

# FISH & RICHARDSON P.C.

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

Frederick P. Fish  
1855-1930

W.K. Richardson  
1859-1951

## 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

Telephone  
202 783-5070

Facsimile  
202 783-2331

Web Site  
www.fr.com

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



ATLANTA

AUSTIN

BOSTON

DALLAS

DELAWARE

HOUSTON

MUNICH

NEW YORK

SILICON VALLEY

SOUTHERN CALIFORNIA

TWIN CITIES

WASHINGTON, DC

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

1

ZEISS 1135  
Zeiss v. Nikon  
IPR2013-00363





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



1 I N D E X

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

6

7 E X H I B I T S

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

10

11

12

13 (Exhibits retained by Attorney Kern.)

14

15

16

17

18

19

20

21

22

23

24

1 P R O C E E D I N G S

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

7 CROSS-EXAMINATION

8 Q. Good morning, Mr Juergens.

9 A. Good morning.

10 Q. Do you know why you're here today?

11 A. Yes.

12 Q. Are you here for -- are you here  
13 as an expert witness for Karl Zeiss?

14 A. Yes, I am.

15 Q. Are you here for Inter Partes  
16 Review IPR2013-00363?

17 A. Yes.

18 Q. Is that involving U.S. Patent  
19 Number 7,348,575.

20 A. Yes.

21 Q. I'd like to ask you a few  
22 questions about your background to start off  
23 the day.

24 A. Okay.

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

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

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

11 A. They did not.

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

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

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

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

1 & Richardson.

2 Q. So just for clarity, have you  
3 worked at any time as a lens designer in  
4 microlithography?

5 A. Well, there's two questions in  
6 there.

7 I have worked as a lens designer,  
8 but I have not worked as a lens designer  
9 specifically in microlithography.

10 Q. So would you consider then  
11 microlithography more of a hobby than a  
12 profession?

13 A. Optics is my profession, and  
14 microlithography is part of that profession.

15 Q. I see.

16 Do you have any publications in  
17 the field of microlithography?

18 A. Not specifically in the field of  
19 lithography, no.

20 Q. Do you have any publications in  
21 the field of optics generally?

22 A. Yes, I do.

23 Q. Can you list those or just  
24 reference them generally?



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

4           Q.    Fair enough.

5                    Do you know what the acronym ITRS  
6 stands for?

7           A.    No, I do not.

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

11                   MR. GLITZENSTEIN:  Objection,  
12 foundation.

13                   THE WITNESS:  I would accept  
14 that.

15 BY MR. KERN:

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

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

20           Q.    Say, for example, a half pitch of  
21 90 nanometers, does that help your  
22 understanding?

23           A.    A half pitch.

24           Q.    A half pitch of 90 nanometers as

1 an example of a technology node.

2 A. No, that does not help.

3 Q. Would it help if I had told you  
4 that it was related to the resolution of a  
5 rejection lens system?

6 A. It does not help much, no.

7 MR. KERN: I'd like to introduce a  
8 document and mark it Nikon 2101.

9 (Exhibit No. 2001, International Technology  
10 Roadmap for Semiconductors, marked for  
11 identification.)

12 MR. GLITZENSTEIN: 2001.

13 MR. KERN: 2101 corresponds to  
14 your Zeiss exhibits.

15 (Off-the-record discussion.)

16 BY MR. KERN:

17 Q. Could you read the title of this  
18 document, Mr. Juergens?

19 A. It is called the International  
20 Technology Roadmap for Semiconductors.

21 Q. And it's the 2003 Edition,  
22 Lithography?

23 A. Yes.

24 Q. And are you familiar with this

1 publication?

2 A. I am not.

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

6 A. It would not surprise me.

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

11 MR. GLITZENSTEIN: Objection,  
12 foundation.

13 THE WITNESS: I accept that.

14 BY MR. KERN:

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

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

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

23 A. Yes.

24 Q. And what is the range of the years

1 shown on the top of the graph?

2 A. It starts at 2003 and goes to  
3 2019.

4 Q. Thank you.

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

7 Do you see that?

8 A. Yes.

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

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

14 And then under 2019 it lists  
15 hp16."

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

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

21 Q. And what is your understanding of  
22 a graphic, such as the one shown in Figure  
23 53, showing a half pitch changing from -- a  
24 half pitch of 90 nanometers in 2004 to a half

1 pitch of 60 nanometers in 2019?

2 A. Could you clarify what the  
3 question is?

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

8 MR. GLITZENSTEIN: Objection,  
9 foundation.

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

14 BY MR. KERN:

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

19 MR. GLITZENSTEIN: Objection,  
20 foundation.

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

23 BY MR. KERN:

24 Q. So based on the 2003 ITRS

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

5 MR. GLITZENSTEIN: Objection,  
6 foundation.

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

10 BY MR. KERN:

11 Q. Fair enough.

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

15 A. Yes.

16 Q. And without having the benefit of  
17 reading this document and looking at the  
18 graphs shown in Figure 3, would you agree  
19 that the graph -- I'm sorry, scratch that,  
20 53, would you agree that the graph shown in  
21 Figure 53 is at least indicating that, in the  
22 future, expectations are that the half pitch  
23 will be reduced?

24 MR. GLITZENSTEIN: Objection,

1 form, foundation.

2 THE WITNESS: Yes.

3 BY MR. KERN:

4 Q. Are you aware of some of the  
5 leading technologies in lithography at the  
6 time of filing the '575 Patent?

7 A. Is this question, Am I aware of  
8 the technology at that time, or the question  
9 is, Was I aware at the time of the filing?

10 Q. At the time of filing, did you  
11 just list some of the leading technologies in  
12 microlithography? Roughly 2003.

13 A. About that time is when immersion  
14 technology was being applied to lithography,  
15 and catadioptric technology was also being  
16 applied to lithography.

17 Q. When you say "applied," were they  
18 leading technologies in the field at that  
19 time, or were they still in their design  
20 phase?

21 MR. GLITZENSTEIN: Objection,  
22 form.

23 THE WITNESS: They were probably  
24 still in their design phase.

1 BY MR. KERN:

2 Q. And what about EUV lithography,  
3 would you agree that was available in 2003  
4 and a leading technology?

5 MR. GLITZENSTEIN: Objection,  
6 form.

7 THE WITNESS: That was not  
8 available back in 2003.

9 BY MR. KERN:

10 Q. What about 157 nanometer  
11 lithography, was that a leading technology in  
12 2003?

13 A. I would say yes.

14 Q. Fair enough.

15 Have you personally designed any  
16 reduction projection lens for lithography?

17 A. No.

18 Q. Have you managed the design of a  
19 projection lens for photolithography?

20 A. No.

21 Q. So I want to look at Exhibit 1129,  
22 and that's your CV.

23 Could you look at the second  
24 paragraph and refresh your recollection of



1 that paragraph?

2 (Witness reviewing document.)

3 A. Okay.

4 Q. For the record, could you please  
5 read aloud the last full sentence in that  
6 paragraph?

7 A. "He worked eleven years at Optical  
8 Research Associates, the suppliers of CODE V,  
9 and went around the world giving seminars,  
10 lectures, and technology support on how to  
11 use CODE V effectively for design and  
12 analysis of all kinds of optical systems  
13 including lithography systems."

14 Q. So is it the intention of that  
15 last sentence to imply that you designed  
16 lithographic systems while at Optical  
17 Research Associates?

18 A. No.

19 Q. I want to ask you about some of  
20 the authors of several articles and lens  
21 designers and whether you're familiar with  
22 their work or them personally.

23 Are you familiar with Mr. Willi  
24 Ulrich in the field of lithography?

1 A. Yes.

2 Q. You're personally familiar with  
3 him?

4 A. Yes.

5 Q. And you are familiar with his  
6 works as far as publications?

7 A. I'm familiar with some of his  
8 works. I would not say I'm familiar with all  
9 of them.

10 Q. Fair enough.

11 Are you familiar with Mr. Ulrich's  
12 design in the field of optical lens design,  
13 particularly related to lithography?

14 A. I'm only familiar with his designs  
15 that have been expressed or shown in the  
16 patents that I've been working with Fish &  
17 Richardson on.

18 Q. Fair enough.

19 How about the same questions with  
20 regard to Mr. David Williamson? Are you  
21 familiar with Mr. Williamson?

22 A. I am.

23 Q. Are you personally familiar with  
24 Mr. Williamson?

1 A. Yes.

2 Q. Are you with familiar any of Mr.  
3 Williamson's publications?

4 A. I have heard him give some talks  
5 at conferences. I could not now tell you  
6 what they are on, other than probably touched  
7 on lithographic topics. But I would not say  
8 that I'm intimately familiar with his  
9 complete history of publications.

10 Q. And Mr. Williamson is a lens  
11 designer in the field of lithography; is that  
12 accurate?

13 A. Yes, he is.

14 Q. Are you familiar with any of  
15 Mr. Williamson's optical designs in the field  
16 of lithography?

17 A. No, I'm not.

18 Q. Same questions with regards to a  
19 Mr. David Shafer.

20 Do you know Mr. David Shafer?

21 A. Yes, I do.

22 Q. And do you know him personally?

23 A. Yes, I do.

24 Q. And are you familiar with

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

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

7 Q. Okay. Fair enough.

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

10 A. Yes, he is.

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

14 A. I'm familiar with some of them.

15 Q. Okay.

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

19 A. Yes, I am.

20 Q. And do you know him personally?

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

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

1 of lithography?

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

4 Q. Fair enough.

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

8 A. Yes.

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

12 A. Only as shown in his patents.

13 Q. In the '575 Patent?

14 A. In particular, yes.

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

17 A. Yes.

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

20 A. There is another patent that we  
21 are using as an example of prior art to his  
22 '575 Patent.

23 Q. Okay. In this proceeding?

24 A. In this proceeding.

1 Q. Okay. Fair enough.

2 Are you familiar with Mr. Warner

3 Tabarelli?

4 A. No.

5 Q. So you never met Mr. Warner

6 Tabarelli?

7 A. I have not.

8 Q. Do you agree that Mr. Warner

9 Tabarelli is an optical lens designer?

10 A. I could not say of my own

11 knowledge.

12 Q. Are you aware of any publications

13 by Mr. Tabarelli?

14 A. I am aware of a publication that

15 he has that describes the use of immersion

16 fluids.

17 Q. Okay. Fair enough.

18 Are you familiar with all or some

19 of Mr. Tabarelli's optical designs in the

20 field of lithography?

21 A. No, I'm not.

22 Q. Okay. Fair enough.

23 Do you consider the people I just

24 mentioned to be experts in the field of

1 optical design for projection lenses and  
2 microlithography?

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

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

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

11 Q. Okay. Fair enough.

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

14 A. Yes.

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

18 A. I was in the marketing and  
19 customer support group, and I did technical  
20 support through faxes, e-mails, and  
21 telephonically to customers on CODE V. I  
22 gave seminars on the use of CODE V, both at  
23 the -- beginning, and intermediate, or  
24 advanced levels, and I went almost literally

1 around the world visiting various countries  
2 giving technical support, doing marketing,  
3 and giving seminars on CODE V.

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

7 A. I have visited Nikon several  
8 times, yes.

9 Q. And that was Nikon in Japan?

10 A. In Japan, yes.

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

13 A. No, I have not.

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

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

23 Subsequent visits to them were to  
24 meet with them and help answer technical



1 questions that they had on CODE V.

2 Q. Does Nikon currently use CODE V?

3 A. Yes, they do.

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

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

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

12 A. It was almost eleven years.

13 Q. And from when to when?

14 A. From 1988 to 1999.

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

20 A. Zero.

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

24 A. Probably 5 to 10 percent.

1 Q. Fair enough.

2 What percentage of your time then  
3 was devoted to customer support of clients  
4 using CODE V software?

5 A. 75 to 80 percent.

6 Q. And what percentage of your time  
7 at Optical Research Associates was devoted to  
8 optical design, specifically optical design  
9 of microlithography?

10 A. Zero percent.

11 Q. And can you tell me what your main  
12 responsibilities are at Raytheon?

13 A. I am considered as a senior --  
14 what's called a subject matter expert in  
15 opticals, and I am involved in overseeing the  
16 technical aspects of the various optical  
17 products that are included in Raytheon  
18 products.

19 Q. How long have you worked at  
20 Raytheon?

21 A. I started in 1999 up to the  
22 present time, so it has been just over 15  
23 years.

24 Q. And do you do optical design for

1 Raytheon?

2 A. I do.

3 Q. What type of optical design?

4 A. It has been primarily infrared  
5 type systems.

6 Q. So infrared sensors? Infrared  
7 emitters? What type of infrared?

8 A. Infrared image sensors.

9 Q. Image sensors. Okay.

10 And what percentage of your time  
11 at Raytheon is devoted to optical design of  
12 microlithography systems?

13 A. Zero percent.

14 Q. So have you been involved in  
15 Sematech, S-e-m-a-t-e-c-h?

16 A. No, I have not.

17 Q. Do you know what Sematech is?

18 A. I cannot say right now what it is.  
19 It sounds familiar, but I do not know what it  
20 is.

21 Q. Okay. Fair enough.

22 So prior to your involvement in  
23 this litigation and the prior interference of  
24 the '870 Patent to Omura, have you ever

1 examined patents related to lens systems  
2 before?

3 A. Yes.

4 Q. Have you ever examined patents  
5 related to projection optical systems before  
6 in the field of microlithography?

7 A. No.

8 Q. Can you define what a lens unit  
9 would mean to a person of ordinary skill in  
10 the art?

11 A. Usually that would be considered a  
12 group of lenses that is doing some specific  
13 function within the overall operation of the  
14 lens.

15 Q. Can you define what it means to be  
16 a lens group to a person of ordinary skill in  
17 the art?

18 A. A lens group is simply a  
19 concatenation of multiple lenses that are  
20 called a single group for whatever reason the  
21 namer of that group had. It would probably  
22 tend to have the same general meaning as a  
23 lens unit but not exactly the same name.

24 Q. So people would generally

1 include -- scratch that.

2                   Back to the definition of a lens  
3 unit.

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

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

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

16                   MR. GLITZENSTEIN:  Objection,  
17           form.

18                   THE WITNESS:  Yes.

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

22 BY MR. KERN:

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

1 A. Yes, I am.

2 Q. Is the objective lens in your  
3 definition a lens unit?

4 A. It could be considered as a lens  
5 unit.

6 Q. And why would it be considered a  
7 lens unit?

8 A. Because the objective lens is --  
9 the elements in an objective lens are close  
10 together, and they are relatively separated  
11 from other portions of the overall lens  
12 system.

13 Q. And what is the function of the  
14 objective lens unit in a pair of binoculars?

15 A. To collect the incoming light and  
16 focus it.

17 Q. And does that function play a role  
18 in defining it as a lens unit since the  
19 lenses cooperate together to collect and  
20 focus light?

21 A. It could.

22 Q. It could.

23 Why might it not?

24 A. The "could" implies that it could

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

3 Q. I see. Okay.

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

7 A. Yes.

8 Q. Is an eyepiece unit a lens unit?

9 A. It could be called a lens unit.

10 Q. Why could it be called a lens  
11 unit?

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

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

17 A. It is to recollimate the light so  
18 that the human eye can see the light easily.

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

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

1 Do you agree with that?

2 A. Yes.

3 Q. And did you write this section of  
4 your expert report?

5 A. I had help from Fish & Richardson  
6 in writing it.

7 Q. What portion or percentage of that  
8 section was written by Fish & Richardson?

9 MR. GLITZENSTEIN: I'm going to  
10 just, before you answer, Mr. Juergens.

11 Counsel, I want to make sure I  
12 understand your position on inquiring on  
13 this issue. So you know, Federal Rules  
14 of Civil Procedure 26 protects the types  
15 of questions that you're asking right  
16 now from discovery.

17 I'm curious as to your position on  
18 the discoverability of this type of  
19 information in view of that.

20 MR. KERN: Sure. I just want to  
21 see what percentage of the report was  
22 actually written by Mr. Juergens.

23 MR. GLITZENSTEIN: Right. I  
24 understand the question.



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

7           MR. KERN: Of course.

8           MR. GLITZENSTEIN: You do.

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

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

15 BY MR. KERN:

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

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

23          Q.    Sure. Fair enough.

24          Could you please read Paragraph 15

1 aloud?

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

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

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

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

22           A.    That's -- yes.

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

1 the U.S. Patent?

2 A. The drawings?

3 Q. The drawings, the figures are part  
4 of the specification in the U.S. Patent?

5 A. Yes.

6 Q. What do you understand "the  
7 prosecution history" to mean in that  
8 paragraph?

9 A. I understand that to mean that if  
10 previous discussions or histories of the  
11 application have -- indicate a different  
12 interpretation of a term, then that is the  
13 interpretation that should be used.

14 Q. And what is the prosecution  
15 history?

16 A. For example, an interference.

17 Q. Okay.

18 Would you agree that interaction  
19 by the applicant with the U.S. Patent and  
20 Trademark Office during examination of the  
21 application, the record of that is a  
22 prosecution history?

23 A. I could accept that.

24 Q. Okay. Fair enough.

1                   So do you generally agree with  
2 Paragraph 15?

3           A.    Yes.

4           Q.    Did you apply Paragraph 15 in your  
5 analysis of what a third lens unit is in  
6 paragraph -- I'm sorry, Claim 55?

7           A.    Yes.

8           Q.    And do you believe that the '575  
9 Patent defines various lens units?

10          A.    Yes.

11          Q.    Fair enough.

12                   I'd like to turn now to the Mann  
13 Application, which is Exhibit 1110.

14                   Do you recognize the Mann  
15 Application, Mr. Juergens?

16          A.    Yes, I do.

17          Q.    Did you read the Mann Application  
18 or review the Mann Application in its  
19 entirety?

20          A.    Yes.

21          Q.    How did you come to know about the  
22 Mann Application?

23          A.    Through Fish & Richardson.

24          Q.    Were you told anything about the

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

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

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

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

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

17 A. I discussed the issue with Fish &  
18 Richardson.

19 Q. Okay. Fair enough.

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

24 A. Okay.

1 Q. Do you recognize this figure?

2 A. Yes.

3 Q. Did you annotate this figure?

4 A. Yes, I did.

5 Q. Did you annotate that figure with  
6 help from others?

7 A. I discussed the annotations with  
8 Fish & Richardson.

9 Q. So did you have any assistance in  
10 separating the various lens units shown in  
11 this figure?

12 A. I would not call it assistance. I  
13 would certainly say that I discussed the  
14 separation of the lens units with Fish &  
15 Richardson.

