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Transcript of Eli Saber, Ph.D.

Date: August 8, 2024

Case: Medit Corporation -v- 3Shape A/S (PTAB)

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1 UNITED STATES PATENT AND TRADEMARK OFFICE

2
3 BEFORE THE PATENT TRIAL AND APPEAL BOARD

4
5 MEDIT CORPORATION,

6 Petitioners,

7 vs.

8 3SHAPE A/S,

9 Patent Owner.

10
11 Case: IPR2023-01315

12 U.S. Patent No. 10,695,151

13
14 DEPOSITION OF ELI SABER, PH.D.

15 via videoconference

16 Thursday, August 8, 2024

17 9:58 a.m.

18
19 Job No.: 548398

20 Pages: 1 - 220

21 Stenographically Reported By:

22 Alison C. Webster, CSR-6266, RPR, RMR, CRR, RDR

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3 Deposition of ELI SABER, PH.D., produced as a
4 witness at the instance of the Petitioner, and duly sworn,
5 was taken in the above-styled and numbered cause on
6 Thursday, August 8, 2024, from 9:58 a.m. to 3:58 p.m.
7 Eastern Time, before Alison C. Webster, RPR, CRR, RMR, RDR,
8 CSR-6266 (Michigan); License No. 14559 (California); License
9 No. 084.004953 (Illinois); License No. 23001848
10 (Washington); CSR-12432 (Texas), reported by stenographic
11 method, via videoconference, pursuant to the Federal Rules
12 of Civil Procedure and the provisions stated on the record
13 or attached hereto.
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A P P E A R A N C E S

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ALSO PRESENT:

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1 DEPOSITION OF ELI SABER, PH.D.

2 Thursday, August 8, 2024

3
4 STENOGRAPHER: The attorneys participating
5 in this deposition and the witness have verified that
6 he is Eli Saber, Ph.D. In lieu of an oath
7 administered in person, the witness will visually
8 affirm his testimony in this matter is under penalty
9 of perjury.

10 The parties and their counsel consent to
11 this arrangement and waive any objections to this
12 manner of reporting or admissibility of the
13 transcript.

14 Would counsel please state their appearance
15 and any objections to proceeding in this manner,
16 starting with scheduling counsel.

17 MR. DANLEY: I think technically that would
18 be you, scheduling.

19 MS. MARKOWSKI: Sorry, yes.

20 No objections to the instructions you just
21 provided.

22 MR. DANLEY: And this is Jeff Danley for

1 petitioner, Medit. No objections to the instructions.

2 STENOGRAPHER: Thank you.

3 Dr. Saber, would you please raise your
4 right hand.

5 Do you swear or affirm the testimony you
6 are about to give in this matter will be the truth,
7 the whole truth, and nothing but the truth?

8 DR. SABER: I do.

9 STENOGRAPHER: Thank you.

10 You may proceed.

11 MR. DANLEY: Good morning, Dr. Saber.

12 THE WITNESS: Good morning.

13 MR. DANLEY: How are you doing today?

14 THE WITNESS: I am doing very well.

15 MR. DANLEY: Glad to hear that. So I
16 understand that you have a hard stop at 5:30 p.m.
17 Eastern Time today; is that right?

18 THE WITNESS: That is correct. I have a
19 class at that time. I would prefer the stop to be
20 earlier than that so this way I can prepare for my
21 class.

22 MR. DANLEY: Okay. I don't anticipate

1 going that long, but I will definitely keep that hard
2 stop in mind. Okay?

3 THE WITNESS: Thank you.

4 MR. DANLEY: You're welcome.

5 THE WITNESS: Thank you very much.

6 ELI SABER, PH.D.,
7 was thereupon called as a witness herein, and after
8 having first been duly sworn to testify to the truth,
9 the whole truth and nothing but the truth, was
10 examined and testified as follows:

11 EXAMINATION

12 BY MR. DANLEY:

13 Q. Can you please state your name for the record?

14 A. Yes, Eli Saber.

15 Q. And, Dr. Saber, you have been deposed before, haven't
16 you?

17 A. I have.

18 Q. I think looking at your --

19 MS. MARKOWSKI: I'd like to -- I'd like to
20 object just to make sure that any question that you
21 provide are preceded by instructions to Dr. Saber
22 about what is a proper response, and offer him enough

1 time. We didn't even get a chance to even discuss
2 offering him a break every hour just to collect his
3 thoughts or even potentially have a bio break. If
4 that -- if we could do that at the outset, that would
5 be good.

6 MR. DANLEY: Yeah, I mean, I just asked, I
7 think, one or two questions about whether he's been
8 deposed before and I was certainly going to get there.
9 So if you'll let me follow my questions, that would be
10 appreciated.

11 MS. MARKOWSKI: Sure, but, I mean, we're
12 talking about his background already and we haven't
13 even set the tone for how this deposition is going to
14 be run, so...

15 MR. DANLEY: Well, if you can just let me
16 ask my questions, I think that we can go ahead and get
17 there, and we will also hopefully shorten the time and
18 length of the deposition if the interruptions are kept
19 to a minimum.

20 MS. MARKOWSKI: Of course.

21 MR. DANLEY: Thank you.

22 BY MR. DANLEY:

1 Q. Dr. Saber, looking at the appendix to your report, I
2 think I counted about eight or nine depositions, is
3 that -- does that sound about right?

4 A. No, there's been several updates since then. I have
5 been deposed 22 times now. Eight times -- eight
6 times in the last two months, in May and June.

