positive lenses.

Q. So when you say "positive lenses add to the field curvature," they are adding a value, adding value to the field curvature?

A. Yes.

Q. And when you say "negative lenses reduce field curvature," they are taking away from that value?

MR. GLITZENSTEIN: Objection, form.

THE WITNESS: They have negative contributions, so they help to cancel the positive contributions of the

positive lenses.
BY MR. KERN:
Q. So that the negative lenses have a negative contribution and positive lenses have a positive contribution to the Petzval sum?
A. That's correct.
Q. And that ideally to solve for the Petzval sum, you would want the correct mix of positive and negative lens so that that sum was zero?
A. That's correct.
Q. So in that sense when you say that every lens in the system contributes to the Petzval's -- or the field of curvature, it's meant that some lenses increase and some lenses decrease the Petzval sum.
A. That's correct.
Q. Do you know whether lenses E6 through E9 function to reduce the projection lens length?
A. It's hard for me to say whether that is -- whether they are doing that or not.

Q. So is it fair to say that you did not take that into account when you made your determination of where the third lens unit was located in Figure 2 of Mann?

A. That's correct, I did not take that into account. I considered that a secondary condition.

Q. I'm sorry. A secondary condition is?

A. Lesser importance.

Q. Do lenses E6 through E9 meet your definition of lens unit?

MR. GLITZENSTEIN: Objection, asked and answered.

MR. KERN: And that was E6 through E9.

THE WITNESS: I would not consider them a lens unit in that they are not forming a specific subfunction of the optical system in general.

BY MR. KERN:

Q. So you would not group them as a third lens unit because they're not cooperating to perform a function?

A. No, it's because the function that is being performed in general by that group is not complete without the addition of element E10.

Q. And by that group you mean E6 through E9?

A. Yes.

Q. So did you calculate at any point the focal length of lenses E6 through E9?

A. I did not.

Q. Did anybody suggest to you that you should calculate the focal length of lenses E6 through E9?

A. No.

Q. If you assume that the lenses E6 through E9 are a lens unit and assume that the focal length of that lens unit is positive, then would you agree that a third unit defined as lens unit E6 through E9 would not meet the limitation for a third unit of Claim 55?

A. That's correct.

Q. Is that why you did not include lens units -- or lenses E6 through E9 as part

of your definition of the third lens unit?
A. The E6 through E9 would not meet the condition of the third unit having two negative lenses, because in that case it would have only one negative lens. So it was immaterial to compute the focal length of that group.
Q. And could you please explain again the positive and negative lenses in that group?
A. Okay. Of the five lenses, E6 through E10, they appear to be positive, negative, positive, positive, and negative.
Q. Do you know that based on the prescription tables corresponding to Figure 2?
A. I computed -- well, I'm basing it now on purely looking at the ray diagram.
Q. Did you at any point calculate the positive or negative attributes of a -- of the lenses E6 through E9 based on the prescription table?
A. I more than likely did. I don't recall exactly when I did it.

Q. If the focal length of that group had come back as positive, would you have selected lens units -- or lenses E6 through E9 as the third lens unit?

MR. GLITZENSTEIN: Objection, form.

THE WITNESS: I would not have selected E6 through E9 as the third unit for several reasons.

BY MR. KERN:

Q. And what are those reasons?

A. The fact that that group does not appear to contain two negative lenses, and the fact that the Group E6 through E10 appear to form a specific function within the function of the overall lens system.

Q. Okay. Fair enough.

MR. KERN: No further questions for the witness.

MR. GLITZENSTEIN: I have just a few.

REDIRECT EXAMINATION

BY MR. GLITZENSTEIN:

Q. Mr. Juergens, can you please turn

to your Declaration for Exhibit 1116, and I want to direct you to page had 41. It's the annotated Figure 2 from the Mann reference.

Do you have that?

A. Yes.

Q. Okay. I want to ask you first about the first unit.

What elements have you concluded are in the first unit of Figure 2 of Mann?

A. The elements labeled element E1 and element E2.

Q. Now, considering the first unit in its entirety, and based on what is shown in the ray tracing of Figure 2 of Mann, does the first unit have a positive refractive power?

A. Yes, it does.

Q. How do you know?

A. I can tell by several reasons. One is that each of the lenses, E1 and E2, are positive lenses, and so the combined power of them would be positive, and another reason would be that they are bending the rays in such a way as to reduce the divergence of the rays exiting from the

reticle.
Q. Can you determine all of that simply from the ray tracing and other information shown in Figure 2 of Mann?
A. Yes, I can.
Q. Did you need to run your CODE V simulation in order to determine that?
A. No, I ran the CODE V simulation to determine what the exact numerical value of that focal length is.
Q. And let me ask you about the second unit in Mann.
What elements are in the second unit of Figure 2 of Mann?
A. Second unit comprises optically elements -- lens elements E3, E4, and E5, and all four mirrors, M1, M2, M3 and M4.
Q. Now, is your conclusion that those various elements are -- or they together comprise the second unit in Mann Figure 2, in any way affected by the thickness of lens element E4?
A. No.
Q. Let me ask you about the third

unit of Mann Figure 2.
I know you were asked a number of questions about this on cross-examination, but can you remind us what elements you have concluded are in the third unit?
A. I concluded the third unit comprises elements E6, E7, E8, E9 and E10.
Q. Now, as part of your analysis in this case, have you concluded that the third unit in the Mann Figure 2 has a negative refractive power?
A. Yes, I determined that group has an overall negative power.
Q. Is that conclusion in any way affected by the thickness of element E1 in the first unit?
A. No.
Q. Is that conclusion in any way affected by the thickness of element E4 in the second unit?
A. No, it is not.
Q. Let me ask you about the fourth unit in Mann Figure 2.
What elements have you concluded

comprise that unit?