16 Q. So were you given any guidance in  
17 how to divide the various lens units of the  
18 Mann Figure 2?

19 A. No.

20 Q. So nobody suggested to you or  
21 showed you where the breakpoints should be  
22 between the various units in Figure 2 Mann?

23 A. We discussed where the breaking  
24 should be.

1 Q. Do you recall where and when you  
2 annotated this figure?

3 A. It was last year, maybe summer  
4 time frame. I don't recall exactly when.

5 Q. And I notice your annotations are  
6 typed on this figure.

7 Did you generate that graphic?

8 A. I did not.

9 Q. Do you know who did generate that  
10 graphic?

11 A. I assume somebody at Fish &  
12 Richardson generated this graphic.

13 Q. Was that graphic based on your  
14 direction?

15 A. Yes.

16 Q. And how did you communicate that  
17 graphic to be generated?

18 A. I took a similar diagram that I  
19 created from CODE V and put that into  
20 PowerPoint, and annotated that drawing and  
21 submitted -- with these annotations, and  
22 submitted that drawing to Fish & Richardson.

23 Q. Do you still have a copy of that  
24 drawing?

1           A.    I probably do somewhere.

2           Q.    So this graphic then was generated  
3 by Fish & Richardson at your direction?

4           A.    Yes.

5           Q.    Were there any changes made to the  
6 drawing after you submitted the instruction  
7 to modify the graphic?

8           A.    Yes.

9           Q.    So you had submitted an original  
10 marked up version and instructions to modify  
11 Figure 2, a graphic was generated, and then  
12 it was later modified?

13          A.    I submitted to them a drawing that  
14 broke this up into units, and we discussed --  
15 I discussed with Fish & Richardson the  
16 breaking of the units and then I submitted  
17 later a second drawing that had a slightly  
18 different breakdown of the units.

19          Q.    And what had changed in the  
20 breakdown of the units between the first and  
21 second drawing?

22          A.    It involved whether or not lenses  
23 E11 -- well, in particular lens labeled E11  
24 was to be considered as part of the third



1 unit or not.

2 Q. So am I to understand that  
3 initially lens E11 was to be considered part  
4 of the third unit based on your initial  
5 analysis?

6 A. I thought that lens E11 could be  
7 construed to be part of a third unit, yes.

8 Q. Why did you think E11 was part of  
9 a third unit initially?

10 A. Because there is a slight  
11 separation between lens E11 and lens E12.

12 Q. So referring to the Figure 2 of  
13 Mann, there is an air space present between  
14 E11 and E12; is that accurate?

15 A. Yes. There is air space between  
16 every element in this lens.

17 Q. Okay. Fair enough.

18 But there is a relatively larger  
19 air space between E11 and E12 in Figure 2  
20 than other lenses in the system?

21 A. Yes.

22 Q. And in the field of optical  
23 design, when there is a relatively large lens  
24 space separating lens units, is that a

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

3 A. Not always.

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

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

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

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

23 Q. Oh, I see. Okay.

24 Could you explain to me why you

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

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

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

12 A. Well, it certainly could be broken  
13 into fewer lens units, obviously. I could  
14 consider the first and second unit together  
15 to be a unit and so forth. I looked to break  
16 it up into four to see if the four units  
17 would correspond to the four units in the  
18 '575 Patent.

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

23 MR. GLITZENSTEIN: Objection to  
24 form. Mischaracterization.

1 THE WITNESS: I would say that I  
2 divided the lenses up into the groups  
3 based upon their obvious function in  
4 this lens and as described in the '575  
5 Patent.

6 BY MR. KERN:

7 Q. So did the '575 Patent, Claim 55,  
8 guide your separation of the projection lens  
9 shown in Figure 2 of Mann?

10 MR. GLITZENSTEIN: Objection to  
11 form.

12 THE WITNESS: It guided it in the  
13 sense that it describes negative groups,  
14 positive groups, and so forth.

15 BY MR. KERN:

16 Q. Did you feel that it was in any  
17 way unnatural to break the Figure 2 of Mann  
18 projections lens into four units?

19 MR. GLITZENSTEIN: Objection to  
20 form.

21 THE WITNESS: No.

22 BY MR. KERN:

23 Q. Did you have difficulty dividing  
24 the Figure 2 projection lens of Mann into

1 four units?

2 A. No.

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

6 It's the latter portion of the  
7 projection lens.

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

18 BY MR. KERN:

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

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

1 group.

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

4 A. That would be the lenses E6  
5 through E10.

6 Q. And which lenses form the beam  
7 bulge group?

8 A. Lens E11 through E20.

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

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

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

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

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

21 A. Because the bulge group, the back  
22 end is imaging a -- what I would refer to as  
23 a virtual object point into the wafer. That  
24 virtual object point is generated by a

1 negative group of lenses that is diverging  
2 the light coming from the front part of the  
3 lens.

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

8 A. Maybe an hour.

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

12 A. No.

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

16 A. That would have been several  
17 hours.

18 Q. Okay. Fair enough.

19 I want to take a look now at Claim  
20 59 in the '575 Patent, and that's in this IPR  
21 Exhibit 1101. And if you'd like, you can use  
22 the exhibit from yesterday's IPR as well.

23 A. Yes, I have that.

24 Q. So could you please read aloud the

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

3 A. It refers to a projection optical  
4 system satisfying the condition at 0.17 times  
5  $M_a$ , divided by  $L$ , is less than 0.6.

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

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

10 Q. What does that equation mean to  
11 you?

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

15 Q. What is the variable  $M_a$  and the  
16 variable  $L$  in that equation?

17 A. Variable  $M_a$  is the distance -- it  
18 says, in the claim, it says, "Is a distance  
19 on an optical axis between the third  
20 reflecting mirror and the second surface,"  
21 which is also the wafer.

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

24 A. I believe it does, yes.



1 Q. Could you please show me where?

2 A. It is on Page 30, Column 13, Line  
3 4.

4 Q. And could you please read that  
5 condition at Column 13, Line 4 aloud?

6 A. It says, "The projection optical  
7 system satisfies the following condition:  
8 0.17 is less than  $M_a$ , divided by  $L$ , and that  
9 is less than 0.6. Where  $M_a$  is a distance on  
10 optical axis between the third reflecting  
11 mirror and the second surface."

12 Q. So is that the same as the  
13 condition shown in Claim 59?

14 A. No. There is a "less than" sign  
15 that is missing or has been added, depending  
16 upon which way you look at it.

17 Q. Did you notice this discrepancy in  
18 Claim 59 when you prepared your Expert  
19 Declaration?

20 A. I do not remember if I actually  
21 noticed it or not.

22 Q. Do you know at this time which  
23 formula is correct or the intended formula?

24 MR. GLITZENSTEIN: Objection to

1 form.

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

5 BY MR. KERN:

6 Q. Fair enough.

7 So did you perform your analysis  
8 then based on the equation as shown in Claim  
9 59?

10 A. I did.

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

15 A. He may have done so.

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

19 A. Okay.

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

23 (Witness reviewing document.)

24 A. Okay.

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

6 Do you agree?

7 A. Yes.

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

11 A. That's correct.

12 Q. So it's my understanding that  
13 Exhibit 1130 shows the CODE V sequence data  
14 corresponding to Table 2 in the Mann  
15 Application, and let me get you the exhibit,  
16 1130.

17 So do you agree that that shows  
18 the CODE V sequence data corresponding to  
19 Table 2 in the Mann Application?

20 A. It does not.

21 Q. What does it show?

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

1 Q. Do you have Exhibit 1130?

2 A. I was handed 1131.

3 Q. Well, that's unfortunate. Let me  
4 correct that.

5 MR. GLITZENSTEIN: It's an  
6 aberration.

7 BY MR. KERN:

8 Q. Do you now have Exhibit 1130 in  
9 front of you?

10 A. Yes.

11 Q. So would you agree that that shows  
12 the CODE V sequence data corresponding to  
13 Table 2 of the Mann Application?

14 A. Yes.

15 Q. And could you please  
16 simultaneously look at Table 2 of the Mann  
17 Application? I believe it's on Page 8.

18 A. Actually, it begins on -- oh.

19 Q. Table 2, Paragraph 63.

20 A. Page 11 or -- the 8 up at the top,  
21 okay.

22 Q. My apologies.

23 So could you please tell me what  
24 the -- well, stepping back.

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

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

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

10          A.    That's accurate.

11          Q.    Do you recognize the language?

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

14          Q.    Very good.    Okay.

15                    So how did you come to know the  
16 titles in the various columns shown in Figure  
17 2?

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

21          Q.    Fair enough.

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

1 Q. Fair enough.

2 Could you please tell me what the  
3 thickness then is of the first lens in Table  
4 2?

5 A. It is 38.10000000.

6 Q. And why are those values --  
7 scratch that.

8 Why did the values shown in that  
9 column have so many significant digits?

10 A. Because that's what Mann chose to  
11 put in his table. I cannot say why Mann  
12 chose to do that.

13 Q. Is that standard in the art?  
14 Would a person of ordinary skill in the art  
15 normally describe lenses to that level of  
16 detail?

17 A. I oftentimes see lenses described  
18 to that level of detail, yes.

19 Q. Fair enough.

20 So is there a reason why a lens is  
21 described at that level of detail?

22 A. When you optimize a lens in CODE  
23 V, for example, oftentimes radii and  
24 thicknesses will be computed to many digits,

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

7 Q. Okay. Fair enough.

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

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

12 Q. Okay. Fair enough.

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

16 A. Well, it shows it as 28.0.

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

19 A. They should be the same.

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

22 A. It appears to be an error, yes.

23 Q. So back to Table 2.

24 Could you please tell me what the

1 thickness of the fourth lens is in Table 2?

2 A. It's 29.923376607.

3 Q. And could you please tell me what  
4 the thickness of the fourth lens is in CODE V  
5 sequence data in Exhibit 1130?

6 A. It is 25.7835 and some following  
7 digits.

8 Q. Is that different from the  
9 thickness shown in Table 2 of Mann for the  
10 fourth lens unit?

11 A. Yeah, it is different.

12 Q. Do you agree that both of these  
13 instances are examples of errors in the CODE  
14 V sequence data?

15 A. Yes.

16 Q. So would these errors affect the  
17 CODE V computations in any way?

18 A. They could.

19 Q. And how might they?

20 A. If you were computing some  
21 characteristics, such as magnification or  
22 wavefront error, it would have a significant  
23 impact on that.

24 Q. On any other calculations would it



1 have an impact?

2 A. If you're referring to, let's say,  
3 the spacings or distances elsewhere in the  
4 prescription, it might not have an impact at  
5 all.

6 Q. Would about on the accuracy on the  
7 calculations, would it have an exact on  
8 accuracy?

9 A. It depends upon what you're  
10 calculating.

11 Q. Can you give me an example of a  
12 calculation where it would not have an impact  
13 on accuracy?

14 A. If I were to try to calculate, for  
15 example, the focal length of a lens or a lens  
16 group that did not include these errors, then  
17 it would have no impact on that.

18 Q. Are you aware of any other errors  
19 in the CODE V sequence data?

20 A. I'm not aware of them, no.

21 Q. Are you aware of any errors in  
22 your Expert Declaration?

23 A. No.

24 Q. Okay. Fair enough.

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

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

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

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

10 THE WITNESS: I would like to make  
11 one comment.

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

21 BY MR. KERN:

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

1 A. That is possible. It's possible.

2 Q. And did anybody instruct you to do  
3 that?

4 A. No.

5 Q. And you submitted this set of data  
6 as a cleaner version of the data you used to  
7 perform the analysis for aesthetic purposes  
8 only?

9 A. Yes.

10 Q. Do you still have the original  
11 data that you used to perform the analysis?

12 A. I probably do.

13 MR. KERN: Now is a good time for  
14 a break then.

15 (Recess taken at 10:17 AM to 10:31 AM.)

16 BY MR. KERN:

17 Q. Mr. Juergens, could you please  
18 take a look at 41 of the Mann's application.  
19 And when you find it, could you please read  
20 it aloud?

21 A. "Now, referring to Figure 2 in  
22 which a catadioptric multi-mirror projection  
23 reduction objective 200 according to a second  
24 embodiment is illustrated. Figure 2 is a

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

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

12 A. Yes.

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

16 A. Yes.

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

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

22 Q. So the sentence, "The system 200  
23 includes a plurality of mirrors and a  
24 plurality of lens elements that are arranged

1 in distinct groups," what does that mean to  
2 you?

3 A. It means that they are separate  
4 groups.

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

9 A. It could mean any of those.

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

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

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

18 A. I would have to review the patent.

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

22 A. Okay. I accept that.

23 Q. Okay. Could you turn to Paragraph  
24 50 of the Mann Application now, and please

1 read that -- well --

2 A. "The system 200 is designed so  
3 that there are a group of lens elements that  
4 are both physically and optically behind the  
5 mirror M3 and the lens elements E6.  
6 According to one exemplary embodiment, there  
7 are fourteen lens elements that are disposed  
8 optically behind the lens element E6, and  
9 more specifically, lens elements E7 to E20  
10 are disposed along the optical axis and  
11 optically behind the lens element E6 and  
12 optically and physically in front of the  
13 wafer 120."

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

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

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

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

24 A. Yes.

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

7 A. Yes.

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

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

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

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

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

1 lenses" to be same as "the lens group"?

2 A. The wording is similar.

3 Q. Does it generally have the same  
4 meaning as to one of ordinary skill in the  
5 art?

6 A. Actually, I would say that a lens  
7 group and a group of lenses do have slightly  
8 different connotations.

9 Q. And how, in your understanding,  
10 are they different from one another?

11 A. Well, a lens group implies a  
12 function of a group of lenses. A group of  
13 lenses just implies a collection of them.

14 Q. So then a group of lenses, under  
15 that interpretation, would have more of an  
16 arbitrary grouping, as opposed to a lens  
17 group, which would group lenses together  
18 based on a common function?

19 MR. GLITZENSTEIN: Objection to  
20 form.

21 THE WITNESS: Yes.

22 BY MR. KERN:

23 Q. So in your understanding, would a  
24 person of ordinary skill in the art



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

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

5 Q. Okay. Fair enough.

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

10 (Witness reviewing document.)

11 A. Okay.

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

16 A. That is correct.

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

20 A. Probably.

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

24 A. Well, I had submitted a sequence,

1 Exhibit 1130.

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

4 A. No, I cannot for sure say that.

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

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

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

14 A. I did.

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

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

24 Q. So the calculation, though, to

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

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

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

13 A. Yes.

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

17 A. That's correct.

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

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

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

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

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

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

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

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

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

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

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

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

11 A. I do not know.

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

16 A. Not that I'm aware of.

17 Q. So there are no other files?

18 A. No.

19 Q. And how did you --scratch that.

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

23 A. Used my personal computer.

24 Q. And this is a personal computer

1 you have at your home?

2 A. At my home.

3 Q. At any time did you use a Fish &  
4 Richardson computer to perform any of these  
5 calculations?

6 A. No.

7 Q. At any time did you use a work  
8 computer to perform any of these  
9 calculations?

10 A. No.

11 Q. And do you personally have a copy  
12 of CODE V software on your home computer?

13 A. I do.

14 Q. And do you know what version of  
15 CODE V software is on your home computer?

16 A. I have three versions of the CODE  
17 V on my home computer.

18 Q. And what versions are they?

19 A. They are numbered 10.4, 10.5 and  
20 10.6.

21 Q. Are those the latest three  
22 versions of the CODE V software?

23 A. They are.

24 Q. And what year, roughly, did those

1 three versions come out respectively?

2 A. 10.6 has come out since I did  
3 these analyses. 10.5 came out probably early  
4 in 2013, and 10.4 probably came out in 2012.  
5 I could not tell you the exact dates.

6 Q. Okay. Fair enough.

7 Did you make any printouts of the  
8 analysis or data entry that's not part of  
9 your Expert Declaration?

10 A. I don't recall having made any  
11 printouts, no.

12 Q. Before calculating the focal  
13 length of elements E6 through E10, did you  
14 speak with anyone about what the results of  
15 that calculation should look like?

16 A. I discussed the results with Fish  
17 & Richardson.

18 Q. So you discussed the actual  
19 results after you had performed the  
20 calculation?

21 A. Yes.

22 Q. Did you discuss, before performing  
23 the calculations, what the results should  
24 look like?

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

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

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

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

14               MR. GLITZENSTEIN:  Objection,  
15               mischaracterization.

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

22 BY MR. KERN:

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



1           A.    I don't recall doing so, no.

2           Q.    So during your analysis, would you  
3 have tried or run calculation simulations on  
4 various subsets on lens groups shown in the  
5 Mann Application?

6                   MR. GLITZENSTEIN:  Objection,  
7           form.

8                   THE WITNESS:  I don't believe that  
9           I experimented by trying different  
10          combinations to see if I could come up  
11          with a predetermined result.  I looked  
12          at groups based on a normal function.  I  
13          looked at, in particular, I looked at  
14          the -- what I labeled Group 3 or Unit 3,  
15          and that was to see if the group that  
16          contained two negative lenses had an  
17          overall negative focal length.

18 BY MR. KERN:

19          Q.    So is it true that you did not  
20 experiment with other subsets of consecutive  
21 lenses to determine a lens unit division as  
22 shown in Figure 2 -- annotated Figure 2 of  
23 the Mann Application?

24                   MR. GLITZENSTEIN:  Objection,

1 form.

2 THE WITNESS: That's correct.

3 BY MR. KERN:

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

9 A. Yes.

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

12 A. That's accurate.

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

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

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

22 A. I did do that.

23 Q. And then later, when group -- when  
24 the group of lenses E6 through E11 was

1 changed to the Group E6 through E10, you  
2 reran a simulation to determine the focal  
3 length?