7 Q. Okay. So I had significantly miscounted. My
8 apologies there.

9 So you are fairly familiar with how the
10 deposition process runs; is that correct?

11 A. Yeah, I would say I'm somewhat familiar with it, yes.

12 Q. Okay. So I'll just go over a few ground rules for the
13 deposition so we're on the same page, but it sounds
14 like you're fairly practiced at this routine.

15 So you understand that you are here today
16 to answer questions that I might have about the
17 declaration that you submitted in one of the IPR
18 proceedings; is that correct?

19 A. That is correct.

20 Q. And that would be IPR Case Number 2023-01315 regarding
21 patent number 10,695,151; is that correct?

22 A. That is correct.

1 Q. Okay. So you understand that I am here today to ask
2 you questions about that declaration, and you are here
3 to answer those questions to the best of your ability.
4 Correct?

5 A. That is correct.

6 Q. Okay. So I will ask that we don't -- or that we try
7 not to talk over one another because the court
8 reporter is taking down a transcript of these
9 proceedings, so I just ask that you try to allow me to
10 ask my question completely, maybe give a pause, and
11 then you can provide your answer.

12 Likewise, when you're providing your
13 answer, I will try not to interrupt you with my next
14 question unless you provide a full and complete
15 answer. Is that acceptable?

16 A. That is acceptable.

17 Q. Okay. And if for some reason any of my questions
18 don't make sense to you or you need clarification --
19 I'm sure it's going to happen during the course of
20 today -- please let me know. I'm happy to provide
21 clarification to the best of my ability. But if you
22 don't ask for clarification, I will assume that you

1 understood the question I asked; is that fair?

2 A. That is fair.

3 Q. Okay. And I will try to take a break about every
4 hour, maybe a little bit more than an hour, maybe a
5 little bit less than an hour. If you need a break at
6 any time, just let me know. I just ask that if
7 there's a pending question, you answer the question
8 first and then we can go on break. Is that okay?

9 A. That would be great. Yeah, once -- a break per hour
10 is very much appreciated.

11 Q. Okay. And I guess the only exception to that is that
12 if there is an issue of potential privilege or
13 attorney work product or expert work product that
14 comes up, you need to consult with 3Shape's attorney
15 on the line, then you can go ahead and do that as
16 well. Okay?

17 A. Thank you.

18 Q. You're welcome.

19 So what did you do to prepare for today's
20 deposition?

21 A. I read through my declaration, I read through the
22 patent and the prior art listed in this case, and I

1 met with counsel.

2 Q. And how many times did you meet with counsel to
3 prepare for today's deposition?

4 A. Two or three times.

5 Q. Okay. Over what time period did you meet with counsel
6 to prepare for today's deposition?

7 A. On Tuesday and Wednesday, and I think somewhat last
8 week, but I don't remember the timing last week.

9 Q. So it sounds like there was one -- at least one
10 meeting last week and you also had a meeting on
11 Tuesday and Wednesday of this week; is that correct?

12 A. Yeah, I think a brief meeting last week, and more
13 in-depth meetings this week.

14 Q. And do you recall how long the meeting was last week?

15 A. No, off the top of my head, I don't recall.

16 Q. I think you mentioned it was a brief meeting, so I
17 would assume it was less than probably 30 minutes?

18 A. Probably around an hour or so.

19 Q. And do you recall how long the meeting was on Tuesday
20 with counsel?

21 A. I don't recall exactly, but somewhere between three
22 and four hours.

1 Q. And do you recall how long the meeting was on
2 Wednesday with counsel?

3 A. Again, I don't recall exactly, but around plus or
4 minus six hours.

5 Q. And in terms of your declaration, you submitted a
6 substitute declaration. Correct?

7 A. That is correct.

8 Q. Okay. And in terms of the work that you performed on
9 your original declaration and the substitute
10 declaration, do you have an estimate of the number of
11 hours that that took for you?

12 A. I couldn't begin to guess. It was a while back, so I
13 don't remember.

14 Q. Do you have a ballpark or an estimate as to that time?

15 A. I couldn't tell you. I don't remember.

16 Q. And do you recall when you first started working on
17 your declarations?

18 A. Again, I don't -- I don't remember. I work on
19 several cases. I just -- I just can't remember
20 timing of cases. It's been a while and I don't
21 remember the details.

22 Q. No problem.

1 Can you state your current position?

2 A. Yes. I'm a -- I'm a professor of electrical and
3 microelectronic engineering at the Rochester
4 Institute of Technology.

5 Q. And how long have you held that position?

6 A. I've been at RIT full-time since 2004 and I was
7 adjunct before that since 1998.

8 Q. So I'm going to ask some questions about your
9 background, but just to help you out, I'm going to go
10 ahead and introduce what will be Exhibit Number 1,
11 which is your CV.

12 A. That would be great.

13 Q. Yeah, so I just dropped that in the Chat. Do you have
14 that or do you see that?

15 STENOGRAPHER: Counsel, did you hit the
16 send arrow?

17 MR. DANLEY: Oh, there we go.

18 MARKED FOR IDENTIFICATION:

19 EXHIBIT 1

20 10:07 a.m.