A. I concluded that that group is comprised of elements E11 through E20.

Q. Okay. Thank you.

And as part of your work in this matter, have you concluded that that unit collectively has a positive refractive power?

A. Yes, I did.

Q. Now, is that conclusion in any way affected by the thickness of element E1 in the first unit?

A. No, it is not.

Q. Is that conclusion in any way affected by the thickness of element E4 in the second unit?

A. No, it is not.

MR. GLITZENSTEIN: Thank you, Mr. Juergens. I have nothing further. I pass the witness.

RECROSS-EXAMINATION

BY MR. KERN:

Q. Mr. Juergens, at any point during your breaks today did you discuss the goings on of our deposition with your counsel?

A. I did not.

MR. KERN: Thank you. No further questions.

(Deposition concluded at 12:19 PM.)

COMMONWEALTH OF MASSACHUSETTS

SUFFOLK SS.

I, Sandra A. Deschaine, Registered Professional Reporter and Notary Public within and for the Commonwealth of Massachusetts at large, do hereby certify that the Cross-Examination by Deposition of Richard Juergens, in the matter of Carl Zeiss SMT GMBH vs. Nikon Corporation, at the offices of Fish & Richardson, One Marina Park Drive, Boston, Massachusetts, on Thursday, February 13, 2014, was taken and transcribed by me; that the witness provided satisfactory evidence of identification as prescribed by Executive Order 455 (03-13) issued by the Governor of the Commonwealth of Massachusetts; that the transcript produced by me is a true record of the proceedings to the best of my ability; that I am neither counsel for, related to, nor employed by any of the parties to the action in which this deposition was taken, and further that I am not a relative or employee of any attorney or counsel employed by the parties thereto, nor financially or otherwise interested in the outcome of this action on this 18th day of February, 2014.

____
Sandra A. Deschaine
Registered Professional Reporter

My Commission Expires:
July 7, 2017

A C K N O W L E D G E M E N T O F D E P O N E N T

I, RICHARD C. JUERGENS, do hereby acknowledge I have read and examined the foregoing pages of testimony, and the same is a true, correct and complete transcription of the testimony given by me, and any changes or corrections, if any, appear in the attached errata sheet signed by me.

February 23, 2014   Richard Juergens
Date   RICHARD C. JUERGENS

Capital Reporting Company
1821 Jefferson Place, NW
Third Floor
Washington, D.C. 20036
(202) 857-3376

E R R A T A S H E E T

Case Name: Carl Zeiss SMT GmbH v. Nikon Corporation

Deponent Name: RICHARD C. JUERGENS

Deposition Date: February 13, 2014

Page No. Line No. Change/Reason for Change

SEE ATTACHED 4-PAGES OF ERRATA SHEETS

February 23, 2014
Date

Richard C Juergens
Signature

ERRATA SHEET

Case Name: Carl Zeiss SMT GmbH v. Nikon Corporation – IPR2013-00363

Deponent Name: RICHARD C. JUERGENS

Deposition Date: February 13, 2014

Page 53, line 22:

After "yes" add "insofar as the numbers are different."

Reason: Clarification

Page 54, line 2:

After "29.923376607" add "with the understanding that the question was referring to fourth surface, and not the fourth lens."

Reason: Clarification

Page 54, line 7:

After "digits" add "with the understanding that the question was referring to fourth surface, and not the fourth lens."

Reason: Clarification

Page 54, line 15:

After "Yes." Add the following:

"After my cross-examination, I determined that my answer here was not true. Neither of these instances are examples of errors in the CODE V sequence data in Exhibit 1130.

The difference between the CODE V sequence data in Exhibit 1130 and Table 2 of the published application for Mann with respect to the thickness of the first lens was due to an error in the publication of the Mann application as filed by the United States Patent and Trademark Office (USPTO). I have since reviewed a copy of the Mann application as filed with the USPTO, and it provides the same thickness of the first lens as that in the CODE V sequence data in Exhibit 1130 (i.e., 28 mm, not 38 mm). I understand that attorneys for Zeiss will provide a copy of this Mann application as filed with the USPTO to the attorneys for Nikon.