4 A. That's correct.

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

10 A. Could you repeat that question,  
11 please?

12 THE REPORTER: \*\*.

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

18 A. Yes.

19 Q. And why was that?

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

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

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

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

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

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

24 A. I discussed the issue with Fish &

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

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

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

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

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

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

23 A. I would say that different optical  
24 designers may interpret where to break lens

1 units. Their understanding -- or their  
2 selection may be different. That is  
3 certainly a possibility.

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

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

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

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

24 Q. Do you feel that your selection of

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

3 A. No, it's not arbitrary.

4 Q. And could you explain why again?

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

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

13 A. Yes.

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

17 MR. GLITZENSTEIN: Objection,  
18 form.

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

24 BY MR. KERN:

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

4 MR. GLITZENSTEIN: Objection,  
5 form.

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

9 BY MR. KERN:

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

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

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

20 A. You could choose to do so.

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



1 A. Okay.

2 Q. So I know we touched upon this  
3 yesterday, but for the record, in this  
4 matter, are you familiar with the concept of  
5 beam bulge and beam waist?

6 A. Yes.

7 Q. And what is a beam bulge?

8 A. A beam bulge is a region in which  
9 the ray paths diverge and then reconverge so  
10 as to form a bulge in the lenses.

11 Q. In your opinion, as a person of  
12 ordinary skill in the art, is what is shown  
13 in Figure 5 of the '575 Patent a large bulge?

14 MR. GLITZENSTEIN: Objection,  
15 form.

16 THE WITNESS: I would not  
17 characterize it as large or small. I  
18 would characterize it as a bulge.

19 BY MR. KERN:

20 Q. What is a beam waist again, for  
21 the record?

22 A. It's a region in the ray paths  
23 where the rays tend to be -- have their  
24 narrowest dimension perpendicular to the

1 axis.

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

6 A. Yes.

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

11 MR. GLITZENSTEIN: Objection,  
12 form.

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

19 BY MR. KERN:

20 Q. Okay. Fair enough.

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

23 MR. GLITZENSTEIN: Objection,  
24 form.

1           THE WITNESS: That was a lens  
2           design form that was first propounded to  
3           the industry by a person named Glatzle,  
4           G-l-a-e-t-z-l (sic), and he described  
5           that that was a useful method for  
6           controlling the aberrations, in  
7           particular the field curvature of a  
8           lithographic type lens.

9 BY MR. KERN:

10          Q. And how does it control  
11          aberrations, the large bulge?

12                 MR. GLITZENSTEIN: Objection,  
13          form.

14                 THE WITNESS: To answer that  
15          question, I would have to go through  
16          Glatzle's paper in fair detail with you.  
17          I think that's beyond the scope of this  
18          proceeding.

19 BY MR. KERN:

20          Q. Fair enough.

21                 Suffice it to say, though, the  
22          beam bulge portion of the projection lens in  
23          Figure 5 is controlling aberration?

24          A. Yes.

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

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

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

10 MR. GLITZENSTEIN: Objection,  
11 form.

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

17 BY MR. KERN:

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

22 A. Elements L25 and L26.

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

1 opinion?

2 A. I would say that the bulge group  
3 comprises elements L27 through to the final  
4 lens L217.

5 Q. Okay. Could you please turn to  
6 Figure 9 of the '575 Patent?

7 A. Okay.

8 Q. Would you please identify what you  
9 understand to be the third unit in Figure 9  
10 of the '575 Patent?

11 A. Based upon function, I would say  
12 that the third unit would be the group  
13 labeled G21.

14 Q. And what function are you basing  
15 that on?

16 A. It's the waist function of the  
17 negative portion that is diverging the light  
18 to form the virtual object point.

19 Q. And why, in your opinion, is the  
20 third unit located near a waist of the  
21 optical beam?

22 A. Putting negative lenses near  
23 waists is one of the techniques used to  
24 correct field curvature.

1 Q. As shown in Figure 9, do you agree  
2 that lenses L6 and L7 are separated from  
3 mirror M3 and lenses L8 by air spaces?

4 A. They are.

5 Q. Would you agree that the air  
6 spaces between mirror M4, and lens L6, and  
7 lens L7, and lens L8 are larger than the air  
8 spaces between lens Units L6 and L7?

9 MR. GLITZENSTEIN: Objection,  
10 form.

11 THE WITNESS: They are larger,  
12 yes.

13 BY MR. KERN:

14 Q. Do you agree that the lenses L6  
15 and L7 are positioned near a waist?

16 A. Yes.

17 Q. And that waist is where the  
18 optical beam reaches its narrowest diameter,  
19 more or less?

20 MR. GLITZENSTEIN: Objection,  
21 form.

22 THE WITNESS: More or less.

23 BY MR. KERN:

24 Q. And assuming Figure 9 is drawn to

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

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

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

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

12 Q. Okay. Thank you.

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

16 A. Of a beam diameter?

17 Q. Of a beam diameter in that section  
18 is.

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

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

1 A. Yes.

2 Q. And do you agree in Figure 9 that  
3 the aperture stop is located near the largest  
4 portion of the beam bulge?

5 A. Yes.

6 Q. Could you please explain the  
7 similarities of the third unit, G21, shown in  
8 the '575 Patent in Figure 9 with your  
9 selection of the third unit in the Mann's  
10 application?

11 A. In both cases, the group that I'm  
12 calling the third unit, composed of a  
13 negative group that is diverging the light  
14 into a positive bulge group.

15 Q. And are those the only  
16 similarities?

17 A. That's the major functional  
18 similarity.

19 Q. Referring to Figure 2 of the Mann  
20 Application, does the Mann Application have a  
21 beam waist?

22 A. Not as clearly defined as in  
23 Figure 9 of the '575.

24 Q. If you had to select a beam waist



1 in Mann, where might you place it?

2 A. Somewhere in the vicinity of E10  
3 perhaps.

4 Q. Does the Mann patent have a beam  
5 bulge?

6 A. It has a slight bulge, yes.

7 Q. And where would you place that  
8 beam bulge?

9 A. I place the maximum diameter of  
10 the bulge at around element E15.

11 Q. And can you say from your  
12 understanding of Figure 2 and the  
13 specification of the Mann Application, what  
14 the function of the beam bulge is in the Mann  
15 Application?

16 A. The function of the beam bulge is  
17 to control certainly aberrations as described  
18 by Glatzle in his paper.

19 Q. And can you say what the function  
20 of the lens is in the beam waist area of the  
21 Mann Figure 2 projection lens is?

22 A. They are primarily controlling the  
23 field curvature, and their function is also  
24 described by Glatzle in his paper.

1 Q. And that function is, generally?

2 A. To control aberrations.

3 Q. And would you say that the lens  
4 E11 is located near the beam waist in Figure  
5 2 of Mann?

6 A. It's near the beam waist.

7 Q. Do you have reason to believe that  
8 the Mann Figure 2 is not drawn in scale?

9 A. No, I believe it is drawn pretty  
10 much in scale.

11 Q. Let's just assume that it's drawn  
12 in scale for purposes of our discussion.

13 Can you estimate the ratio of a  
14 beam diameter at lens 7 to a beam diameter of  
15 the bulge as shown in Figure 2 of the Mann  
16 Application?

17 A. That appears to be perhaps in a  
18 range of 1.5 or less.

19 Q. Can you also estimate a ratio of  
20 beam diameter at lens E10 to the beam  
21 diameter of the bulge?

22 A. The bulge is larger by a factor of  
23 maybe one and a quarter to one and a half, in  
24 that ballpark range.

1 Q. Okay. Thank you.

2 I want to return to the '575  
3 Patent. That's Exhibit 1101.

4 A. Which patent?

5 Q. '575 Patent. I want to look at  
6 Column 12, Line 14.

7 Could you please read aloud the  
8 sentence beginning on Line 14 and ending at  
9 Line 18?

10 A. "Since the projection optical  
11 system comprises the third unit having the  
12 negative refracting power, the total length  
13 of the catadioptric projection optical system  
14 can be decreased and the adjustment for  
15 satisfying the Petzval's condition can be  
16 readily performed."

17 Q. Do you agree that satisfying  
18 Petzval's condition corrects for Petzval  
19 field curvature aberration?

20 A. Yes.

21 Q. And we generally discussed this  
22 yesterday, but for the record, could you  
23 please explain what that means?

24 A. Petzval's condition of having a

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

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

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

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

15 A. Yes.

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

21 A. One of the standard techniques for  
22 controlling Petzval, for driving the Petzval  
23 sum to zero, is to place negative lenses in a  
24 region where their diameter is smaller or is

1 relatively small. And so he's saying here  
2 that by putting negative lenses in this unit,  
3 that you can readily control the Petzval.

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

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

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

20 MR. GLITZENSTEIN: Objection to  
21 form.

22 THE WITNESS: The placing of  
23 negative lenses near a waist is used to  
24 control Petzval, not necessarily to

1 control the length of a system.

2 BY MR. KERN:

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

8 MR. GLITZENSTEIN: Objection,  
9 form.

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

16 BY MR. KERN:

17 Q. What is the main function again?

18 A. To control the Petzval sum.

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

23 A. It means that it's fairly easy to  
24 adjust the negative powers of those lenses so

1 as to achieve a zero Petzval sum.

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

5 A. It can, but not as easily.

6 Q. And why not?

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

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

21 MR. GLITZENSTEIN: Objection,  
22 form.

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

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

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

10 BY MR. KERN:

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

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

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



1 the same?

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

4 Q. Okay. Fair enough.

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

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

11 A. It does say that.

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

15 A. Yes.

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

19 MR. GLITZENSTEIN: Objection,  
20 form.

21 THE WITNESS: The fourth lens  
22 group is relaying a virtual object to  
23 the image, and by adding negative power  
24 to the third group, you are changing the

1 location of that virtual object, and  
2 that affects the overall length to the  
3 image plane.

4 BY MR. KERN:

5 Q. Okay. Fair enough.

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

8 A. Yes.

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

14 A. That is correct.

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

17 A. I have it here.

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

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

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

4 MR. GLITZENSTEIN: Objection,  
5 form.

6 THE WITNESS: Not completely, no.  
7 BY MR. KERN:

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

10 A. The function of the third unit.

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

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

15 Q. Any other functions?

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

18 Q. Is there anything else?

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

21 Q. Okay.

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

1 request a break.

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

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

6 MR. KERN: Back on.

7 BY MR. KERN:

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

14 MR. GLITZENSTEIN: Objection,  
15 form.

16 THE WITNESS: Yes.

17 BY MR. KERN:

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

21 A. That's correct.

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

1 MR. GLITZENSTEIN: Objection,  
2 asked and answered.

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

8 BY MR. KERN:

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

12 A. Yes.

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

16 A. Yes.

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

20 A. Yes.

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

1 curvature?

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

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

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

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

14          A.    Yes.

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

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

1 that that the group from E11 forward would  
2 have to be further out to collect those rays.  
3 "Further," I mean further in length.

4 Q. So how does that reduce the length  
5 of the projection optical system?

6 A. It keeps the group from E11  
7 through E20 from having to move further in  
8 the wafer direction.

9 Q. So referring again to Figure 2 of  
10 Mann, could you explain why you did not  
11 choose lenses E7 through E20 as a third unit?

12 A. There were several reasons. One  
13 was the fact that the lenses that I  
14 identified as Unit 3 have a different  
15 function than the lenses identified as Unit  
16 4. And another reason is that the '575  
17 refers to a group that has two negative  
18 lenses and has -- or has negative power; and  
19 so I chose to look to see if the group that  
20 has two negative lenses indeed has negative  
21 power.

22 Q. Do you know whether the lenses E7  
23 through E20 correct for field curvature?

24 A. All the lenses in the system have

1 some impact on field curvature.

2 Q. Including the lenses before the  
3 mirrors?

4 A. Yes.

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

8 MR. GLITZENSTEIN: Objection.

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

11 BY MR. KERN:

12 Q. And why isn't it clear?

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

16 Q. Okay.

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

22 THE WITNESS: Could you repeat  
23 that, please?

24 THE REPORTER: "So did you take



1           into account the functions of correcting  
2           field curvature and reducing system  
3           length when you selected the third lens  
4           unit shown in annotated Figure 2 of the  
5           Mann Application?"

6                   THE WITNESS: I considered the  
7           reduction of the Petzval, but I did not  
8           take into consideration the effect  
9           shortening the overall length.

10 BY MR. KERN:

11           Q.    So, Mr. Juergens, do you know  
12 whether the lenses E7 through E20 correct for  
13 field curvature?

14           A.    All the -- every lens in the  
15 system has an impact on field curvature, and  
16 I would say that the lenses between E7 to E20  
17 were certainly chosen in such a way as to  
18 make the Petzval sum equal to zero.

19           Q.    So referring to Figure 2 --  
20 scratch that.

21                   In your opinion, Mr. Juergens,  
22 would one of ordinary skill in the art have  
23 understood that the third lens unit could  
24 include lenses E6 through E9?

1           A.    I do not believe that a person of  
2 ordinary skill would break at that point.

3           Q.    Why not?

4           A.    Because it's so obviously a  
5 division between a negative group and a  
6 positive group, that the break point would  
7 not put the most powerful negative lens in  
8 with the positive group.

9           Q.    Which lens is -- in lens Group E6  
10 through E9 are positive and which lenses are  
11 negative?

12          A.    Just by looking at the ray  
13 diagram, I would say that E6 is positive, E7  
14 negative, E8 I can't tell but it's probably  
15 positive, E9 is definitely positive, E10 is  
16 negative.

17          Q.    And do you know whether the lenses  
18 E6 through E9 correct for field curvature?

19          A.    All the lenses have an impact on  
20 field curvature. And these being negative  
21 lenses are serving to correct for field  
22 curvature.

23          Q.    When you say "that all the lenses  
24 have an impact on field curvature, some of

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

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

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

16 A. Yes.

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

20 MR. GLITZENSTEIN: Objection,  
21 form.

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

1 positive lenses.

2 BY MR. KERN:

3 Q. So that the negative lenses have a  
4 negative contribution and positive lenses  
5 have a positive contribution to the Petzval  
6 sum?

7 A. That's correct.

8 Q. And that ideally to solve for the  
9 Petzval sum, you would want the correct mix  
10 of positive and negative lens so that that  
11 sum was zero?

12 A. That's correct.

13 Q. So in that sense when you say that  
14 every lens in the system contributes to the  
15 Petzval's -- or the field of curvature, it's  
16 meant that some lenses increase and some  
17 lenses decrease the Petzval sum.

18 A. That's correct.

19 Q. Do you know whether lenses E6  
20 through E9 function to reduce the projection  
21 lens length?

22 A. It's hard for me to say whether  
23 that is -- whether they are doing that or  
24 not.

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

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

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

10 A. Lesser importance.

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

13 MR. GLITZENSTEIN: Objection,  
14 asked and answered.

15 MR. KERN: And that was E6 through  
16 E9.

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

21 BY MR. KERN:

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

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

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

7           A.    Yes.

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

10          A.    I did not.

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

14          A.    No.

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

22          A.    That's correct.

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

1 of your definition of the third lens unit?

2 A. The E6 through E9 would not meet  
3 the condition of the third unit having two  
4 negative lenses, because in that case it  
5 would have only one negative lens. So it was  
6 immaterial to compute the focal length of  
7 that group.

8 Q. And could you please explain again  
9 the positive and negative lenses in that  
10 group?

11 A. Okay. Of the five lenses, E6  
12 through E10, they appear to be positive,  
13 negative, positive, positive, and negative.

14 Q. Do you know that based on the  
15 prescription tables corresponding to Figure  
16 2?

17 A. I computed -- well, I'm basing it  
18 now on purely looking at the ray diagram.

19 Q. Did you at any point calculate the  
20 positive or negative attributes of a -- of  
21 the lenses E6 through E9 based on the  
22 prescription table?

23 A. I more than likely did. I don't  
24 recall exactly when I did it.

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

5 MR. GLITZENSTEIN: Objection,  
6 form.

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

10 BY MR. KERN:

11 Q. And what are those reasons?

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

17 Q. Okay. Fair enough.

18 MR. KERN: No further questions  
19 for the witness.

20 MR. GLITZENSTEIN: I have just a  
21 few.

22 REDIRECT EXAMINATION

23 BY MR. GLITZENSTEIN:

24 Q. Mr. Juergens, can you please turn



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

4 Do you have that?

5 A. Yes.

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

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

10 A. The elements labeled element E1  
11 and element E2.

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

16 A. Yes, it does.

17 Q. How do you know?

18 A. I can tell by several reasons.

19 One is that each of the lenses, E1 and E2,  
20 are positive lenses, and so the combined  
21 power of them would be positive, and another  
22 reason would be that they are bending the  
23 rays in such a way as to reduce the  
24 divergence of the rays exiting from the

1 reticle.

2 Q. Can you determine all of that  
3 simply from the ray tracing and other  
4 information shown in Figure 2 of Mann?

5 A. Yes, I can.

6 Q. Did you need to run your CODE V  
7 simulation in order to determine that?

8 A. No, I ran the CODE V simulation to  
9 determine what the exact numerical value of  
10 that focal length is.

11 Q. And let me ask you about the  
12 second unit in Mann.

13 What elements are in the second  
14 unit of Figure 2 of Mann?

15 A. Second unit comprises optically  
16 elements -- lens elements E3, E4, and E5, and  
17 all four mirrors, M1, M2, M3 and M4.

18 Q. Now, is your conclusion that those  
19 various elements are -- or they together  
20 comprise the second unit in Mann Figure 2, in  
21 any way affected by the thickness of lens  
22 element E4?

23 A. No.

24 Q. Let me ask you about the third

1 unit of Mann Figure 2.

2 I know you were asked a number of  
3 questions about this on cross-examination,  
4 but can you remind us what elements you have  
5 concluded are in the third unit?

6 A. I concluded the third unit  
7 comprises elements E6, E7, E8, E9 and E10.

8 Q. Now, as part of your analysis in  
9 this case, have you concluded that the third  
10 unit in the Mann Figure 2 has a negative  
11 refractive power?