21 A. I don't see anything in the Chat.

22 BY MR. DANLEY:

1 Q. I think it should --

2 A. Now I do.

3 Q. Okay. And just let me know when you've been able to
4 open that and when you're ready to proceed.

5 A. I do have that open.

6 Q. And you're ready -- are you ready to proceed?

7 A. Yes, sir, I am.

8 Q. Okay. Thank you. So can you describe for me what
9 your current research interests are at your
10 university?

11 A. Well, I'm working nowadays in machine learning, audit
12 tracking, machine learning, remote sensing areas.
13 But, you know, research interests do change a little
14 bit depending on, you know, the level of funding and
15 the source of funding. You know, currently we're
16 doing a fair amount of work for the Department of
17 Defense on machine learning for imaging, video, and
18 remote sensing applications. That's the latest grant
19 that I'm working upon.

20 Q. And if you're looking at page 2 of your CV, it has
21 Research Interests at the top. Do you see that?

22 A. I do.

1 Q. The second bullet point says, "Image and Video
2 Processing for Multimedia, Military, & Biomedical
3 Applications"; is that right?

4 A. That is correct.

5 Q. Can you describe for me what the biomedical
6 applications are that are listed here?

7 A. Yes. So we've had two grants, one that had to do
8 with brachytherapy that we did this. It was a small
9 project with the University of Rochester and it was
10 many years back, and I don't remember the details off
11 the top of my head.

12 The second one that we did for biomedical
13 application was funded by a company called Data
14 Physics, and that was essentially in working on CT
15 scans and the CT scans essentially contribute --
16 comprehend what they call notch to crotch. So you
17 have a CT on a cadaver that starts, you know, around
18 his throat area and goes all the way down to the
19 crotch area. And it's kind of slices in 1 millimeter
20 on a cadaver.

21 And the work that we were doing -- we've
22 done on that is to essentially do some segmentation,

1 some three-dimensional model estimation, and provide a
2 three-dimensional model, virtual model, obviously, of
3 the cadaver and recognizing the bones, the organs, the
4 various tissue in there, depending on the different
5 intensities in the CT stuff, and reconstruct a
6 three-dimensional segmentation of the body with all
7 the various pieces so it can be used essentially as a
8 template for live type of diagnosis.

9 Q. Okay. Does the CT scan or this research interest,
10 does it involve color?

11 A. Oh, yes. It involves color and, obviously, CT,
12 computer tomography.

13 Q. And could you just describe -- sorry.

14 A. When I say "CT," I mean computer tomography.

15 Q. And I believe you said that the first research
16 interest in the biomedical applications was
17 brachytherapy. Did I pronounce that right?

18 A. Yeah, brachytherapy.

19 Q. Could you just describe for the record what that is?

20 A. Yeah, so it involves, essentially, prostate-type
21 cancer where the physician would want to go and drop
22 seeds inside the prostate to combat, you know, cancer

1 situations, and during the operation, instead of
2 having to stop the operation and roll the patient
3 into a CT scanner or an MRI, they wanted to use an
4 ultrasound directly on the body so they can see where
5 the seeds are being dropped as they were being
6 dropped through like a two-dimensional grid that they
7 kind of place against the body.

8 So they place a grid against the body, they
9 insert a needle through that grid, and they drop seeds
10 in the prostate, and they want them at a certain
11 distance apart. And they want to be able to visualize
12 that from the ultrasound while the operation is taking
13 place.

14 Our work was to essentially take the
15 ultrasound imagery and see if we can locate the seeds,
16 you know, in realtime or near realtime as the
17 operation is being -- is taking place. And obviously
18 when the operation is taking place you have, you know,
19 blood and other things that take place during the
20 process.

21 Q. Right. Okay. So it sounds like -- -- strike that.

22 Are there any other research interests or

1 topics that would fall under the biomedical
2 application category?

3 A. Well, those were the two primary topics that we
4 worked on during my, you know, time at RIT, if I
5 recall off the top of my head, but I've also done a
6 fair amount of work for 3Shape over the years on
7 multiple cases that have to do with dental imaging,
8 dental -- you know, dentitions and dental imaging and
9 gingival models and second gingival models, and, you
10 know, a variety of dental imaging applications, in a
11 sense.

12 And I've testified in court twice about
13 that, in ITC court. The first time was in 2018 on an
14 ITC case and the second time was 2019.

15 Q. Okay. So I want to set aside the work that you've
16 done for 3Shape and focus more on your research
17 interest at the Rochester Institute of Technology and
18 your academic background. Because I will get to the
19 3Shape matters you worked on in just a little bit, but
20 I just want to focus right now on your -- kind of the
21 academic side of your work as opposed to the expert
22 testifying part of your work. Is that okay?

1 A. That's fair.

2 Q. And so in terms of your research interests, your work
3 as a professor, your educational background, is it
4 fair to say that you do not have a background in
5 dentistry?

6 A. No, I am not a dentist.

7 Q. And is it fair to say you have taken no courses in
8 dentistry?

9 A. That is correct.

10 Q. Did you talk to any dentists regarding the subject
11 matter -- and I guess this is kind of going into more
12 of your declaration or the declarations that you've
13 done for 3Shape.

14 In terms of these declarations, have you
15 ever talked to any dentists about your opinions?

16 A. No, I have not.

17 Q. Okay. Have you ever talked to any of the -- any of
18 the inventors on any of the 3Shape patents for the
19 declarations that you've done?

20 A. I have -- during the court -- during the trials I
21 have spoken to personnel from 3Shape, but I have not
22 spoken to them since then. But during the trial --

1 MS. MARKOWSKI: I will caution Dr. Saber
2 not to reveal the contents of any conversations you
3 might have had with 3Shape personnel.