The difference between the CODE V sequence data in Exhibit 1130 and Table 2 of the published application for Mann with respect to the thickness of the fourth surface is because the CODE V sequence data in Exhibit 1130 splits this thickness into two by adding an additional 'dummy' surface between the fourth surface, which corresponds to the back surface of lens E2, and the fifth surface corresponding to the front surface of lens E3. The reason for this additional dummy surface is to locate a surface in the air path between lenses E2 and E3 corresponding to mirror M2, if mirror M2 were to extend into the beam path as the light rays pass from lens E2 to lens E3. The sum of the air thicknesses in the CODE V sequence data of Exhibit 1130 between the back surface of lens E2 and this dummy surface and between this dummy surface and the front surface of lens E3 exactly equals (to the ninth decimal point) the thickness for the fourth surface in Table 2 of Mann, which explains the discrepancy identified during my cross-examination. Furthermore, the CODE V sequence data in Exhibit 1130 shows the same optical medium both before and after this dummy surface (i.e., the optical medium is left blank each time, indicating the default medium of air), which confirms that this dummy surface has no effect on the propagation of the light rays because there is no refraction at the dummy surface.

The CODE V sequence data of Exhibit 1130 includes other examples of such dummy surfaces, including six dummy surfaces corresponding to the front and back surfaces of lenses E4 and E5 and the surfaces of mirrors M1 and M4, respectively, as the light rays pass from lens E3 to mirror M3 around the outside of lenses E4 and E5 and mirrors M1 and M4. Because there is no refraction at any of the dummy surfaces, they have no effect on the propagation of the light rays through the Mann projection objective, and therefore they have no effect on my analysis or the conclusions I reached in my declaration.

Since my cross-examination I did find one slight discrepancy between the CODE V sequence data of Exhibit 1130 and Table 2 of Mann in that the position of the image plane in Exhibit 1130 differs from that Table 2 of Mann by about 7 nm. The only possible effect this 7 nanometer discrepancy could have on my calculations is with respect to the precise values for Ma and L in claim 59 at the sixth decimal place. However, this discrepancy is way too small to affect the value of the ratio of Ma/L I reported in my declaration, which I calculated to only three significant digits. I could find no other discrepancies between the CODE V sequence data of Exhibit 1130 and Table 2 of Mann, except for rounding errors at the ninth decimal place."

Reason: Correction.

Page 56, line 20:

After "used in the analysis." Add:

"After my cross-examination, I determined that my answer here was not accurate. I have since confirmed that I used the CODE V sequence data in Exhibit 1130 to do the CODE V calculations for Mann described in my declaration. I prepared the CODE V sequence data in Exhibit 1130 based on CODE V sequence data for Mann provided to me by Fish & Richardson. I edited this original CODE V sequence data to remove information that was not necessary for the calculations I reported in my declaration. Since my cross-examination, I have confirmed that no errors were introduced into Exhibit 1130 by my editing. I understand that attorneys for Zeiss will provide a copy of the original CODE V sequence data for Mann they gave me to the attorneys for Nikon."

Reason: Correction.

Page 64, line 4:

After "No, I cannot for sure say that." Add:

"After my cross-examination, I determined that my answer here was not accurate. As noted in the correction above, I have since confirmed that I used the CODE V sequence data in Exhibit 1130 to do the CODE V calculations for Mann described in my declaration."

Reason: Correction.

Page 64, line 23:

After "prescription." Add:

"After my cross-examination, I determined that my answer here was not accurate. As explained in the correction above for page 54, line 15, after my cross-examination, I determined that what had been identified as mistakes in Exhibit 1130 were not in fact mistakes, and I have since confirmed that I used the CODE V sequence data in Exhibit 1130 to do the CODE V calculations for Mann described in my declaration."

Reason: Correction.

Page 66, line 6:

After "properly enough to." Add:

"After my cross-examination, I determined that my answer here was not accurate. As I explained in the correction above for page 54, line 15, after my cross-examination I determined that what had been identified as errors in Exhibit 1130 were not in fact errors, and I have since confirmed that I used the CODE V sequence data in Exhibit 1130 to do the CODE V calculations for Mann described in my declaration."

Reason: Correction.

Page 73, line 22:

Change "becomes positive" to "becomes a large negative focal length, such that the power of the group is near zero, but still negative."

Reason: Correction.

Page 73, line 24:

Change "negative" to "more strongly negative."

Reason: Clarification.

Page 74, line 18:

Change "second group" to "fourth group"

Reason: Correction.

Kurt Glitzenstein, Esquire
Marc Wefers, Ph.D., Esquire
FISH & RICHARDSON, P.C.
One Marina Park Drive
Boston, Massachusetts 02210

IN RE: Carl Zeiss SMT GmbH v. Nikon Corporation

Dear Mr. Glitzenstein,

Enclosed please find your copy of the deposition of RICHARD C. JUERGENS, along with the original signature page. As agreed, you will be responsible for contacting the witness regarding signature.

Within 30 days of February 21, 2014, please forward errata sheet and original signed signature page to counsel for Nikon Corporation, John Kern, Esquire.

If you have any questions, please do not hesitate to call. Thank you.

Yours,

Sandra A. Deschaine
Registered Professional Reporter

cc: John Kern, Esquire; Robert Mattson, Esquire