12 A. Yes, I determined that group has  
13 an overall negative power.

14 Q. Is that conclusion in any way  
15 affected by the thickness of element E1 in  
16 the first unit?

17 A. No.

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

21 A. No, it is not.

22 Q. Let me ask you about the fourth  
23 unit in Mann Figure 2.

24 What elements have you concluded

1 comprise that unit?

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

4 Q. Okay. Thank you.

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

8 A. Yes, I did.

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

12 A. No, it is not.

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

16 A. No, it is not.

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

20 RECROSS-EXAMINATION

21 BY MR. KERN:

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

1           A.    I did not.

2                   MR. KERN:  Thank you.  No further  
3           questions.

4  (Deposition concluded at 12:19 PM.)

5

6

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

1 COMMONWEALTH OF MASSACHUSETTS

2 SUFFOLK SS.

3

4

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

17

18

19

20

21

\_\_\_\_\_  
Sandra A. Deschaine  
Registered Professional Reporter

22

23 My Commission Expires:  
July 7, 2017

24

1 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

2

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

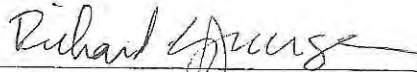
9

10

11

February 23, 2014

Date



RICHARD C. JUERGENS

13

14

15

16

17

18

19

20

21

22

23

24

Capital Reporting Company  
Juergens, Richard C. 02-13-2014

118

1 Capital Reporting Company  
1821 Jefferson Place, NW  
2 Third Floor  
Washington, D.C. 20036  
3 (202) 857-3376

4 E R R A T A S H E E T

5 Case Name: Carl Zeiss SMT GmbH v. Nikon Corporation

6 Deponent Name: RICHARD C. JUERGENS

7 Deposition Date: February 13, 2014

8 Page No. Line No. Change/Reason for Change

9

10

SEE ATTACHED 4-PAGES OF ERRATA SHEETS

11

12

13

14

15

16

17

18

19

20

21

22

23 February 23, 2014

24 Date

Richard Juergens  
Signature

25



**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  $M_a$  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  $M_a/L$  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.

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

4

5 IN RE: Carl Zeiss SMT GmbH v. Nikon Corporation

6

7 Dear Mr. Glitzenstein,

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

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

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

18

19 Yours,

20

Sandra A. Deschaine  
21 Registered Professional Reporter

22

23

cc: John Kern, Esquire; Robert Mattson, Esquire  
24

<u>0</u>	<b>14</b> 89:6,8 95:6 99:11	<b>2003</b> 8:21 10:2,10 11:17,24 13:12 14:3,8,12	82:18,24 <b>50</b> 59:24 61:15
<b>0.17</b> 46:4 47:8	<b>15</b> 24:22 29:23 31:16,24 34:2,4	<b>20036</b> 118:2	<b>53</b> 9:16,18 10:23 12:20,21
<b>0.474</b> 49:9	<b>157</b> 14:10	<b>2004</b> 10:12,24 11:6,11	<b>55</b> 34:6 41:21 42:7 74:2,7 96:12,15 97:2 108:21
<b>0.6</b> 46:5 47:9	<b>16</b> 9:16 11:7,13	<b>2012</b> 69:4	
<b>02210</b> 1:18 2:17 119:3	<b>17</b> 46:14 53:1	<b>2013</b> 69:4	<b>575</b> 13:6 19:13,22 34:8 35:12,16 41:4,18,21 42:4,7 45:20 46:22 78:21 79:13 82:18 83:6,10 86:8,23 89:2,5 90:12 93:19 96:12,16 98:12 99:10 100:5 101:16
<b>03-13</b> 116:10	<b>18</b> 89:9	<b>2014</b> 1:15 116:9,16 118:7 119:12	<b>59</b> 45:20 46:2 47:13,18 48:9,13
<u>1</u>	<b>1821</b> 118:1	<b>2017</b> 116:23	<u>6</u>
<b>1</b> 85:5,6	<b>18th</b> 116:16	<b>2019</b> 10:3,11,14 11:1,7,12	<b>60</b> 11:1
<b>1.5</b> 85:5,6 88:18	<b>1940</b> 2:7	<b>202</b> 118:3	<b>617.542.5070</b> 2:18
<b>10</b> 23:24	<b>1988</b> 23:14	<b>21</b> 119:12	<b>617.542.8906</b> 2:18
<b>10.4</b> 68:19 69:4	<b>1999</b> 23:14 24:21	<b>2101</b> 8:8,13	<b>63</b> 50:19
<b>10.5</b> 68:19 69:3	<u>2</u>	<b>220</b> 49:5	<b>662</b> 63:14
<b>10.6</b> 68:20 69:2	<b>2</b> 35:11,15,21	<b>22314</b> 2:8	<u>7</u>
<b>10:17</b> 57:15	36:18,22 38:11	<b>25.7835</b> 54:6	<b>7</b> 88:14 116:23
<b>10:31</b> 57:15	39:12,19 41:1,19	<b>26</b> 30:14 31:4	<b>7,348,575</b> 1:7 4:19
<b>1001</b> 78:22	42:9,17,24	<b>28.0</b> 53:16	<b>703.412.3000</b> 2:9
<b>107</b> 48:17	44:2,10,15	<b>29.923376607</b> 54:2	<b>703.413.2200</b> 2:9
<b>11</b> 50:20 100:23	49:3,14,19	<u>3</u>	<b>75</b> 24:5
<b>11:31</b> 98:5	50:13,16,19	<b>3</b> 12:18 71:14 101:14	<u>8</u>
<b>11:55</b> 98:5	51:2,3,17 52:4	<b>30</b> 47:2 119:12	<b>8</b> 3:10 50:17,20
<b>110</b> 3:5	53:9,23 54:1,9	<b>38</b> 53:10	<b>80</b> 24:5
<b>1101</b> 29:20 45:21 89:3	57:21,24 58:10	<b>38.10000000</b> 52:5	<b>857-3376</b> 118:3
<b>1110</b> 34:13 96:7	65:3,7,20,23	<u>4</u>	<b>870</b> 19:16 25:24
<b>1116</b> 29:21 48:18 111:1	66:1,8 67:2,10	<b>4</b> 47:3,5 101:16	
<b>1129</b> 14:21	71:22 72:5 74:9	<b>4/114</b> 3:4	
<b>1130</b> 49:13,16 50:1,8 53:15 54:5 64:1,3 66:4	75:6,9,11,21	<b>41</b> 57:18 111:2	
<b>1131</b> 50:2	76:6 86:19	<b>455</b> 116:10	
<b>12</b> 89:6 95:5 99:11	87:12,21	<u>5</u>	
<b>12:19</b> 115:4	88:5,8,15 96:7	<b>5</b> 23:24 78:23 79:13 81:23	
<b>120</b> 60:13	97:3 98:13		
<b>13</b> 1:15 47:2,5 116:9 118:7	100:9,16 101:9		
	102:20 103:4,19		
	107:4 109:16		
	111:3,9,14		
	112:4,14,20		
	113:1,10,23		
	<b>2.5</b> 85:20		
	<b>200</b> 57:23		
	58:1,2,4,22 60:2		
	<b>2001</b> 3:9 8:9,12		

<u>9</u>	<b>actually</b> 18:4 30:22 47:20 50:18 60:14 62:6 67:5 74:18 82:12 98:2	<b>analyses</b> 69:3	35:1,2,6,7,10,13 41:2 44:10,15 45:6,14 49:3,15,19 50:13,17 51:2 56:2 57:18 58:11,18 59:24 61:9 67:10 71:5,23 75:22 76:7 77:10,15 78:11 86:10,20 87:13,15 88:16 96:7 102:21 103:5
9 83:6,9 84:1,24 85:3 86:2,8,23	<b>adapted</b> 82:15	<b>analysis</b> 15:12 34:5 39:5 48:7 56:20,23 57:7,11 64:6,9 66:22 67:3,14 69:8 71:2 113:8	58:11,18 59:24 61:9 67:10 71:5,23 75:22 76:7 77:10,15 78:11 86:10,20 87:13,15 88:16 96:7 102:21 103:5
<b>9:02</b> 1:15	<b>add</b> 93:11 105:14	<b>annotated</b> 35:20 37:2,20 71:22 72:5 74:9 75:10 100:9 102:20 103:4 111:3	61:9 67:10 71:5,23 75:22 76:7 77:10,15 78:11 86:10,20 87:13,15 88:16 96:7 102:21 103:5
<b>90</b> 7:21,24 10:24 11:6,13	<b>added</b> 47:15	<b>annotations</b> 36:7 37:5,21	<b>applied</b> 13:14,16,17
<b>94</b> 35:22	<b>adding</b> 93:9 95:23 105:14,15	<b>answer</b> 12:7 22:24 30:10 31:10 32:21 81:14 102:15	<b>apply</b> 34:4
<b>98</b> 63:6,12	<b>addition</b> 108:3	<b>answered</b> 99:2 107:14	<b>arbitrary</b> 62:16 77:2,3
<u>A</u>	<b>additionally</b> 82:1	<b>anybody</b> 35:5,14 57:2 108:11	<b>area</b> 87:20
<b>aberration</b> 50:6 81:23 82:5 89:19	<b>adjust</b> 92:24	<b>anything</b> 34:24 35:4 97:18	<b>areas</b> 80:18
<b>aberrations</b> 81:6,11 82:3 87:17 88:2	<b>adjustment</b> 89:14 90:18	<b>anyone</b> 69:14	<b>Arizona</b> 4:4
<b>ability</b> 31:3 116:12	<b>advanced</b> 21:24	<b>aperture</b> 76:9,10 85:24 86:3	<b>arranged</b> 58:6,21,24
<b>accept</b> 7:13 9:13 33:23 59:22	<b>advised</b> 72:10	<b>apologies</b> 50:22	<b>arrangement</b> 58:3
<b>access</b> 100:23	<b>aesthetic</b> 57:7	<b>APPEAL</b> 1:2	<b>art</b> 19:21 21:13 26:10,17 35:12,16 46:7 52:13,14 59:11,14 61:24 62:5,24 75:4,8,19 76:5 79:12 90:18 92:4 103:22
<b>according</b> 57:23 60:6	<b>affect</b> 54:16 93:19	<b>appear</b> 74:19 92:10 109:12 110:13,14 117:7	<b>articles</b> 15:20
<b>account</b> 85:22 102:17 103:1 107:2,6	<b>affected</b> 112:21 113:15,19 114:10,14	<b>appeared</b> 35:12	<b>AS1</b> 85:24
<b>accuracy</b> 55:6,8,13	<b>affects</b> 96:2	<b>appears</b> 11:10,22 44:16 53:22 76:22 85:4 88:17	<b>ascertain</b> 35:11
<b>accurate</b> 17:12 27:6 39:14 40:19 49:10 51:9,10 65:4 72:11,12 91:16 105:3	<b>against</b> 105:12	<b>applicant</b> 33:19	<b>ascertaining</b> 35:15
<b>achieve</b> 12:3 27:15 93:1	<b>agreed</b> 119:10	<b>application</b> 32:7 33:11,21 34:13,15,17,18,2 2	<b>aspect</b> 82:2
<b>acknowledge</b> 117:3	<b>air</b> 39:13,15,19 84:3,5,7		<b>aspects</b> 24:16 78:7
<b>acronym</b> 7:5	<b>Alexandria</b> 2:8		<b>assessment</b> 40:17
<b>across</b> 7:18 9:21	<b>allow</b> 31:10		<b>assistance</b> 36:9,12
<b>action</b> 100:24 116:13,16	<b>aloud</b> 15:5 32:1 45:24 47:5 57:20 89:7		
<b>actual</b> 5:19 44:11 67:8 69:18	<b>am</b> 1:15 4:14 9:2 13:7 16:22 18:3,19 20:14 24:13,15 28:1 31:10 39:2 51:12 57:15 98:5 116:12,14		
	<b>amount</b> 94:17		





<p><b>Civil</b> 30:14 31:5  <b>claim</b> 32:3,9 34:6              41:21 42:7 45:19              46:1,2,18              47:13,18              48:2,4,8,13              74:2,7 96:12,15              97:2 108:21  <b>claim's</b> 32:4  <b>clarify</b> 11:2  <b>clarity</b> 6:2  <b>cleaner</b> 57:6  <b>clear</b> 77:19              102:9,12  <b>clearly</b> 51:23              86:22  <b>clients</b> 23:23 24:3  <b>close</b> 28:9  <b>closer</b> 94:4 100:22  <b>CLR</b> 1:21  <b>CODE</b> 15:8,11              21:21,22              22:3,19,20,22              23:1,2,19,22              24:4 37:19              49:3,13,18 50:12              52:22 53:14,20              54:4,13,17 55:19              63:17 64:20              65:5,16 66:9              67:21              68:12,15,16,22              112:6,8  <b>collect</b> 28:15,19              101:2  <b>collection</b> 62:13              63:19  <b>collectively</b> 114:7  <b>College</b> 5:4  <b>column</b> 47:2,5              52:9 89:6 95:5              99:11</p>	<p><b>columns</b> 51:9,16  <b>combinations</b>              71:10  <b>combined</b> 111:20  <b>comes</b> 32:2  <b>coming</b> 45:2 94:2  <b>comment</b> 56:11  <b>Commission</b>              116:23  <b>common</b> 62:18              78:12,18  <b>commonly</b> 66:11  <b>Commonwealth</b>              116:1,5,11  <b>communicate</b>              37:16  <b>compactness</b>              99:17  <b>Company</b> 118:1  <b>compare</b>              65:19,22,23  <b>complete</b> 17:9              18:5 108:3 117:5  <b>completely</b> 97:6  <b>complex</b> 40:2  <b>composed</b> 86:12  <b>comprise</b> 43:10              112:20 114:1  <b>comprised</b> 43:11              114:3  <b>comprises</b> 83:3              89:11 112:15              113:7  <b>comprising</b> 96:22  <b>computations</b>              54:17  <b>compute</b> 109:6  <b>computed</b> 52:24              109:17  <b>computer</b></p>	<p>67:20,23,24          68:4,8,12,15,17  <b>computing</b> 54:20  <b>concatenation</b>              26:19  <b>concept</b> 79:4 82:14  <b>concepts</b> 82:13  <b>concerned</b> 31:11  <b>concluded</b> 111:8              113:5,6,9,24              114:2,6 115:4  <b>conclusion</b> 112:18              113:14,18              114:9,13  <b>condition</b> 46:4              47:5,7,13              89:15,18,24              90:14,19 93:2              99:18 100:10              107:7,8 109:3  <b>conferences</b> 5:22              17:5  <b>confirm</b> 96:10  <b>conjunction</b> 19:3  <b>connotations</b> 62:8  <b>consecutive</b> 71:20  <b>consider</b> 6:10              20:23 21:12              41:14 98:11              107:17  <b>consideration</b>              103:8  <b>considered</b> 24:13              26:11 28:4,6              38:24 39:3 40:5              103:6 107:6  <b>considering</b>              111:12  <b>consistent</b>              32:5,12,15  <b>consternation</b></p>	<p>31:14  <b>construed</b> 39:7  <b>construing</b> 98:12  <b>contacting</b> 119:11  <b>contain</b> 110:13  <b>contained</b> 71:16  <b>context</b> 7:17 92:21  <b>continuation</b>              19:16  <b>contributes</b> 106:14  <b>contribution</b>              106:4,5  <b>contributions</b>              105:10,23,24  <b>control</b> 81:10              87:17 88:2              91:3,24 92:1,18              93:14,15 97:16  <b>controlling</b>              81:6,23 87:22              90:22  <b>convenient</b> 56:4,7              97:24 98:3  <b>converge</b> 94:3  <b>conversely</b> 80:7  <b>convince</b> 22:21  <b>cooperate</b> 28:19  <b>cooperating</b>              107:24  <b>copy</b> 37:23 68:11              119:8  <b>Corporation</b> 1:8              2:3 116:7 118:5              119:5,14  <b>correct</b> 47:23 48:3              49:11 50:4              63:15,16 64:22              65:17 66:5 72:2              73:4 83:24 96:14              98:20,21 99:15              100:13 101:23</p>
---	---	--	---