4 BY MR. DANLEY:

5 Q. Yeah, so, as your counsel noted, please, I'm not
6 interested in the content or the subject matter, the
7 content of those conversations, so you can answer
8 these questions yes or no in terms of your discussions
9 with 3Shape.

10 So in terms of your declaration for the
11 '151 patent, yes or no, did you talk to anyone at
12 3Shape regarding that declaration?

13 A. No, I have not.

14 Q. Okay. So one additional question on your CV. If you
15 can go down to page 4.

16 A. Page 4?

17 Q. Yeah. And I can just go ahead and share my screen on
18 this one. Let's see...

19 Do you see my screen?

20 A. I do.

21 Q. What is on the screen?

22 A. I see the title of Research and Development

1 Scientist.

2 Q. Okay. So this is page 4 of your CV; is that correct?

3 A. That is correct.

4 Q. And so I wanted to go down to the Research and
5 Development Engineer title --

6 A. Yes, sir.

7 Q. -- that is now second on the screen. Do you see that?

8 A. I do.

9 Q. This is from -- it looks like from 1993 to 1995; is
10 that right?

11 A. That is correct.

12 Q. Can you tell me, to the extent that you remember, what
13 your responsibilities were in this position?

14 A. Yeah, exactly what's listed there under that
15 position. This was a position that was created for
16 me. Xerox -- so -- what I think might be a little
17 confusing is the dates here.

18 So Xerox has sponsored me to receive a
19 Ph.D. at the University of Rochester, so they
20 funded -- they funded my research and they paid my
21 salary while I was a -- I would say a full-time
22 student at the University of Rochester, and at the

1 same time a research and development engineer at
2 Xerox Corporation.

3 So I was working at the research labs at
4 Xerox while at the same time working at the University
5 of Rochester on my Ph.D. work. So my Ph.D. work was
6 essentially the intersection between Xerox and the
7 University of Rochester, and I worked with folks from
8 Xerox and obviously my advisor at the University of
9 Rochester.

10 Q. So the responsibility -- responsibilities listed under
11 this position say "design and develop query by image
12 content."

13 Is it fair to say you were developing or
14 working on a query engine?

15 A. Well, it's more -- it's more than a query engine. It
16 was basically developing algorithms for digital
17 libraries and, you know, image and video libraries.

18 The example I used to give is if you went
19 on a vacation and you've taken, let's say, 2,000
20 images and several videos with your camera, and
21 you've come back to home and you put that onto your
22 P.C. and you want to be able to search it very

1 quickly, you want to be able to say, can you show me
2 the picture where I was standing next to the yellow
3 Corvette or, you know, can you show me the picture
4 when I was surfing or something.

5 So you provide a query by example. You
6 say, here is me, here is what I look like, and here is
7 what a surfboard look like, can you go find any images
8 that have matches to any of these items that I've
9 presented.

10 So that's where the query by example comes
11 in. Instead of a textual, like you would do a search
12 on Google today, you would type in, you know,
13 surfboard and it would -- comes up with stuff.

14 Q. Okay. And it appears, from the description here, that
15 the query could be performed by keyword, color, shape,
16 and texture; is that right?

17 A. That's correct.

18 Q. And so those would be four different categories for
19 the query; is that right?

20 A. Well, you could use color, shape, texture, and motion
21 cues because obviously in video you have some motion
22 as well. Or you could use combinations of them. You

1 could say, you know, can you find not just a
2 Corvette, but a picture next to a yellow Corvette or
3 a red Corvette or, you know, certain textures that
4 you might -- you know, you took a picture next to a
5 strange periodic texture or something and you want to
6 find that.

7 Q. And what do you mean when you -- when you were
8 referring to "texture" there?

9 A. Well, "texture" would be, in a sense -- let me think
10 what's the best way to state that.

11 "Texture" would be in a sense, you know,
12 something that has like consistency of a surface or
13 smoothness or roughness or appearance. Like your
14 grass, for instance, that has a texture to it. The
15 shirt I'm wearing has a certain texture to it. Some
16 textures are like -- you know, fabrics may have
17 different textures to it or your carpet, for instance,
18 has a different texture to it. Sand has a certain
19 texture to it.

20 So it has -- it's -- you know, I guess it's
21 appearance of how the surface appear and, you know,
22 the smoothness, roughness of it.

1 Q. And as you're using it in this description, is texture
2 different from color?

3 A. Well, I think the best way -- the best way to answer
4 this, in a sense, is basically saying it is my view
5 that texture data or texture would be more than color
6 alone as understood by a POSITA. So a POSITA looking
7 at texture would understand that could be something
8 more than color.

9 But I do recognize in this case that Medit,
10 and maybe perhaps the board, has interpreted texture
11 to mean that it could be color alone.

12 So as I was working through my declaration,
13 you know, my opinions essentially do not change
14 regardless of this definition. I did apply this
15 definition in my analysis in this declaration, so I do
16 recognize that there is a bit of, you know,
17 differences here when it occurs to texture and color.

18 Q. No, no, and I appreciate that. It's -- I mean, it's
19 not really meant to be a trick question or anything
20 like that because I understand that the patent does
21 discuss what texture data is within the context of the
22 patent. I was just more curious as to what the

1 difference was between color and texture as listed in
2 this entry on your CV, that was all. So we can move
3 on.

4 Stop sharing...

5 So I want to go ahead and introduce your
6 substitute declaration as an exhibit. And just let me
7 know when you have that.

8 MARKED FOR IDENTIFICATION:

9 EXHIBIT 2

10 10:24 a.m.