103:12 104:18,21 105:2 106:7,9,12,18 107:5 108:22 117:5 <b>corrected</b> 93:3 <b>correcting</b> 93:8 99:18 100:4,12 102:18 103:1 <b>corrections</b> 117:7 <b>corrective</b> 91:17 <b>corrects</b> 89:18 99:24 100:2,9 <b>correspond</b> 41:17 70:20 96:11 <b>corresponding</b> 10:10 49:14,18 50:12 109:15 <b>corresponds</b> 8:13 <b>cost</b> 66:16 <b>counsel</b> 30:11 97:22 114:24 116:13,15 119:14 <b>countries</b> 22:1 <b>course</b> 5:14 31:7 <b>CRA</b> 1:21 <b>created</b> 37:19 <b>cross-examination</b> 1:13 4:7 113:3 116:6 <b>CSR</b> 1:21 <b>curious</b> 30:17 <b>currently</b> 23:2 63:22 64:16 <b>curvature</b> 51:4 81:7 82:4 83:24 87:23 89:19 90:9 100:1,2,13 101:23 102:1,18 103:2,13,15 104:18,20,22,24	105:1,3,6,8,14,1 5,18 106:15 <b>customer</b> 21:19 24:3 <b>customers</b> 21:21 <b>CV</b> 7:1 14:22 <hr/> <b>D</b> <hr/> <b>D.C</b> 118:2 <b>data</b> 49:13 50:12 53:2,14,21 54:5,14 55:19 56:23 57:5,6,11 64:3 65:14,16,19,22 66:7,21 67:2,8 69:8 <b>date</b> 49:18 117:12 118:7,24 <b>dates</b> 69:5 <b>David</b> 16:20 17:19,20 18:8 <b>day</b> 4:23 116:16 <b>days</b> 119:12 <b>Dear</b> 119:7 <b>deciding</b> 73:8 <b>decision</b> 72:13,15 74:8 <b>Declaration</b> 29:20 45:10,15 47:19 48:17 55:22 67:22 69:9 75:11 98:10 111:1 <b>decrease</b> 92:6 106:17 <b>decreased</b> 89:14 95:10 <b>decreasing</b> 11:13 <b>define</b> 26:8,15 97:2 <b>defined</b> 77:16 86:22 98:12	108:19 <b>defines</b> 34:9 <b>defining</b> 28:18 58:18 74:7 78:16 <b>definitely</b> 104:15 <b>definition</b> 27:2 28:3 32:8,10 107:12 109:1 <b>degree</b> 5:3,6 <b>demonstrating</b> 23:22 <b>demonstrations</b> 22:19 <b>depend</b> 91:8,10 <b>dependent</b> 46:2 <b>depending</b> 47:15 <b>depends</b> 55:9 <b>Deponent</b> 4:2 118:6 <b>deposition</b> 1:13 114:24 115:4 116:6,14 118:7 119:8 <b>Deschaine</b> 1:21 116:4,21 119:20 <b>describe</b> 22:19 35:5 51:1 52:15 <b>described</b> 27:14 32:19 42:4 52:17,21 76:18 81:4 87:17,24 90:20 97:17 99:13 <b>describes</b> 20:15 42:13 <b>DESCRIPTION</b> 3:8 <b>design</b> 12:13 13:19,24 14:18 15:11 16:12 21:1,9 24:8,24 25:3,11 39:23	41:1 43:15 67:8 80:22 81:2 <b>designed</b> 14:15 15:15 60:2 <b>designer</b> 6:3,7,8 17:11 18:9 19:6 20:9 80:21 <b>designers</b> 15:21 75:24 82:8 <b>designing</b> 82:6 <b>designs</b> 16:14 17:15 18:12 19:10 20:19 82:14,16 <b>detail</b> 52:16,18,21 81:16 <b>determinant</b> 73:8 <b>determination</b> 73:16 74:22 107:3 <b>determinations</b> 73:5 <b>determine</b> 49:4 63:18 64:11 65:1 71:21 73:2 112:2,7,9 <b>determined</b> 113:12 <b>devices</b> 9:10 <b>devoted</b> 23:19,22 24:3,7 25:11 <b>diagram</b> 37:18 58:1 104:13 109:18 <b>diameter</b> 44:11,16 80:5,10 84:18 85:2,8,9,11,13,1 6,17,22,23 87:9 88:14,20,21 90:24 91:9,11,13 92:5 93:12 94:22 <b>diameters</b> 100:6
--	--	--	--

<b>Dickin</b> 51:23	<b>discussions</b> 12:12 33:10	88:8,9,11	<b>E3</b> 112:16
<b>difference</b> 63:1 90:10	<b>disposed</b> 60:7,10 96:20	<b>Drive</b> 1:17 2:16 116:8 119:2	<b>E4</b> 112:16,22 113:19 114:14
<b>different</b> 33:11 38:18 40:9 53:5 54:8,11 56:22 62:8,10 71:9 75:23 76:2 101:14	<b>distance</b> 46:13,17,18 47:9 49:4	<b>driver's</b> 4:4	<b>E5</b> 112:16
<b>difficult</b> 93:15 100:4	<b>distances</b> 55:3	<b>driving</b> 90:22	<b>E6</b> 43:4 44:4,19 60:5,8,11,21 61:6 63:14 64:7,12 65:1 69:13 72:20,24 73:1,6,7,14,15 74:13 76:14 77:1,5,21 96:11 98:19,24 100:16 103:24 104:9,13,18 106:19 107:11,15 108:5,9,13,15,19 ,24 109:2,11,21 110:3,8,14 113:7
<b>difficulty</b> 42:23	<b>distinct</b> 58:6,21 59:1,8	<b>Duke</b> 2:7	<b>E7</b> 60:9 61:9,11,19,22 77:11,16 78:12 101:11,22 102:5 103:12,16 104:13 113:7
<b>digits</b> 52:9,24 53:1,3,5 54:7	<b>diverge</b> 40:17 77:6 79:9 94:2 97:13	<b>duly</b> 4:5	<b>E8</b> 104:14 113:7
<b>dimension</b> 79:24	<b>divergence</b> 100:21 111:24	<b>during</b> 22:4 33:20 71:2 114:22	<b>E9</b> 103:24 104:10,15,18 106:20 107:11,16 108:6,9,13,16,19 ,24 109:2,21 110:4,8 113:7
<b>dioptric</b> 82:14	<b>diverges</b> 99:6	<hr/> <b>E</b> <hr/>	<b>earlier</b> 64:18 72:4 76:18 77:12 97:17
<b>direct</b> 111:2	<b>diverging</b> 40:11 45:1 83:17 86:13 100:18	<b>E1</b> 111:10,19 113:15 114:10	<b>early</b> 69:3
<b>direction</b> 37:14 38:3 101:8	<b>divide</b> 36:17 41:1 75:5,8,21 76:6,23	<b>E10</b> 44:5,12,20 63:14 64:7,13 65:2 69:13 73:1,7,15 74:14 76:14 77:1,6 87:2 88:20 96:11 98:19,24 100:16,20,24 104:15 108:4 109:12 110:14 113:7	<b>easily</b> 29:18 93:5
<b>directly</b> 66:9	<b>divided</b> 42:2 44:19 46:5,13 47:8 105:7	<b>E11</b> 38:23 39:3,6,8,11,14,1 9 40:12,15,20 44:8,20 72:7,11,14,15,20 ,24 73:7,15,20 74:16,17,22 88:4 100:20 101:1,6 114:3	<b>easy</b> 92:23
<b>directs</b> 90:1	<b>dividing</b> 42:23	<b>E12</b> 39:11,14,19	<b>edited</b> 56:15
<b>discloses</b> 46:23 61:2	<b>division</b> 71:21 104:5	<b>E15</b> 44:17 87:10	<b>editing</b> 56:17
<b>disclosure</b> 61:3	<b>document</b> 8:8,18 9:16 12:1,9,17 15:2 48:23 63:10	<b>E2</b> 111:11,19	<b>Edition</b> 8:21
<b>discoverability</b> 30:18	<b>done</b> 5:24 48:15 66:11 100:6	<b>E20</b> 43:5 44:8,19 60:9,21 61:9,12,19,22 77:12,16 78:12 101:7,11,23 102:6 103:12,16 114:3	
<b>discovery</b> 30:16 31:3	<b>draft</b> 31:17,19		
<b>discrepancy</b> 47:17 48:13	<b>drafting</b> 45:10		
<b>discuss</b> 69:22 70:1 114:23	<b>drawing</b> 37:20,22,24 38:6,13,17,21 65:23		
<b>discussed</b> 35:17 36:7,13,23 38:14,15 69:16,18 70:2 74:24 77:12 89:21	<b>drawings</b> 32:24 33:2,3		
<b>discussion</b> 7:3 8:15 66:19,23 88:12	<b>drawn</b> 84:24		

<p><b>education</b> 5:2  <b>effect</b> 103:8  <b>effectively</b> 15:11                  94:5  <b>eight</b> 53:11  <b>elections</b> 60:9  <b>element</b> 39:16                  60:8,11 72:7                  87:10 93:19                  105:7 108:4                  111:10,11                  112:22                  113:15,19                  114:10,14  <b>elements</b> 28:9                  58:4,6,24                  60:3,5,7,17                  61:4,6,11,17                  63:14 65:1 69:13                  82:20,22,23 83:3                  105:4 111:8,10                  112:13,16,19                  113:4,7,24 114:3  <b>eleven</b> 15:7 23:12  <b>else</b> 65:11,15                  97:8,18  <b>elsewhere</b> 55:3  <b>e-mails</b> 21:20  <b>embodiment</b> 35:10                  57:24 60:6  <b>emitters</b> 25:7  <b>employed</b>                  116:13,15  <b>employee</b> 116:14  <b>employment</b> 5:19                  22:4  <b>Enclosed</b> 119:8  <b>English</b> 51:9  <b>entered</b> 67:9  <b>entering</b> 66:9  <b>entire</b> 60:20</p>	<p><b>entirety</b> 34:19                  111:13  <b>entry</b> 65:14 66:21                  69:8  <b>equal</b> 103:18  <b>equally</b> 75:22  <b>equation</b>                  46:6,9,10,12,16,                  23 48:8  <b>errata</b> 117:8                  119:13  <b>error</b> 53:20,22                  54:22 56:17  <b>errors</b> 54:13,16                  55:16,18,21 66:3  <b>Esquire</b>                  2:5,6,14,15                  119:1,15,23  <b>estimate</b> 45:5 85:1                  88:13,19  <b>EUV</b> 14:2  <b>eventually</b> 74:17  <b>evidence</b> 116:10  <b>exact</b> 7:18 55:7                  56:19 69:5 112:9  <b>exactly</b> 26:23 37:4                  109:24  <b>examination</b> 33:20                  110:22  <b>examined</b> 4:6                  26:1,4 117:4  <b>example</b> 7:20 8:1                  19:21 27:8 33:16                  52:23 55:11,15                  100:19  <b>examples</b> 5:17                  54:13  <b>exception</b> 21:3  <b>Executive</b> 116:10  <b>exemplary</b> 60:6  <b>exhibit</b> 3:9 8:9</p>	<p>14:21 29:20,21                  34:13 45:21,22                  48:18 49:13,15                  50:1,8 53:15                  54:5 56:24 63:22                  64:1,3,15,19                  66:4 67:15 78:22                  89:3 96:7 111:1  <b>exhibits</b> 3:8,14 7:2                  8:14  <b>exit</b> 100:20  <b>exiting</b> 111:24  <b>expectation</b> 11:16  <b>expectations</b> 9:9                  12:22  <b>experiment</b> 71:20  <b>experimented</b> 71:9  <b>expert</b> 4:13 24:14                  29:22 30:4                  35:21,23 45:10                  47:18 48:11,17                  55:22 63:7,12                  67:22 69:9 74:10                  75:11  <b>experts</b> 20:24 31:3  <b>Expires</b> 116:23  <b>explain</b> 40:4,24                  43:3 44:18 49:1                  70:12 77:4 86:6                  89:23 90:4,16                  92:19 95:16                  98:23 99:24                  100:15 101:10                  109:8  <b>Exposure</b> 9:20  <b>expressed</b> 16:15  <b>extent</b> 66:20  <b>eye</b> 29:18  <b>eyepiece</b> 29:5,8,16  <hr/>                 F  <hr/> <b>fact</b> 74:13 76:15</p>	<p>101:13                  110:12,14  <b>factor</b> 88:22  <b>fair</b> 7:4 12:11                  14:14 16:10,18                  18:7 19:4                  20:1,17,22 21:11                  24:1 25:21 31:23                  33:24 34:11                  35:19 39:17                  45:18 48:6 51:21                  52:1,19 53:7,12                  55:24 63:5 69:6                  72:18 80:20                  81:16,20 95:4                  96:5 107:1                  110:17  <b>fairly</b> 27:13 51:20                  63:4 92:23  <b>familiar</b> 8:24                  15:21,23                  16:2,5,7,8,11,14,                  21,23                  17:2,8,14,24                  18:3,11,14,17,23                  19:9 20:2,18                  21:5 25:19 27:23                  29:4 79:4  <b>fashion</b> 75:10  <b>faxes</b> 21:20  <b>feature</b> 12:14  <b>February</b> 1:15                  116:9,16 118:7                  119:12  <b>Federal</b> 30:13 31:4  <b>feel</b> 42:16 76:24  <b>felt</b> 78:7  <b>fewer</b> 41:13  <b>field</b> 6:17,18,21                  13:18 15:24                  16:12 17:11,15                  18:9,24 20:20,24                  26:6 39:22 81:7                  82:4 83:24 87:23</p>
---	--	---	--

89:19 99:24 100:2,12 101:23 102:1,18 103:2,13,15 104:18,20,21,24 105:1,2,12,14,15 ,18 106:15 <b>figure</b> 9:16,18 10:22 12:18,21 35:11,15,21 36:1,3,5,11,18,2 2 37:2,6 38:11 39:12,19 41:1,19 42:9,17,24 44:2,10,15 51:16 57:21,24 58:10 65:3,20 66:1 71:22 72:5 74:9 75:6,9,11,15,21 76:6 78:23 79:13 81:23 82:18,24 83:6,9 84:1,24 85:3 86:2,8,19,23 87:12,21 88:4,8,15 96:7 97:3 98:13 100:9,16 101:9 102:20 103:4,19 107:4 109:15 111:3,9,14 112:4,14,20 113:1,10,23 <b>figures</b> 33:3 <b>files</b> 56:13,14 63:17 67:12,17 <b>filing</b> 13:6,9,10 <b>final</b> 83:3 <b>financially</b> 116:15 <b>first</b> 4:3 22:18 35:2,7 38:20 41:14 52:3 53:9,14 60:18 61:15 81:2 99:24 111:6,7,9,12,15 113:16 114:11	<b>Fish</b> 1:17 2:13 5:24 16:16 30:5,8 34:23 35:17 36:8,14 37:11,22 38:3,15 56:13 65:7,10 66:12 67:1 68:3 69:16 74:24 116:8 119:2 <b>fit</b> 74:19 <b>five</b> 41:11 109:11 <b>fixing</b> 82:1,3 <b>flat</b> 90:2 <b>flatten</b> 105:12 <b>Floor</b> 118:2 <b>fluent</b> 51:12 <b>fluids</b> 20:16 21:10 <b>focal</b> 55:15 63:13,18 64:6,11 65:1 69:12 70:4,8,18,23 71:17 72:21 73:2,6,21,23 74:3,5 76:16 90:1 91:10,14 93:13,14,17 108:9,12,17 109:6 110:1 112:10 <b>focus</b> 5:10 28:16,20 66:3 <b>foregoing</b> 117:4 <b>form</b> 13:1,22 14:6 21:6 27:17 29:13 40:11,13 41:24 42:11,20 43:9,13,15,23 44:2,6 48:1 51:18 62:20 71:7 72:1 77:18 78:5 79:10,15 80:12,24 81:2,13 82:11 83:18 84:10,21 91:21	92:9 93:22 95:20 97:5 98:15 105:21 110:6,15 <b>formed</b> 43:24 44:14 99:4 <b>forming</b> 76:20 97:1 107:19 <b>formula</b> 47:23 48:13,14 90:5,6 <b>forth</b> 9:8 27:12 31:4 41:15 42:14 51:24 76:11 98:9 <b>forward</b> 11:17 40:12 101:1 119:13 <b>foundation</b> 7:12 9:12 11:9,20 12:6 13:1 78:12 <b>fourteen</b> 60:7 <b>fourth</b> 40:7,16 54:1,4,10 93:23 94:9 95:21 113:22 <b>frame</b> 37:4 <b>front</b> 45:2 50:9 60:12 76:10 <b>full</b> 15:5 <b>Fullerton</b> 5:5 <b>function</b> 26:13 27:5,7,15 28:13,17 29:13,15 42:3 62:12,18 71:12 76:18 78:16,19 83:11,14,16 87:14,16,19,23 88:1 92:14,17 97:10,11 98:11 99:5 101:15 102:10 106:20 107:24 108:1 110:15,16 <b>functional</b> 86:17	<b>functioned</b> 27:15 <b>functions</b> 41:8 90:13 97:15,19 99:14,23 102:18 103:1 <b>future</b> 9:9 11:18 12:4,22 <hr/> <b>G</b> <hr/> <b>G21</b> 83:13 85:8,23 86:7 93:19 <b>general</b> 26:22 40:10 107:20 108:2 <b>generally</b> 6:21,24 26:24 32:23 34:1 58:3 61:1 62:3 82:6,8 88:1 89:21 90:4 <b>generate</b> 37:7,9 <b>generated</b> 37:12,17 38:2,11 44:24 <b>German</b> 51:13 <b>given</b> 31:9 32:4 35:1 36:16 65:12,19 117:6 <b>giving</b> 15:9 22:2,3 <b>G-l-a-e-t-z-l</b> 81:4 <b>glass</b> 51:5 <b>Glatzle</b> 81:3 82:12 87:18,24 <b>Glatzle's</b> 81:16 <b>Glitzenstein</b> 2:14 3:5 7:11 8:12 9:11 11:8,19 12:5,24 13:21 14:5 27:16,19 30:9,23 31:8 41:23 42:10,19 47:24 50:5 56:3,6,8 62:19 70:14 71:6,24
---	--	---	---

<p>77:17 78:4 79:14              80:11,23 81:12              82:10 84:9,20              91:20 92:8 93:21              95:19 97:4,22              98:2,14 99:1              102:8 105:20              107:13              110:5,20,23              114:17 119:1,7  <b>glitzenstein@fr.co</b>  <b>m</b> 2:19  <b>GmbH</b> 1:5 2:12              116:7 118:5              119:5  <b>goings</b> 114:23  <b>gone</b> 72:5  <b>gotten</b> 66:4  <b>Governor</b> 116:11  <b>graph</b> 9:17,22              10:1 11:10,16              12:19,20  <b>graphic</b> 10:22 11:5              37:7,10,12,13,17              38:2,7,11  <b>graphs</b> 12:18  <b>group</b> 21:19 23:4              26:12,16,18,20,2              1 27:14 40:13,21              43:9,11,16,23              44:1,3,7,21 45:1              55:16 59:6,7              60:3,17,20,23              61:4,10,13,16,24              62:1,7,11,12,14,              17 63:2 70:8              71:14,15              72:16,20,23,24              73:1,6,8,14,15,1              7,21,23              74:4,11,16,18,19              76:20,21              77:6,9,11,15              78:2,18 83:2,12              85:8,10,11</p>	<p>86:11,13,14              93:24              94:3,7,9,19              95:22,24              97:14,20 98:11              99:4,5,7,21              100:3,5,7              101:1,6,17,19              102:14              104:5,6,8,9              107:22 108:2,5              109:7,10              110:1,12,14              113:12 114:2  <b>grouped</b> 29:12  <b>grouping</b> 27:4              62:16 72:8 75:14              77:20  <b>groups</b> 23:5,8 40:1              41:6,8              42:2,13,14 43:17              58:7,15,18,21              59:1,4,15,17,21              70:3,17,19,20,21              ,24 71:4,12              76:19,23 77:5  <b>guess</b> 72:7  <b>guidance</b> 35:14              36:16 74:21 75:2  <b>guide</b> 42:8  <b>guided</b> 42:12 74:8  <hr/> <p style="text-align: center;"><b>H</b></p> <hr/> <b>half</b> 7:20,23,24              10:9,17,19,23,24              11:5,7,12 12:22              85:10 88:23  <b>handed</b> 50:2  <b>happen</b> 94:15  <b>happy</b> 56:9  <b>hard</b> 106:22  <b>haven't</b> 102:13  <b>having</b> 4:3 12:16</p>	<p>69:10 80:22              89:11,24 94:20              95:12 96:23              100:3 101:7              109:3  <b>heard</b> 17:4  <b>help</b> 7:21 8:2,3,6              22:24 30:5 36:6              105:11,23  <b>helps</b> 97:16  <b>hereby</b> 116:6              117:3  <b>he's</b> 60:20,22              61:16,21 91:1  <b>hesitate</b> 119:17  <b>histories</b> 33:10  <b>history</b> 17:9 32:6              33:7,15,22  <b>hobby</b> 6:11  <b>home</b>              68:1,2,12,15,17  <b>hour</b> 45:8 97:23  <b>hours</b> 45:17  <b>hp16</b> 10:15  <b>hp90</b> 10:13  <b>human</b> 29:18  <hr/> <p style="text-align: center;"><b>I</b></p> <hr/> <b>I'd</b> 4:21 8:7 29:19              34:12 35:20              48:16 56:1 98:5  <b>idea</b> 70:3  <b>ideally</b> 106:8  <b>ideas</b> 43:17  <b>identification</b> 8:11              116:10  <b>identified</b> 4:3              76:19 99:22              100:7 101:14,15  <b>identify</b> 49:23              70:17 76:9 77:20</p>	<p>80:16 83:8 97:9  <b>ignore</b> 77:14  <b>I'll</b> 31:10 63:7  <b>illustrated</b> 57:24  <b>illustrating</b> 58:2  <b>illustration</b> 73:14  <b>I'm</b> 12:19              16:7,8,14              17:8,17 18:14              20:21 30:9,17              34:6 35:3 43:19              49:9 55:20 67:16              86:11 107:8              109:17  <b>image</b> 25:8,9 40:13              78:15 90:2 94:1              95:23 96:3  <b>imager</b> 27:11  <b>imaging</b> 27:9              44:22 93:24  <b>immaterial</b> 109:6  <b>immersion</b> 13:13              20:15 21:10  <b>impact</b> 54:23              55:1,4,12,17              91:7,9,13,14              93:13 102:1              103:15              104:19,24  <b>impinged</b> 5:20  <b>implies</b> 28:24              62:11,13 90:1  <b>imply</b> 15:15 61:21  <b>importance</b>              107:10  <b>important</b> 12:13              78:8  <b>imported</b> 65:16  <b>include</b> 27:1 32:18              45:11 55:16              72:11,13,15              73:20 74:15,17</p>
---	--	---	---

103:24 108:23 <b>included</b> 24:17 64:16 72:7 <b>includes</b> 58:4,23 98:19 <b>including</b> 15:13 80:17 82:4 102:2 <b>incoming</b> 28:15 <b>increase</b> 94:14,23 105:1 106:16 <b>increasing</b> 94:6 <b>indeed</b> 101:20 <b>independent</b> 64:10 <b>index</b> 51:5 90:10 105:7 <b>indicate</b> 11:11 33:11 <b>indicates</b> 11:5 <b>indicating</b> 12:21 <b>indirectly</b> 94:8 <b>individual</b> 10:19 41:8 <b>industry</b> 9:8 11:16 12:3 81:3 <b>information</b> 30:19 112:4 <b>infrared</b> 25:4,6,7,8 <b>initial</b> 39:4 72:21 74:22 <b>initially</b> 39:3,9 40:5 <b>in-line</b> 82:7 <b>inquiring</b> 30:12 <b>instances</b> 54:13 <b>instruct</b> 57:2 <b>instructed</b> 70:7 <b>instruction</b> 38:6 <b>instructions</b> 38:10 <b>intended</b> 47:23	<b>intention</b> 15:14 <b>Inter</b> 4:15 45:6 63:22 64:16 67:15 <b>interaction</b> 33:18 <b>interested</b> 116:15 <b>interference</b> 25:23 33:16 <b>intermediate</b> 21:23 78:15 <b>International</b> 3:9 7:9 8:9,19 <b>interpret</b> 75:24 <b>interpretation</b> 32:5,15 33:12,13 62:15 <b>interpreted</b> 32:10 <b>interpreting</b> 32:3 <b>interrupt</b> 56:4 <b>intimately</b> 17:8 <b>introduce</b> 8:7 <b>introduced</b> 56:17 <b>introducing</b> 93:9 <b>inventor</b> 78:1 <b>involved</b> 24:15 25:14 38:22 <b>involvement</b> 25:22 <b>involving</b> 4:18 <b>IPR</b> 45:20,22 78:22 <b>IPR2013-00363</b> 1:6 4:16 <b>Irvine</b> 5:8 <b>isn't</b> 102:12 <b>issue</b> 30:13 35:17 74:24 <b>issued</b> 116:10 <b>iteration</b> 72:6 <b>ITRS</b> 7:5 11:24	<b>it's</b> 8:21 9:19 12:1 29:20,21 31:13 43:6,24 49:12 50:5,17 54:2 57:1 77:3 79:22 82:3 83:16 88:6,11 90:6 91:7 92:23 96:10 102:9 104:4,14 106:15,22 108:1 111:2 <b>I've</b> 5:24 7:18 16:16 19:2 51:19 97:17 <hr/> <b>J</b> <hr/> <b>Japan</b> 22:9,10,15,16 <b>Jefferson</b> 118:1 <b>jkern@oblon.com</b> 2:10 <b>John</b> 2:5 119:14,23 <b>Juergens</b> 1:13 3:3 4:2,8 8:18 30:10,22 31:17 34:15 45:4 57:17 60:15 66:20 75:3 98:8 103:11,21 110:24 114:18,22 116:7 117:3,12 118:6 119:9 <b>July</b> 116:23 <hr/> <b>K</b> <hr/> <b>Karl</b> 4:13 <b>Kern</b> 2:5 3:14 7:15 8:7,13,16 9:14 11:14,23 12:10 13:3 14:1,9 27:22 30:20 31:7,9,12,15 42:6,15,22 43:18 48:5 50:7 56:21	57:13,16 62:22 70:22 71:18 72:3 77:24 78:9 79:19 80:19 81:9,19 82:17 84:13,23 92:2,16 94:10 96:4 97:7 98:6,7,17 99:8 102:11 103:10 106:2 107:15,21 110:10,18 114:21 115:2 119:14,23 <b>kinds</b> 15:12 <b>knew</b> 31:21 <b>knowledge</b> 20:11 <b>Kurt</b> 2:14 119:1 <hr/> <b>L</b> <hr/> <b>L.L.P</b> 2:4 <b>L217</b> 83:4 <b>L25</b> 82:22 <b>L26</b> 82:22 <b>L27</b> 83:3 <b>L6</b> 84:2,6,8,14 <b>L7</b> 84:2,7,8,15 <b>L8</b> 84:3,7 <b>labeled</b> 9:19 10:6 38:23 71:14 83:13 111:10 <b>labels</b> 51:8 <b>language</b> 32:11 51:11 74:7 97:2 <b>large</b> 39:23 79:13,17 80:22 81:11 82:8 85:10 91:9,14 93:12 116:6 <b>larger</b> 39:18 43:10 84:7,11 88:22 94:21,22 100:6 <b>largest</b> 86:3
--	---	---	--

<p><b>last</b> 15:5,15 32:20                  37:3</p> <p><b>later</b> 38:12,17                  72:10,23 82:15</p> <p><b>latest</b> 68:21</p> <p><b>latter</b> 43:6</p> <p><b>leading</b> 13:5,11,18                  14:4,11</p> <p><b>learn</b> 9:3,7</p> <p><b>learned</b> 5:13,21</p> <p><b>least</b> 12:21 23:7                  40:5 72:5 73:15                  74:12 96:22</p> <p><b>lecture</b> 22:6,15</p> <p><b>lectures</b> 15:10</p> <p><b>legal</b> 29:23 98:9</p> <p><b>lend</b> 105:8</p> <p><b>length</b> 55:15                  63:13,18 64:6,12                  65:1 69:13                  70:5,9,24 71:17                  72:21 73:3,21,23                  74:3,5 76:16                  89:12                  91:10,14,19                  92:1,6,13                  93:13,14,17,20                  94:8,13,23 95:8                  96:2 100:17                  101:3,4 102:6,19                  103:3,9 106:21                  108:9,12,17                  109:6 110:1                  112:10</p> <p><b>lengths</b> 70:18 73:6</p> <p><b>lens</b> 6:3,7,8 8:5                  12:14 14:16,19                  15:20 16:12                  17:10 18:9 19:6                  20:9                  26:1,8,14,16,18,                  23 27:2,4,13,24                  28:2,3,4,7,8,9,11</p>	<p>,14,18                  29:1,5,8,9,10,14,                  16 34:5,9                  36:10,14,17                  38:23                  39:3,6,11,16,23,                  24                  40:1,7,9,10,12,1                  6                  41:2,6,7,10,11,1                  3 42:4,8,18,24                  43:7,8                  44:8,12,15,17                  45:3 49:2 51:19                  52:3,20,22                  53:9,14                  54:1,4,10 55:15                  58:6,14,18,24                  60:3,5,7,8,9,11,1                  7 61:3,6,11,17                  62:1,6,11,16                  63:2,19 64:7                  65:24 66:2,14                  70:3,17,19,21,24                  71:4,21                  72:7,11,14                  73:8,14,15,16                  74:2,7,13,14,23                  75:5,24                  77:1,5,15 78:19                  80:2,21                  81:1,8,22 83:4                  84:6,7,8                  87:20,21                  88:3,14,20 91:12                  93:18,23                  95:17,18,21                  99:14,21                  100:7,8,23,24                  102:20                  103:3,14,23                  104:7,9                  106:10,14,21                  107:3,12,18,23                  108:16,17,19,24                  109:1,5                  110:3,4,16                  112:16,21</p>	<p><b>lenses</b> 21:1                  26:12,19 27:4,14                  28:19 29:6 38:22                  39:20 41:5 42:2                  43:11,12,16,23,2                  4 44:2,4,6,19,20                  45:1 49:23                  52:15,17 58:20                  59:7,20 60:21,23                  61:9,13,19                  62:1,7,12,13,14,                  17 64:12 70:8                  71:16,21                  72:20,24 74:12                  75:9,21                  76:6,9,10,14                  77:11,16,21                  78:2,12,18 79:10                  83:22 84:2,3,14                  90:23 91:2,17,23                  92:4,15,24                  94:11,20                  96:11,23                  98:19,24                  101:11,13,15,18,                  20,22,24 102:2,5                  103:12,16,24                  104:10,17,19,21,                  23                  105:8,9,11,12,13                  ,17                  106:1,3,4,16,17,                  19 107:11                  108:9,13,15,24                  109:4,9,11,21                  110:3,13                  111:19,20</p> <p><b>less</b> 46:5,14                  47:8,9,14                  84:19,22 88:18</p> <p><b>lesser</b> 91:13                  107:10</p> <p><b>let's</b> 55:2 88:11                  98:3</p> <p><b>level</b> 52:15,18,21</p> <p><b>levels</b> 21:24</p>	<p><b>license</b> 4:5</p> <p><b>light</b> 28:15,20                  29:17,18                  40:11,22 45:2                  77:7 80:9 83:17                  86:13 94:2,4                  97:13 99:6                  100:18</p> <p><b>likely</b> 109:23</p> <p><b>Likewise</b> 80:14</p> <p><b>limitation</b> 74:1                  96:19 108:20</p> <p><b>limitations</b> 31:2</p> <p><b>line</b> 10:5 47:2,5                  65:22,23                  89:6,8,9 95:6                  99:11 118:8</p> <p><b>lines</b> 10:20 66:24</p> <p><b>list</b> 6:23 13:11                  53:2,4</p> <p><b>listed</b> 7:1</p> <p><b>listened</b> 5:23</p> <p><b>lists</b> 10:14</p> <p><b>literally</b> 21:24</p> <p><b>lithographic</b> 15:16                  17:7 81:8</p> <p><b>lithography</b> 5:13                  6:19 8:22 9:19                  13:5,14,16                  14:2,11,16                  15:13,24 16:13                  17:11,16 18:9,13                  19:1,11 20:20                  48:12</p> <p><b>litigation</b> 25:23</p> <p><b>little</b> 31:11 100:4</p> <p><b>located</b> 44:10,12                  80:3,8 83:20                  86:3 88:4 94:12                  107:4</p> <p><b>location</b> 40:1 78:3                  91:5 96:1</p>
---	--	---	--



<p><b>locations</b> 58:7</p> <p><b>logical</b> 70:20 74:15 75:14,16,18,22 76:22</p> <p><b>logically</b> 74:19 78:17</p> <p><b>long</b> 23:10 24:19</p> <hr/> <p style="text-align: center;"><b>M</b></p> <hr/> <p><b>M1</b> 112:17</p> <p><b>M2</b> 112:17</p> <p><b>M3</b> 49:4 60:5 61:5,18 77:22 84:3 112:17</p> <p><b>M4</b> 84:6 112:17</p> <p><b>Ma</b> 46:5,13,15,17 47:8,9 49:9</p> <p><b>macro</b> 49:22</p> <p><b>magnification</b> 54:21 66:2,5</p> <p><b>MAIER</b> 2:3</p> <p><b>main</b> 21:15 24:11 92:14,17 93:8 97:19</p> <p><b>major</b> 86:17</p> <p><b>managed</b> 14:18 23:8</p> <p><b>Mann</b> 34:12,14,17,18,2 2 35:1,6,9,21 36:18,22 39:13 41:2,9,20 42:9,17,24 44:10,15 45:5,14 49:3,14,19 50:13,16 51:2 52:10,11 54:9 56:1 58:10,13 59:19,24 60:18 61:2,3,8 65:3,20 66:8 67:10 71:5,23 74:9 75:6,9,21</p>	<p>77:10,15 78:11 86:19,20 87:1,4,13,14,21 88:5,8,15 96:6 97:3 98:13,18 99:21 100:17 101:10 102:21 103:5 107:4 111:3,9,14 112:4,12,14,20 113:1,10,23</p> <p><b>manner</b> 58:2</p> <p><b>Mann's</b> 57:18 58:17 76:7 86:9</p> <p><b>manually</b> 67:9</p> <p><b>Marc</b> 2:15 119:1</p> <p><b>Marina</b> 1:17 2:16 116:8 119:2</p> <p><b>mark</b> 8:8</p> <p><b>marked</b> 8:10 38:10</p> <p><b>marketing</b> 21:18 22:2</p> <p><b>Massachusetts</b> 1:18 2:17 116:1,6,8,11 119:3</p> <p><b>Master's</b> 5:6</p> <p><b>match</b> 41:20</p> <p><b>material</b> 51:6</p> <p><b>matter</b> 24:14 79:4 114:6 116:7</p> <p><b>Mattson</b> 2:6 119:23</p> <p><b>maximum</b> 44:16 80:10 87:9</p> <p><b>may</b> 48:15 56:16,22 64:18 75:24 76:2 80:16 95:2</p> <p><b>maybe</b> 37:3 43:20 45:8 85:5,6,20</p>	<p>88:23</p> <p><b>MCCLELLAND</b> 2:3</p> <p><b>mean</b> 26:9 32:13 33:7,9 35:4 46:10 59:1,5,9,12 64:8 65:11 90:17 101:3 108:5</p> <p><b>meaning</b> 26:22 62:4 63:4</p> <p><b>means</b> 26:15 32:14 46:12 59:3 89:23 92:20,23</p> <p><b>meant</b> 31:22 32:20 106:16</p> <p><b>meet</b> 22:24 107:11 108:20 109:2</p> <p><b>mentioned</b> 20:24 72:4</p> <p><b>met</b> 18:21 20:5 23:5</p> <p><b>method</b> 81:5</p> <p><b>microlithography</b> 5:20,22 6:4,9,11,14,17 13:12 19:7 21:2 24:9 25:12 26:6</p> <p><b>middle</b> 46:1</p> <p><b>millimeters</b> 63:15</p> <p><b>mind</b> 98:8</p> <p><b>minimum</b> 80:4</p> <p><b>mirror</b> 46:20 47:11 49:4 60:5 61:5 77:22 84:3,6</p> <p><b>mirrors</b> 58:5,8,23 59:6 102:3 112:17</p> <p><b>mischaracterizati on</b> 41:24 70:15</p> <p><b>missing</b> 47:15</p>	<p><b>mistakes</b> 64:19</p> <p><b>mix</b> 106:9</p> <p><b>modified</b> 38:12</p> <p><b>modify</b> 38:7,10</p> <p><b>moment</b> 27:20 63:8</p> <p><b>morning</b> 4:8,9</p> <p><b>move</b> 101:7</p> <p><b>moving</b> 11:17 94:5</p> <p><b>multi-mirror</b> 57:22</p> <p><b>multiple</b> 26:19</p> <hr/> <p style="text-align: center;"><b>N</b></p> <hr/> <p><b>namely</b> 92:12</p> <p><b>namer</b> 26:21</p> <p><b>nanometer</b> 14:10</p> <p><b>nanometers</b> 7:21,24 10:17,24 11:1</p> <p><b>narrow</b> 92:5</p> <p><b>narrower</b> 91:17</p> <p><b>narrowest</b> 79:24 80:15 84:18</p> <p><b>natural</b> 40:1 43:16,20</p> <p><b>necessarily</b> 91:24 95:3</p> <p><b>negative</b> 40:10 42:13 43:10 45:1 63:14 70:4,8 71:16,17 73:24 74:3,5,12,14 76:16,19 77:6 83:17,22 86:13 89:12 90:23 91:2,12,23 92:14,24 93:9,10,11 94:6,18,21 95:23 96:23 99:5 100:3 101:17,18,20</p>
--	---	--	---