11 A. I am working on it.

12 MR. DANLEY: And for the record, I'm
13 sharing my screen, which should have the title page
14 for Dr. Saber's substitute declaration.

15 BY MR. DANLEY:

16 Q. Dr. Saber, just let me know when you're ready to
17 proceed.

18 A. Yes, I tried to download it, so give me one moment.
19 It seems like -- okay, I -- it is -- I do have it
20 now. Okay.

21 Q. So I wanted to turn your attention first to the
22 appendix at the end.

1 A. Appendix at the end of the declaration.

2 Q. Correct.

3 A. Okay. Just so the record is clear, counsel has sent
4 a three-ring binder, hard copies of all the exhibits,
5 I guess. They're here in this binder. And it's a
6 clean set of exhibits that were shipped to me by
7 counsel a few days ago.

8 Q. Okay. And does that also include -- or strike that.

9 You don't have one -- wouldn't be answering
10 that question.

11 Do you also have a hard copy of your
12 substitute declaration in front of you?

13 A. I do.

14 Q. Okay. So feel free to reference the hard copy, the
15 electronic copy, what I'm sharing on the screen,
16 whatever is most convenient for you. Okay?

17 A. Yeah, I typically prefer the electronic copy because
18 it's just easier to work with. But, yes, I'm looking
19 at the electronic copy that I just received from you.

20 Q. Okay. And so for Appendix 1, my understanding is that
21 this appendix lists all the matters in which you've
22 previously testified and/or been consulted on; is that

1 correct?

2 A. That's generally correct. There is a couple of new
3 matters that I'm not, I guess, at liberty to discuss
4 yet, but there are -- in the process. But this is
5 generally the ones that I've worked on that are
6 either active or inactive or have been closed or
7 concluded.

8 Q. Are there any updates that you want to make to this
9 appendix?

10 A. Not off the top of my head, but there is a new case
11 that I am -- just got signed onto a month or so ago
12 that is, I think, Maxell versus TCL, and it's just in
13 the beginning of that case. That's not listed in
14 this appendix.

15 But I think the rest of them are all -- of
16 all -- are all there. There is another case that also
17 is in -- I'm starting -- starting to work on, but it's
18 not -- I guess I haven't been declared yet. I can
19 give you the name of counsel and you can contact him.

20 Q. Yeah, why don't we go ahead and put that on the
21 record. So if you could give me the name of counsel
22 in that matter.

1 A. Yes. I think name of counsel is Robert Jain, and I
2 would have to look up to see what -- where is he at.

3 Q. No, that's --

4 A. Robert Jain.

5 Q. Okay. Does the subject matter of that additional
6 matter involve dentistry?

7 A. No, it does not.

8 Q. Does it involve color matching?

9 A. I don't think so.

10 Q. Any other additions you would like to make to your --
11 or to this appendix?

12 A. Not that I think of off the top of my head.

13 Q. All right. So in going through your appendix, I
14 believe I counted nine entries related to 3Shape.
15 Does that sound about right?

16 A. That sounds about right, but, you know, some of them
17 have multiple patents and things involved, so I
18 don't -- it's hard to keep them all straight, there's
19 so many of them, but that sounds about right.

20 Q. Yeah, and that's why I was going by entries because it
21 looked like a number of the entries had multiple
22 patents associated with them, so I just didn't want to

1 get into a process where I was counting up patents.
2 But, you know, we'll step through your -- or this
3 appendix for each of these matters.

4 But, you know, like I said, nine matters
5 does sound about right in terms of what you handled
6 for 3Shape?

7 A. There is a -- there are new IPRs that I'm working on
8 now for 3Shape. I'm not sure that those are listed
9 in this appendix.

10 MS. MARKOWSKI: Dr. Saber, to the extent
11 that you have not been publicly named as an expert on
12 those matters, I caution you again to refrain from
13 questions regarding substance and especially for any
14 kind of proceedings that have not been entered in the
15 public record.

16 BY MR. DANLEY:

17 Q. Yeah, and just so we can make the record clear, the
18 work that you just mentioned, has any -- have there
19 been any filings with the PTAB related to that work,
20 yes or no?

21 A. I don't know off the top of my head. I know there is
22 some new work that I'm working on, and I don't know

1 which part of it is public knowledge, which is not,
2 but Ms. Markowski and/or Mr. Walters can fill you in
3 on all those details.

4 Q. Okay. So let's just go and stick with what's listed
5 in Appendix 1 that you've provided to us as part of
6 this current IPR matter.

7 So the very first entry on your -- or on
8 this appendix is 3Shape A/S v. Dental Imaging
9 Technologies & Carestream Dental. Do you see that
10 entry?

11 A. I do.

12 Q. And it should be highlighted on the screen as well.

13 A. Yeah, I see.

14 Q. I don't think that's going to work, but, yeah, it
15 should be this entry here.

16 It says that you were retained on behalf of
17 3Shape, the petitioner, and you provided expert
18 opinions in the proceedings for, it looks like, two
19 patents. Do you see that?

20 A. I do. And to be honest with you, I don't remember
21 the details, but I do see that, yes.

22 Q. And with 3Shape being the petitioner in this matter,

1 would it be your understanding that 3Shape is
2 challenging the validity of these two patents?

3 A. I don't remember off the top of my head, to be honest
4 with you. It's been a while since I've looked at
5 these. I would have to consult the details. I
6 honestly don't remember off the top of my head.

7 Q. Okay. Do you recall if you submitted any declarations
8 as part of this -- or as part of this work or this
9 matter?