104:5,7,11,14,16 ,20 105:9,10,11,17,2 2 106:3,4,10 109:4,5,9,13,20 110:13 113:10,13 <b>negatives</b> 49:23 <b>negotiations</b> 66:12 <b>neither</b> 116:12 <b>NEUSTADT</b> 2:4 <b>Nikon</b> 1:8 2:3 8:8 22:6,7,9 23:2,5 116:7 118:5 119:5,14 <b>Nixon</b> 22:16 <b>nobody</b> 36:20 <b>node</b> 7:16 8:1 10:6 <b>nor</b> 66:5 116:13,15 <b>normal</b> 71:12 <b>normally</b> 52:15 <b>Notary</b> 4:5 116:5 <b>nothing</b> 114:18 <b>notice</b> 37:5 47:17 <b>noticed</b> 47:21 48:12 <b>numerical</b> 112:9 <b>NW</b> 118:1	71:6,24 77:17 78:4 79:14 80:11,23 81:12 82:10 84:9,20 91:20 92:8 93:21 95:19 97:4 98:14 99:1 102:8 105:20 107:13 110:5 <b>objective</b> 27:24 28:2,8,9,14 29:14 57:23 <b>OBLON</b> 2:3 <b>obtain</b> 72:20 <b>obvious</b> 42:3 43:22,24 51:20 92:11 <b>obviously</b> 41:13 74:17 104:4 <b>off-access</b> 82:7 <b>Office</b> 1:1 33:20 <b>offices</b> 116:8 <b>Off-the-record</b> 8:15 <b>oftentimes</b> 52:17,23 66:13 <b>oh</b> 40:23 50:18 <b>okay</b> 4:24 10:12 15:3 18:7,15 19:23 20:1,17,22 21:11 25:9,21 29:3 31:9 33:17,24 35:19,24 39:17 40:23 45:18 48:19,24 50:21 51:14 53:7,12 55:24 59:22,23 60:22 63:5,11 65:18 69:6 72:18 79:1 80:20 83:5,7 85:12 89:1 95:4 96:5 97:21 102:16	109:11 110:17 111:6 114:4 <b>Omura</b> 18:17,18,21 19:5,19 23:9 25:24 <b>Omura's</b> 18:24 19:10 <b>on-the-job</b> 5:15,18 <b>onto</b> 40:14,22 77:9 78:15 <b>operate</b> 102:6 <b>operation</b> 26:13 <b>operative</b> 31:5 <b>opinion</b> 75:3 79:11 82:19 83:1,19 96:10 97:1 103:21 <b>opposed</b> 62:16 66:9 <b>optical</b> 15:7,12,16 16:12 17:15 18:8,12 19:6,10 20:9,19 21:1,9,16 22:5 23:11,16,18 24:7,8,16,24 25:3,11 26:5 39:22 40:2 46:3,19 47:6,10 58:1 60:10 75:14,23 76:23 80:3 82:8 83:21 84:18 89:10,13 91:19 92:6,7 93:20 94:13,24 95:9,13,17 96:21 101:5 102:7 107:20 <b>optically</b> 60:4,8,11,12 61:5,18 112:15 <b>opticals</b> 24:15	<b>optics</b> 5:10 6:13,21 <b>optimize</b> 52:22 <b>ORA</b> 22:4 <b>order</b> 112:7 116:10 <b>ordinary</b> 21:13 26:9,16 52:14 59:11,13 61:23 62:4,24 75:4,7,13,19 76:5 79:12 90:17 92:3 103:22 104:2 <b>original</b> 38:9 57:10 119:9,13 <b>others</b> 36:6 <b>otherwise</b> 116:15 <b>outcome</b> 116:16 <b>output</b> 53:2 <b>outward</b> 100:21 <b>overall</b> 26:13 28:11 70:19 71:17 73:21,23 74:5 92:13 94:8 96:2 103:9 110:16 113:13 <b>overseeing</b> 24:15 <b>Owner</b> 1:9
<hr/> <b>O</b> <hr/>			<hr/> <b>P</b> <hr/>
<b>object</b> 27:20 40:11,14 44:23,24 76:20 77:7,8 83:18 94:1,5 95:22 96:1 <b>Objection</b> 7:11 9:11 11:8,19 12:5,24 13:21 14:5 27:16 41:23 42:10,19 47:24 62:19 70:14			<b>P.C</b> 2:13 119:2 <b>page</b> 3:2,8 9:15 47:2 50:17,20 111:2 118:8 119:10,14 <b>pages</b> 117:4 <b>pair</b> 27:24 28:14 29:5,6,16 <b>paper</b> 81:16 87:18,24 <b>papers</b> 5:23

<p><b>paragraph</b> 14:24                      15:1,6 29:23                      31:16,24 32:13                      33:8 34:2,4,6                      35:22 48:17,21                      49:1 50:19                      58:9,14,19 59:23                      60:16,19 61:15                      63:6,12 90:20                      92:21 95:6,7                      99:9,13</p> <p><b>parallel</b> 100:23</p> <p><b>Park</b> 1:17 2:16                      116:8 119:2</p> <p><b>Partes</b> 4:15 45:7                      63:22 64:16                      67:15</p> <p><b>partially</b> 72:16</p> <p><b>particular</b> 19:14                      35:10 38:23                      59:21 71:13 81:7</p> <p><b>particularly</b> 16:13                      61:14</p> <p><b>parties</b> 116:13,15</p> <p><b>pass</b> 114:19</p> <p><b>passing</b> 40:18 80:9</p> <p><b>past</b> 11:17</p> <p><b>patent</b> 1:1,2,7,9                      4:18 13:6                      19:13,16,20,22                      21:7 25:24                      32:7,17                      33:1,4,19 34:9                      35:12,16                      41:4,18,22                      42:5,7 45:20                      46:22 59:18                      78:7,22,24 79:13                      82:18 83:6,10                      86:8 87:4                      89:3,4,5 93:19                      96:13,16                      98:12,13,19                      99:10</p>	<p><b>patents</b> 16:16                      19:2,12,18                      26:1,4 43:14</p> <p><b>path</b> 96:21</p> <p><b>paths</b> 79:9,22</p> <p><b>pause</b> 27:19</p> <p><b>peak</b> 80:14</p> <p><b>people</b> 20:23 26:24</p> <p><b>Per</b> 12:12</p> <p><b>percent</b> 23:24                      24:5,10 25:13</p> <p><b>percentage</b>                      23:17,21 24:2,6                      25:10 30:7,21                      31:16</p> <p><b>perform</b> 48:7                      56:23 57:7,11                      66:22 68:4,8                      78:13 99:22                      107:24</p> <p><b>performed</b> 69:19                      72:19 89:16                      90:19 92:21                      108:2</p> <p><b>performing</b> 69:22                      78:18</p> <p><b>perhaps</b> 87:3                      88:17</p> <p><b>perpendicular</b>                      79:24</p> <p><b>person</b> 26:9,16                      52:14 61:23                      62:24                      75:4,7,12,19                      76:5 79:11 81:3                      90:17 92:3 104:1</p> <p><b>personal</b> 67:23,24</p> <p><b>personally</b> 14:15                      15:22 16:2,23                      17:22 18:20,21                      65:18 68:11</p> <p><b>persons</b> 21:12,13</p>	<p><b>Petitioner</b> 1:6</p> <p><b>Petzval</b> 89:18                      90:14,22                      91:3,8,15,24                      92:18 93:1,8,15                      97:17 99:18                      100:4,9 103:7,18                      105:5,9,10                      106:5,9,17</p> <p><b>Petzval's</b>                      89:15,18,24                      90:19 93:2                      106:15</p> <p><b>Ph.D</b> 2:15 119:1</p> <p><b>phase</b> 13:20,24</p> <p><b>photolithography</b>                      14:19 46:7</p> <p><b>physical</b> 78:2</p> <p><b>physically</b> 60:4,12                      61:4,17 77:21,22</p> <p><b>physics</b> 5:4,7,9</p> <p><b>picked</b> 5:14</p> <p><b>pitch</b> 7:20,23,24                      10:17,23,24                      11:1,6,7,12                      12:22</p> <p><b>pitches</b> 10:10</p> <p><b>placing</b>                      91:11,17,22 92:4</p> <p><b>plan</b> 12:2</p> <p><b>plane</b> 90:2 96:3</p> <p><b>play</b> 28:17 56:9</p> <p><b>please</b> 5:1,12 9:15                      15:4 27:21 31:24                      40:4 44:18 45:24                      47:1,4 48:20                      50:15,23 51:1                      52:2 53:24 54:3                      57:17,19 59:24                      63:9 73:11                      83:5,8 86:6                      89:7,23 90:16                      96:10,15,18</p>	<p>98:22 100:15                      102:23 109:8                      110:24                      119:8,12,16</p> <p><b>plural</b> 23:6</p> <p><b>plurality</b>                      58:5,23,24                      59:6,7</p> <p><b>Plus</b> 51:22</p> <p><b>PM</b> 115:4</p> <p><b>point</b> 40:12                      44:11,23,24                      53:10 56:5,7                      77:7,8 83:18                      94:1,4,5,17                      97:24 104:2,6                      108:8 109:19                      114:22</p> <p><b>points</b> 80:18</p> <p><b>portion</b> 30:7 43:6                      44:14 60:16                      65:14 81:22                      83:17 86:4 91:18                      93:3 94:12,21,22</p> <p><b>portions</b> 28:11</p> <p><b>position</b> 30:12,17</p> <p><b>positioned</b> 84:15</p> <p><b>positive</b> 40:13                      42:14 43:12 70:4                      73:22 74:3 76:21                      77:9 86:14 93:24                      99:6                      104:6,8,10,13,15                      105:8,12,13,24                      106:1,4,5,10                      108:18                      109:9,12,13,20                      110:2                      111:15,20,21                      114:7</p> <p><b>positives</b> 49:24</p> <p><b>possibility</b> 76:3</p> <p><b>possible</b> 57:1</p>
---	--	--	--

<p><b>potential</b> 9:20 23:23</p> <p><b>power</b> 89:12 93:9,10,11 94:7,18,21 95:23 96:24 100:3 101:18,21 105:7 111:15,21 113:11,13 114:7</p> <p><b>powerful</b> 104:7</p> <p><b>PowerPoint</b> 37:20</p> <p><b>powers</b> 92:24</p> <p><b>predetermined</b> 58:7 71:11</p> <p><b>predominantly</b> 43:12</p> <p><b>prefer</b> 82:8</p> <p><b>preparation</b> 45:6,9,14 67:21</p> <p><b>prepared</b> 47:18 65:11,15 66:8 67:2,5</p> <p><b>preparing</b> 45:15</p> <p><b>prescribed</b> 116:10</p> <p><b>prescription</b> 49:2 51:19 55:4 64:23 65:2,6 109:15,22</p> <p><b>prescriptions</b> 66:14 67:7</p> <p><b>present</b> 11:18 24:22 39:13 82:20,23</p> <p><b>pretty</b> 88:9</p> <p><b>previous</b> 33:10</p> <p><b>primarily</b> 25:4 76:17 87:22</p> <p><b>primary</b> 66:15</p> <p><b>printouts</b> 69:7,11</p> <p><b>prior</b> 12:12 19:21 25:22,23 35:12,15 65:20</p>	<p>70:9</p> <p><b>probably</b> 13:23 17:6 23:24 26:21 38:1 57:12 63:20 69:3,4 82:4 85:20 104:14</p> <p><b>problem</b> 105:1,2</p> <p><b>Procedure</b> 30:14 31:5</p> <p><b>proceeding</b> 19:23,24 31:6 43:15 81:18</p> <p><b>proceedings</b> 116:12</p> <p><b>process</b> 43:3</p> <p><b>produced</b> 116:11</p> <p><b>production</b> 4:4</p> <p><b>products</b> 24:17,18</p> <p><b>profession</b> 6:12,13,14</p> <p><b>Professional</b> 116:5,21 119:21</p> <p><b>program</b> 53:2 65:16</p> <p><b>projected</b> 93:4</p> <p><b>projection</b> 12:14 14:16,19 21:1 26:5 40:18 42:8,24 43:7 44:14 46:3 47:6 57:22 80:3,9 81:22 87:21 89:10,13 91:19 92:5,7 93:20 94:23 95:9,13,17 101:5 102:7 106:20</p> <p><b>projections</b> 42:18</p> <p><b>proof</b> 31:20</p> <p><b>proper</b> 66:2</p> <p><b>properly</b> 66:6</p>	<p><b>proportional</b> 90:8</p> <p><b>propounded</b> 81:2 82:13</p> <p><b>prosecution</b> 32:6 33:7,14,22</p> <p><b>protects</b> 30:14</p> <p><b>provided</b> 116:9</p> <p><b>provides</b> 32:8</p> <p><b>Public</b> 4:5 116:5</p> <p><b>publication</b> 9:1,4,8 20:14</p> <p><b>publications</b> 6:16,20 16:6 17:3,9 18:1,2,4,5,24 20:12</p> <p><b>published</b> 9:4</p> <p><b>purely</b> 109:18</p> <p><b>purpose</b> 35:6 40:8</p> <p><b>purposes</b> 57:7 88:12 100:11</p> <p><b>putting</b> 83:22 91:2 92:14 94:18</p> <hr/> <p style="text-align: center;"><b>Q</b></p> <hr/> <p><b>quality</b> 90:2</p> <p><b>quarter</b> 88:23</p> <p><b>question</b> 11:3 13:7,8 30:24 31:1,13 53:6 70:5 73:10 81:15</p> <p><b>questions</b> 4:22 6:5 16:19 17:18 18:16 23:1 30:15 110:18 113:3 115:3 119:16</p> <hr/> <p style="text-align: center;"><b>R</b></p> <hr/> <p><b>radiant</b> 51:22</p> <p><b>radii</b> 52:23</p> <p><b>radius</b> 51:4,22</p>	<p>90:9</p> <p><b>ran</b> 112:8</p> <p><b>range</b> 9:24 10:9 85:19 88:18,24</p> <p><b>ratio</b> 46:1,6 85:1,6,15 88:13,19</p> <p><b>ray</b> 79:9,22 104:12 109:18 111:14 112:3</p> <p><b>rays</b> 79:23 100:19 101:2 111:23,24</p> <p><b>Raytheon</b> 24:12,17,20 25:1,11</p> <p><b>RE</b> 119:5</p> <p><b>reaches</b> 80:4,10 84:18</p> <p><b>readily</b> 89:16 90:19 91:3 92:20</p> <p><b>reading</b> 12:17</p> <p><b>reads</b> 95:8</p> <p><b>ready</b> 48:22 63:9 99:10</p> <p><b>really</b> 5:20</p> <p><b>reason</b> 26:20 29:1 52:20 66:15 77:23 88:7 93:7 101:16 111:22</p> <p><b>reasonable</b> 12:1 32:5 76:4</p> <p><b>reasoning</b> 98:23</p> <p><b>reasons</b> 75:14 101:12 110:9,11 111:18</p> <p><b>recall</b> 22:14 37:1,4 66:7 69:10 71:1 74:1 99:9 109:24</p> <p><b>recap</b> 76:13</p> <p><b>received</b> 74:21 75:2</p>
--	---	--	--

<p><b>Recess</b> 57:15 98:5  <b>recited</b> 96:12  <b>recognize</b> 34:14              36:1 51:11  <b>recollection</b> 14:24              48:21 63:8  <b>recoluminate</b>              29:17  <b>reconverge</b> 79:9  <b>record</b> 15:4 33:21              79:3,21 89:22              116:12  <b>RECROSS-          EXAMINATIO          N</b> 114:20  <b>REDIRECT</b>              110:22  <b>reduce</b> 91:18              92:12 101:4              102:6 105:18              106:20 111:23  <b>reduced</b> 11:6              12:23 95:18  <b>reduces</b> 100:17  <b>reducing</b> 102:19              103:2  <b>reduction</b> 14:16              57:23 103:7  <b>refer</b> 44:22 95:5              96:6  <b>reference</b> 6:24              35:21 95:12              111:3  <b>referring</b> 39:12              55:2 57:21 58:10              60:18,20,22              61:16,18,20,21              86:19 101:9              103:19  <b>refers</b> 46:3 61:9,11              101:17  <b>reflecting</b> 46:20</p>	<p>47:10  <b>refocus</b> 40:21  <b>refocused</b> 77:8  <b>refracting</b> 89:12  <b>refraction</b> 90:10  <b>refractive</b> 51:5              96:24 111:15              113:11 114:7  <b>refresh</b> 14:24              48:20 63:8  <b>regard</b> 16:20  <b>regarding</b> 119:11  <b>regards</b> 17:18  <b>region</b> 79:8,22              80:17 90:24              91:12  <b>regions</b> 93:11  <b>Registered</b>              116:4,21 119:21  <b>re-image</b> 78:14  <b>re-images</b> 40:13  <b>rejection</b> 8:5  <b>related</b> 8:4 16:13              21:8,9 26:1,5              116:13  <b>relative</b> 58:8              116:14  <b>relatively</b> 28:10              39:18,23 91:1,5              92:11 93:3 94:12  <b>relaying</b> 95:22  <b>remaining</b> 94:24  <b>remember</b> 23:4              47:20  <b>remind</b> 113:4  <b>repeat</b> 73:10              102:22  <b>rephrase</b> 31:12  <b>report</b> 29:22              30:4,21 35:22,23</p>	<p>63:7,13 74:10  <b>Reporter</b> 73:12              102:24 116:5,21              119:21  <b>Reporting</b> 118:1  <b>request</b> 98:1  <b>required</b> 74:11  <b>requires</b> 74:2,4  <b>reran</b> 73:2  <b>Research</b> 15:8,17              21:16 22:5              23:11,16,18 24:7  <b>resolution</b> 7:17 8:4              11:17 12:3,13  <b>respective</b> 73:6              85:14  <b>respectively</b> 69:1  <b>responsibilities</b>              21:16 23:16              24:12  <b>responsible</b>              119:10  <b>result</b> 71:11 72:21  <b>results</b>              69:14,16,19,23              72:14  <b>retained</b> 3:14  <b>reticle</b> 112:1  <b>return</b> 89:2  <b>review</b> 4:16 34:18              45:7 59:18 63:23              64:17 65:18              67:15  <b>reviewed</b> 98:10  <b>reviewing</b> 15:2              48:23 63:10  <b>Richard</b> 1:13 3:3              4:2 116:7              117:3,12 118:6              119:9  <b>Richardson</b> 1:17</p>	<p>2:13 6:1 16:17              30:5,8 34:23              35:18 36:8,15              37:12,22 38:3,15              56:14 65:8,10              66:12 67:2 68:4              69:17 75:1 116:8              119:2  <b>rmattson@oblon.          com</b> 2:11  <b>Roadmap</b> 3:9 7:9              8:10,20  <b>Robert</b> 2:6 119:23  <b>role</b> 28:17  <b>roughly</b> 13:12              44:9 68:24              85:11,22  <b>row</b> 10:11  <b>RPR</b> 1:21  <b>Rule</b> 31:4  <b>Rules</b> 30:13 31:5  <b>run</b> 64:10 67:20              71:3 112:6  <b>running</b> 65:21  <hr/> <p style="text-align: center;"><b>S</b></p> <hr/> <b>sales</b> 23:19  <b>Sandra</b> 1:21              116:4,21 119:20  <b>satisfactorily</b> 4:3  <b>satisfactory</b> 116:9  <b>satisfies</b> 47:7  <b>satisfy</b> 90:14  <b>satisfying</b> 46:4              89:15,17 90:18  <b>savings</b> 66:16  <b>scale</b> 85:1              88:8,10,12  <b>scanner</b> 27:9  <b>scanning</b> 27:12</p>
--	--	---	--

<b>schematic</b> 58:1	<b>sensors</b> 25:6,8,9	12:18,20 16:15	<b>skill</b> 21:13 26:9,16
<b>scope</b> 32:3 81:17	<b>sentence</b> 15:5,15	19:12 36:10 42:9	52:14 59:11,13
<b>scratch</b> 12:19 27:1	58:22 60:18	47:13 48:8	61:24 62:4,24
29:20 52:7 67:19	61:15 89:8	51:2,16 52:8	75:4,7,13,19
75:6,17 103:20	<b>separate</b> 10:19	53:14 54:9 65:3	76:5 79:12 90:17
<b>second</b> 14:23	29:13 40:1	67:10 71:4,22	92:3 103:22
38:17,21 41:14	43:4,5 59:3	74:9 75:6,9,10	104:2
46:20 47:11	64:5,8,11	76:6 79:12	<b>slight</b> 39:10 87:6
57:23 74:14,18	<b>separated</b> 28:10	82:19,24 84:1	<b>slightly</b> 38:17 62:7
96:21,22	41:7,20 84:2	85:2 86:7 88:15	<b>small</b> 79:17
112:12,13,15,20	<b>separating</b> 36:10	93:18 102:20	91:1,6,9
113:20 114:15	39:24	103:4 111:13	<b>smaller</b> 90:24
<b>secondary</b> 107:7,8	<b>separation</b> 36:14	112:4	91:13
<b>section</b> 29:23	39:11 42:8	<b>shows</b> 49:13,17,22	<b>smallest</b> 44:11
30:3,8 85:17	<b>sequence</b> 49:13,18	50:11 51:3 53:16	<b>SMT</b> 1:5 2:12
<b>sections</b> 85:15	50:12 53:14,21	<b>sic</b> 81:4	116:7 118:5
<b>seen</b> 19:3 51:19	54:5,14 55:19	<b>sides</b> 90:11	119:5
<b>select</b> 73:9 74:8	56:13,19 63:24	<b>sign</b> 47:14	<b>software</b> 23:19,22
86:24	64:20,21 65:6	<b>signature</b> 118:24	24:4 68:12,15,22
<b>selected</b> 72:6	<b>sequences</b> 67:4	119:10,11,13	<b>Solutions</b> 9:20
98:23 99:3	<b>serve</b> 78:14	<b>signed</b> 117:8	<b>solve</b> 106:8
102:19 103:3	<b>serving</b> 104:21	119:13	<b>solving</b> 90:5
110:3,8	<b>sets</b> 9:8	<b>significant</b> 52:9	<b>somebody</b> 37:11
<b>selection</b> 40:15	<b>seven</b> 53:11	53:1,3,5 54:22	65:11,15 67:5,9
73:17 76:2,14,24	<b>several</b> 15:20	93:12	<b>somewhere</b> 38:1
86:9	22:7,17 45:16	<b>similar</b> 19:15 27:5	87:2
<b>Sematech</b>	82:3 101:12	37:18 43:9,15	<b>sorry</b> 12:19 34:6
25:15,17	110:9 111:18	51:23 56:16 62:2	43:19 49:9 56:3
<b>S-e-m-a-t-e-c-h</b>	<b>Shafer</b> 17:19,20	63:3,4 65:24	74:13 107:8
25:15	18:8	100:5	<b>sort</b> 43:23 56:15
<b>semiconductor</b> 9:9	<b>Shafer's</b> 18:1,12	<b>similarities</b>	76:13
12:2	18:8	86:7,16	<b>sounds</b> 25:19
<b>Semiconductors</b>	<b>sharp</b> 100:21	<b>similarity</b> 86:18	51:22
3:10 7:10	<b>sheet</b> 117:8 119:13	<b>simply</b> 26:18	<b>space</b>
8:10,20	<b>shortening</b> 94:8	112:3	39:13,15,19,24
<b>semi-diameter</b>	103:9	<b>simulation</b> 64:11	<b>spaces</b> 84:3,6,8
51:6	<b>showed</b> 36:21	65:21 72:14 73:2	<b>spacing</b> 10:19
<b>seminars</b> 15:9	75:15	112:7,8	<b>spacings</b> 55:3
21:22 22:3	<b>showing</b> 10:23	<b>simulations</b> 67:21	<b>speak</b> 69:14
<b>senior</b> 24:13	11:16	71:3	<b>specific</b> 26:12 27:7
<b>sense</b> 42:13 78:17	<b>shown</b> 9:17	<b>simultaneously</b>	66:23 70:11
106:13	10:1,10,11,22	50:16	
		<b>single</b> 26:20	

<p>107:19 110:15  <b>specifically</b> 6:9,18                  24:8 60:9 99:23  <b>specification</b>                  32:6,8,12,16,19,                  24 33:4 46:23                  48:14 59:20                  87:13  <b>specifies</b> 90:13  <b>specifying</b> 58:14  <b>spending</b> 66:21  <b>spent</b> 45:5,13  <b>SPIVAK</b> 2:3  <b>SS</b> 116:2  <b>standard</b> 46:6,9                  52:13 90:21  <b>standards</b> 29:24                  98:9  <b>stands</b> 7:6,8  <b>start</b> 4:22 22:22                  40:20  <b>started</b> 24:21  <b>starts</b> 10:2,12  <b>state</b> 5:4 63:13  <b>stated</b> 29:2 78:17  <b>statement</b> 61:2  <b>STATES</b> 1:1  <b>steadily</b> 11:13  <b>steeper</b> 94:2  <b>stepping</b> 50:24  <b>stop</b> 76:10,11                  85:24 86:3  <b>stopping</b> 56:5,7                  97:24  <b>Street</b> 2:7  <b>stress</b> 78:8  <b>studied</b> 19:15,19                  102:13  <b>studies</b> 5:9</p>	<p><b>studying</b> 45:5,14  <b>subfunction</b>                  107:19  <b>subject</b> 24:14  <b>submitted</b> 7:2                  37:21,22                  38:6,9,13,16                  56:12 57:5 63:24                  64:19 65:7,10  <b>Subsequent</b> 22:23  <b>subset</b> 18:1  <b>subsets</b> 71:4,20  <b>subsidiary</b> 22:12  <b>Suffice</b> 81:21  <b>SUFFOLK</b> 116:2  <b>suggest</b> 108:11  <b>suggested</b> 36:20  <b>sum</b> 90:1,6,7,8,23                  91:15 92:18 93:1                  97:17 103:18                  105:6,9,10                  106:6,9,11,17  <b>summer</b> 37:3  <b>supplied</b> 66:13  <b>suppliers</b> 15:8  <b>support</b> 15:10                  21:19,20 22:2                  24:3  <b>sure</b> 11:4 30:11,20                  31:23 35:3 64:4  <b>surface</b> 46:20                  47:11 51:3,7                  90:3,11 96:22  <b>surfaces</b> 90:7                  105:5  <b>surprise</b> 9:3,6,7  <b>sworn</b> 4:5  <b>system</b> 8:5 27:12                  28:12 39:20                  40:2,18 46:4                  47:7 51:7</p>	<p>58:1,2,4,22 60:2                  80:4,10,22 82:7                  89:11,13                  91:10,19                  92:1,6,7                  93:4,10,18,20                  94:14,24                  95:9,14,17                  100:17 101:5,24                  102:7,19                  103:2,15 106:14                  107:20 110:16  <b>systems</b>                  15:12,13,16                  25:5,12 26:1,5                  43:8  <hr/>                 T  <hr/> <b>Tabarelli</b>                  20:3,6,9,13 21:3  <b>Tabarelli's</b> 20:19                  21:6  <b>table</b> 49:2,3,14,19                  50:13,16,19                  51:2,3 52:3,11                  53:9,10,23                  54:1,9                  65:3,7,15,20,23                  66:8 67:2,10                  109:22  <b>tables</b> 109:15  <b>taking</b> 85:21                  105:18  <b>talks</b> 5:24 17:4  <b>task</b> 19:3  <b>taught</b> 77:10  <b>teaches</b> 61:3  <b>teaching</b> 77:14                  78:11  <b>technical</b> 21:19                  22:2,24 24:16  <b>techniques</b> 5:21                  83:23 90:21</p>	<p><b>technologies</b>                  13:5,11,18  <b>technology</b> 3:9                  5:13 7:9,16                  8:1,9,20 10:6                  13:8,14,15                  14:4,11 15:10  <b>telephonically</b>                  21:21  <b>telescope</b> 27:8,10  <b>tend</b> 26:22 29:12                  43:8 79:23  <b>tends</b> 43:10  <b>term</b> 7:19 32:9,15                  33:12  <b>terms</b> 32:4 105:4,5  <b>testified</b> 4:6  <b>testimony</b> 117:4,6  <b>Thank</b> 10:4 60:15                  85:12 89:1                  114:4,17 115:2                  119:17  <b>that's</b> 11:21 14:22                  32:22 35:22                  45:9,20 48:18                  49:11 50:3 51:10                  52:10 60:14                  65:17 69:8                  72:2,12 73:4                  78:6 81:17                  85:19,21 86:17                  89:3 92:13 98:21                  100:11 102:10                  106:7,12,18                  107:5 108:22  <b>therefore</b> 105:11  <b>there's</b> 6:5 29:23  <b>thereto</b> 116:15  <b>they're</b> 107:23  <b>thickness</b> 51:4,23                  52:3 54:1,4,9                  112:21                  113:15,19</p>
---	--	--	---

114:10,14 <b>thicknesses</b> 52:24 <b>third</b> 34:5 38:24 39:4,7,9 40:6,9 46:19 47:10 73:9 74:2,7,8,23 76:15 77:1 83:9,12,20 85:23 86:7,9,12 89:11 90:13 93:18 94:7,11,19 95:13,18,24 96:12,19,20 97:3,9,10,11 98:11,13,18,24 99:14,22 100:8,16 101:11 102:20 103:3,23 107:3,23 108:18,20 109:1,3 110:4,8 112:24 113:5,6,9 118:2  <b>Thursday</b> 1:15 116:8 <b>title</b> 8:17 9:17 <b>titles</b> 51:16 <b>today</b> 4:10 114:23 <b>Tool</b> 9:20 <b>top</b> 9:22 10:1 50:20 <b>topic</b> 22:14 <b>topics</b> 17:7 <b>total</b> 89:12 95:8,17 <b>totally</b> 102:13 <b>touched</b> 17:6 79:2 <b>tracing</b> 111:14 112:3 <b>Trademark</b> 1:1 33:20 <b>training</b> 5:15,18 <b>transcribed</b> 116:9	<b>transcript</b> 116:11 <b>transcription</b> 117:6 <b>TRIAL</b> 1:2 <b>tried</b> 71:3 <b>true</b> 71:19 116:12 117:5 <b>try</b> 55:14 <b>trying</b> 71:9 <b>turn</b> 9:15 29:19 34:12 48:16 56:1 59:23 78:21,23 83:5 96:15 110:24 <b>type</b> 25:3,5,7 30:18 81:8 <b>typed</b> 37:6 <b>types</b> 30:14 <b>typically</b> 53:1  <hr/> <b>U</b> <hr/> <b>U.S</b> 4:18 22:11 33:1,4,19 <b>U.S.A</b> 2:8 <b>Ulrich</b> 15:24 <b>Ulrich's</b> 16:11 <b>understand</b> 11:15 30:12,24 31:21 32:2 33:6,9 39:2 41:19 59:11 61:24 63:1 83:9 92:4 <b>understanding</b> 7:22 10:16,21 11:4 49:12 62:9,23 76:1 78:10 87:12 <b>understood</b> 75:5,8,20 103:23 <b>unfortunate</b> 50:3 <b>unit</b> 26:8,23	27:3,4,9,10,11,1 2,13 28:3,5,7,14,18 29:1,8,9,11,14,1 6 34:5 39:1,4,7,9 40:7,9,10,16 41:14,15 54:10 63:2 71:14,21 73:9 74:2,8,9,23 76:15 77:1 78:19 83:9,12,20 85:23 86:7,9,12 89:11 90:13 91:2 93:18,23 94:11 95:13,18 96:12,19,20,21 97:3,9,10,11 98:13,18,24 99:14,22 100:8,16 101:11,14,15 102:20 103:4,23 107:3,12,18,23 108:16,17,19,20 109:1,3 110:4,8 111:7,9,12,15 112:12,14,15,20 113:1,5,6,10,16, 20,23 114:1,6,11,15 <b>UNITED</b> 1:1 <b>units</b> 34:9 36:10,14,17,22 38:14,16,18,20 39:24 40:9 41:3,10,11,13,16 ,17,20,21 42:18 43:1,4,5 64:7 75:5,15 76:1 77:1 84:8 108:24 110:3 <b>University</b> 5:7 <b>unnatural</b> 42:17 <b>upon</b> 5:20 42:3 47:16 55:9 64:2,22 65:2,5 72:16 79:2 83:11	91:8,11 <b>useful</b> 81:5 <b>usually</b> 26:11 66:13  <hr/> <b>V</b> <hr/> <b>value</b> 46:14 53:8,13 105:15,19 112:9 <b>values</b> 52:6,8 <b>variable</b> 46:15,16,17 <b>various</b> 22:1 24:16 34:9 36:10,17,22 43:14 51:16 71:4 112:19 <b>verified</b> 66:1 <b>verify</b> 31:21 <b>version</b> 38:10 57:6 68:14 <b>versions</b> 68:16,18,22 69:1 <b>vicinity</b> 85:4 87:2 <b>view</b> 30:19 31:2 <b>viewpoint</b> 102:14 <b>Virginia</b> 2:8 <b>virtual</b> 40:11,14 44:23,24 76:20 77:7 83:18 94:1 95:22 96:1 <b>visited</b> 22:7,11,15,17,18 23:5,8 <b>visiting</b> 22:1 <b>visits</b> 22:23 <b>vs</b> 116:7  <hr/> <b>W</b> <hr/> <b>wafer</b> 40:14,22 44:23 46:21 49:5 60:13 77:9 78:15
---	--	--	---



<p>101:8  <b>waist</b> 43:9,23                  44:3,9 79:5,20                  80:3,14,16                  82:20,21                  83:16,20                  84:15,17                  85:2,11,14                  86:21,24 87:20                  88:4,6 91:23  <b>waists</b> 83:23  <b>Warner</b> 20:2,5,8  <b>Washington</b> 118:2  <b>wavefront</b> 54:22  <b>ways</b> 75:20                  76:4,11  <b>Wefers</b> 2:15 119:1  <b>wefers@fr.com</b>                  2:20  <b>we've</b> 97:22  <b>whatever</b> 26:20  <b>whether</b> 15:21                  35:11,15 38:22                  41:6 46:8 53:4                  67:8 101:22                  102:5 103:12                  104:17                  106:19,22,23  <b>whom</b> 21:4  <b>wider</b> 93:3 94:12  <b>width</b> 91:5,18                  94:16  <b>Willi</b> 15:23  <b>Williamson</b>                  16:20,21,24                  17:10  <b>Williamson's</b>                  17:3,15  <b>witness</b> 4:13 7:13                  9:13 11:10,21                  12:7 13:2,23                  14:7 15:2 27:18</p>	<p>42:1,12,21                  48:2,23 56:10                  62:21 63:10                  70:16 71:8 72:2                  77:19 78:6 79:16                  80:13 81:1,14                  82:12 84:11,22                  91:22 92:10                  93:23 95:21 97:6                  98:16 99:3                  102:9,22 103:6                  105:22 107:17                  110:7,19 114:19                  116:9 119:11  <b>WITNESSES</b> 3:2  <b>wording</b> 62:2                  74:11  <b>work</b> 5:24 15:22                  21:6,8 23:11                  68:7 114:5  <b>worked</b> 6:3,7,8                  15:7 24:19  <b>working</b> 16:16  <b>works</b> 16:6,8  <b>world</b> 15:9 22:1  <b>write</b> 30:3  <b>writing</b> 30:6  <b>written</b> 30:8,22  <b>wrote</b> 49:22  <hr/>                 Y  <hr/> <b>Yashuhiro</b> 18:17  <b>yesterday</b> 79:3                  89:22  <b>yesterday's</b> 45:22  <b>Yours</b> 119:19  <hr/>                 Z  <hr/> <b>ZEIS</b> 1:5  <b>Zeiss</b> 2:12 4:13                  8:14 67:5,6                  116:7 118:5</p>	<p>119:5  <b>Zern</b> 3:4  <b>zero</b> 23:20 24:10                  25:13 90:1,23                  93:1 103:18                  106:11  <b>zeros</b> 53:11</p>	
---	--	--	--