10 A. Again, I mean, I am -- I work on -- I've got like six
11 or seven active cases. I have a number of cases that
12 have to do with Buchanan on multiple IPRs. I can't
13 remember off the top of my head which case, yes or
14 no, and whether the case was just at a pauper level
15 or what.

16 So I would have to look at every detail of
17 it, but I'm sure Ms. Markowski and Mr. Walters will
18 be able to give you all the details with each one of
19 these cases. I honestly don't know what is public
20 knowledge and what is not in each of these cases.

21 Q. Okay. No problem.

22 So I want to go down to the next entry on

1 page A-2. That would be Medit USA, Crown Jade Company
2 v. 3Shape A/S. And it lists five patents here in the
3 bullet -- in the second bullet point. Do you see
4 that?

5 A. I do, yes.

6 Q. And I think at least one of those would be the '151
7 patent. Correct?

8 A. Yes, I see that.

9 Q. And is my understanding correct that this would be
10 part of the -- or that this listing for this entry
11 would be part of the deposition and the declaration
12 you provided in this current matter?

13 A. I think that is correct, yes.

14 Q. Okay.

15 A. We have to obviously check, but I think that is
16 correct.

17 Q. So I want to go next to A-7.

18 A. Page -- I'm sorry?

19 Q. A-7.

20 A. A-7. Yes, sir.

21 Q. And see the third entry on that page is 3Shape A/S v.
22 Align Technology?

1 A. Yes, I see that.

2 Q. And you were retained as an expert on behalf of the
3 plaintiff in that matter. Correct?

4 A. I was retained on behalf of 3Shape.

5 Q. Okay. Well, that was going to be my next question.
6 The entry here says you were retained on behalf of
7 plaintiff. I was going to ask, and I assume that was
8 3Shape in this matter. So thank you for going ahead
9 and clarifying that.

10 Do you recall if you submitted any expert
11 reports as part of this matter?

12 A. I don't recall submitting any reports. I don't
13 recall off the top of my head, to be honest with you,
14 but I don't recall submitting any reports in this
15 matter.

16 I think the matter changed hands at that
17 point, and I don't know -- it's been a while,
18 obviously, four years, but the matters changed hands,
19 I think, from different law firms, if I recall
20 correctly, and I'm vaguely recalling from memory at
21 this point. And I don't believe I submitted anything
22 in that particular case.

- 1 Q. Okay. The next entry is 3Shape A/S v. Align
2 Technology as well. It looks like this is four
3 matters in front of the Patent Trial and Appeal Board,
4 or the PTAB. Do you see that entry?
- 5 A. This is the October 2019 to October 2020?
- 6 Q. Correct.
- 7 A. Yeah, I do see that.
- 8 Q. And it says that this was submitted on behalf of
9 petitioner, 3Shape A/S. So would your understanding
10 be that with 3Shape being the petitioner, that 3Shape
11 is challenging the validity of the patents in this
12 matter?
- 13 A. That would be my understanding. Again, it's been
14 quite a while since I looked at these, and I'm sure
15 you can look up each one of these IPRs and see
16 exactly what has taken place. Off the top of my
17 head, I don't remember from five years ago.
- 18 Q. And it says that you provided two declarations in this
19 matter related to the '661 patent, is the third bullet
20 point entry here?
- 21 A. Yes, I do see that. I don't remember the details at
22 this point, but I do see that.

1 Q. Do you recall if your opinion in this matter was that
2 the '661 patent was invalid?

3 A. I don't recall off the top of my head. It's been
4 five years, sir. It's very hard to remember, and
5 many cases and many IPRs. I probably worked on more
6 than 50 IPRs.

7 Q. Yeah, understood. Quite frankly, I have trouble
8 remembering what I did last week, so I appreciate that
9 it was five years ago. So no problem with that.

10 A. I have trouble remembering what I did yesterday,
11 so...

12 Q. Now, going down to page A-8, the second entry is Align
13 Technology versus 3Shape A/S. Do you see that?

14 A. Yes, I do.

15 Q. And it says here that you "Provided expert reports
16 regarding the Invalidity and non-infringement of"
17 patent number 9,510,757.

18 Do you see that?

19 A. Yes, I do.

20 Q. And it looks like here that was submitted on behalf of
21 defendant 3Shape. So would it be your understanding
22 that in this matter, 3Shape had been accused of

1 infringing this patent?

2 A. I don't remember off the top of my head. It's
3 been -- it's been a long time, so I honestly don't
4 remember off the top of my head.

5 Q. Okay. And you're --

6 A. I wouldn't be able to tell you with certainty what
7 has taken place, but I remember giving a deposition
8 on this. That was just like right around the start
9 of COVID, or so, because I remember getting sick on
10 the way back home.

11 Q. Oh, I'm sorry about that.

12 A. Yes. But I don't honestly remember the details.

13 Q. Okay. And is it fair to say you wouldn't recall what
14 your conclusion was with respect to whether the '757
15 patent was valid or invalid?

16 A. I don't recall off the top of my head. I mean, I
17 would have to go back and consult the reports and the
18 details.

19 Q. Okay. And it looks like the next entry is Certain
20 Dental and Orthodontic Scanners and Software. Do you
21 see that?

22 A. I do.

1 Q. Okay. And it looks like you were also retained as an
2 expert on behalf of respondent 3Shape A/S. Do you see
3 that?

4 A. Yes, I do.

5 Q. And as the respondent, would it be your understanding
6 that 3Shape was also accused of infringing in this
7 matter?

8 A. This was one of the ITC cases, if I remember clearly,
9 yes. I'm looking at the details. So to my
10 understanding, I mean, it's been, you know, six years
11 so I don't remember the details exactly, but I was
12 retained on behalf of 3Shape to provide invalidity,
13 noninfringement, and domestic industry expertise.

14 Q. And do you recall what your conclusions were with
15 respect to whether the '192 patent was valid or
16 invalid?

17 MS. MARKOWSKI: Objection. Foundation.

18 A. I don't recall off the top of my head. It's been
19 several years, but I'm sure the court proceedings can
20 show you all the details.

21 BY MR. DANLEY:

22 Q. Okay. So going to the next page, page A-9.

1 A. A-9, yes, sir.

2 Q. So the first entry is 3Shape v. Align Technologies
3 again, and this is October 2018 to September 2019. Do
4 you see that?

5 A. Yes, I do.

6 Q. And it looks like this was another IPR proceeding; is
7 that right?

8 A. I think there were -- according to what I am seeing
9 here, there were three IPR proceedings and these two
10 are the patents that I listed there. And beyond that
11 I don't remember any of the details, but I'm sure --
12 I'm sure the PTAB office can provide these IPRs, and
13 I think -- I think all this stuff is public
14 knowledge, so you'll be able to see exactly what has
15 taken place.

16 Q. And is it fair to say you don't recall any conclusions
17 you might have drawn for these three IPRs as to
18 whether or not these three patents were valid or
19 invalid?

20 A. I don't recall off the top of my head.

21 MS. MARKOWSKI: Objection to form.

22 THE WITNESS: Sorry.

1 A. No, I don't recall off the top of my head from, you
2 know, five, six years ago.

3 BY MR. DANLEY:

4 Q. And moving down, skipping the Blackberry matter,
5 there's an Exocad v. 3Shape matter that's listed last
6 on this page. Do you see that?

7 A. On page A-9 at the bottom, I do, sir, yes.

8 Q. And it looks like this is another IPR matter; is that
9 right?

10 A. It looks like it, yes.

11 Q. And you were retained again on behalf of 3Shape to
12 defend 3Shape's -- 3Shape in this IPR filing; is that
13 right?

14 A. That is correct.

15 Q. Is it fair to say you wouldn't recall what your --
16 strike that.

17 It looks like you provided a declaration in
18 support of the patent owner in this matter; is that
19 right?

20 A. I vaguely remember that. I believe so. But I'm sure
21 the PTAB records will -- for those IPRs will show you
22 what exactly I've provided, but I'm -- that's what I

1 recollect.

2 Q. And is it fair to say you also would not remember what
3 conclusions, if any, you drew about the validity of
4 the patent that was the subject matter of this IPR?

5 MS. MARKOWSKI: Objection. Foundation.

6 A. Oh, so I don't remember off the top of my head. You
7 know, now we're back -- now that's six some years
8 ago. You know, I would have to consult the details
9 to give you a more accurate description or answer.

10 BY MR. DANLEY:

11 Q. And the last entry I have related to 3Shape is at the
12 top of page A-10, Certain Intraoral Scanners and
13 Related Hardware and Software. Do you see that?

14 A. I do.

15 Q. And again, you were retained on behalf of respondent
16 3Shape; is that right?

17 A. That is correct.

18 Q. And would it be your understanding that 3Shape, as the
19 respondent in this ITC matter, had been accused of
20 infringing patents from -- actually, strike that.

21 So would it be your understanding that
22 3Shape, as the respondent in this ITC proceeding, had

1 been accused of infringement?

2 A. I don't --

3 MS. MARKOWSKI: Objection. Foundation.

4 A. I don't remember off the top of my head, but that
5 seems about right, but I don't remember off the top
6 of my head. I know I was retained as an expert at
7 that time. I think this was my first case with
8 3Shape, to work on noninfringement and domestic
9 industry, and I've testified in court in that
10 particular case and given a deposition on that date
11 that I show there.

12 BY MR. DANLEY:

13 Q. Okay. And that was going to be my question about the
14 third bullet point. You said that you provided expert
15 opinions regarding claim construction,
16 noninfringement, and the domestic industry analysis;
17 is that right?

18 A. That is correct.

19 Q. Okay. Do you recall if you provided any opinions
20 related to validity or invalidity of the patents in
21 that matter?

22 A. I don't believe so. I think -- I think there was

1 another expert working on that. I don't believe so.
2 I think my opinions, to the best of my knowledge from
3 eight years ago, six years ago, my opinions, I think,
4 were confined to claim construction, noninfringement,
5 and domestic industry analysis.

6 Q. Okay. So, again, like I said, by my count this is
7 nine matters that you've listed related to 3Shape, and
8 is it fair to say that across these nine matters, in
9 some instances you have been working with 3Shape when
10 they've been accused of infringing someone else's
11 patents, and in other matters you've been working with
12 3Shape when they've been asserting their own patents
13 against other companies? Is that a fair statement?

14 MS. MARKOWSKI: Objection. Form.

15 A. Well, I mean, it's been -- like I said, it's been
16 several years on some of these cases. I remember
17 working for 3Shape on the two ITC trials where, you
18 know, I was, I guess, part of the respondent or
19 working for the respondent 3Shape at that time when
20 they were accused of whatever it was.

21 I do remember working on several IPRs with
22 3Shape on both offense and defense, but I don't

1 remember the details of each one of them. I would
2 have to consult, you know, those details before I can
3 answer those specific questions.

4 BY MR. DANLEY:

5 Q. Okay. Well, in terms of the matters you've handled
6 for 3Shape in which 3Shape has been accused of
7 infringing someone else's patents, so is it fair to
8 say you have worked on matters in which 3Shape has
9 been accused of infringing someone else's patents?

10 MS. MARKOWSKI: Objection. Form.

11 A. I mean, like the Align case, I would assume that
12 Align was accusing 3Shape of infringement, but again,
13 it's been -- it's been a long time, so I don't
14 remember the details off the top of my head, and I
15 would have to look at the reports and details for
16 each case so I can give you a specific and accurate
17 answer.

18 BY MR. DANLEY:

19 Q. So for those matters in which 3Shape has been accused
20 of infringing someone else's patents, do you recall
21 any instance in which you ever concluded that those
22 patents that are owned by someone else and being

1 asserted against 3Shape were invalid -- or strike
2 that.

3 So for those matters in which 3Shape has
4 been accused of infringing someone else's patents, do
5 you recall ever reaching a conclusion that those
6 patents were valid?

7 A. I don't recall the details off the top of my head and
8 I don't recall the specific patents. I mean, we
9 would have to be -- you know, we would have to be --
10 you know, I would have to look at each patent
11 specifically, look at the reports, look at the
12 declarations or reports that I have provided, and I
13 can give you a better answer.

14 I don't remember off the top of my head
15 from several years back.

16 Q. But is it fair to say, sitting here today, you don't
17 recall any instance in which you found any patent
18 being asserted against 3Shape to be valid?

19 MS. MARKOWSKI: Objection. Foundation and
20 form.

21 A. I don't recall the details off the top of my head.

22 BY MR. DANLEY:

1 Q. And for those matters in which 3Shape has been
2 asserting its patents against some other party, do you
3 recall any instance in which you found 3Shape's own
4 patents to be invalid?

5 MS. MARKOWSKI: Objection. Foundation and
6 form.

7 A. Again, I don't -- I don't recall any details off the
8 top of my head from several months or years back. I
9 would have to consult each one of them and I can give
10 you a more accurate answer.

11 MR. DANLEY: So I'm going to move now to
12 the substance of your substitute declaration, but it
13 would also probably be a good time to take a break.
14 So if you want to plow forward, I'm happy to do that.
15 If you want to take a short break, since this is a
16 good breaking point, I'm happy to do that too.

17 THE WITNESS: Yeah, I think this is a good
18 time to take a quick break. I have 10:50 on my watch
19 here. Would it be okay if I'm back by 11:00? Is that
20 a good time for you? What would you prefer?

21 MR. DANLEY: Yeah, I mean, you're the
22 witness so it's up to you, but if the top of the hour

1 works for you, that is fine by me as well.

2 THE WITNESS: Fantastic. I'll be in my
3 seat at 11:00 ready to go.

4 MR. DANLEY: Yeah, sounds good. Thank you,
5 Dr. Saber.

6 THE WITNESS: Thank you, sir.

7 (Off the record at 10:49 a.m.)

8 (Back on the record at 11:01 a.m.)

9 BY MR. DANLEY:

10 Q. So I'm going to go ahead and reshare my screen. It
11 should be your substitute declaration. Do you see
12 that, Dr. Saber?

13 A. I do.

14 Q. Okay. And I dropped a copy of this document in the
15 Chat. Have you had a chance to look over the document
16 that I put into the Chat?

17 A. Yes. I have downloaded it and I have it open.

18 Q. Okay. And this would be a full and complete version
19 of the substitute declaration you provided in this
20 matter; is that right?

21 A. That is correct.

22 Q. And you submitted the substitute declaration to add

1 some material to the declaration; is that right?

2 A. That is correct.

3 Q. Okay. So my understanding, if I scroll down to
4 page 8, paragraph 24, I believe -- my understanding is
5 you added some material at the end of this paragraph;
6 is that correct?

7 A. That is -- just one second. Let me get there.

8 You said page 8? Did I get the wrong page?

9 Q. I understand it's -- well, it's the paragraph that
10 bridges pages 8 and 9.

11 A. Ah, yes. Yes. Now I have it. I'm sorry.

12 Q. And can you just read or identify for the record which
13 material you added as part of your substitute
14 declaration?

15 A. I don't remember exactly the sentence, but I do have
16 the other declaration.

17 Q. Sorry, it was not meant to be a trick question, but
18 what we were told and what we've identified is that
19 the last sentence that starts off with, "For purposes
20 of this proceeding," was the material that was added
21 as part of this declaration; is that correct?

22 A. I recall -- I think that's correct off the top of my

1 head, but obviously if I -- I don't have the original
2 declaration in front of me, so I can't compare and
3 tell you exactly which words were added.

4 Essentially, we adopted -- it is my understanding
5 that we adopted Dr. Foroosh's POSITA declaration.

6 Q. Okay. And is it accurate that this is the only
7 material that was added as part of your substitute
8 declaration?

9 A. As far as I recall off the top of my head, that is
10 correct.

11 Q. And the substitute declaration was filed on July 24th,
12 correct -- actually, strike that.

13 The substitute declaration was signed by
14 you on July 24th; is that correct?

15 A. That is correct.

16 Q. And can you describe for me how you noticed that
17 this -- or strike that as well.

18 It's my understanding that this sentence
19 was intended to be part of the original declaration;
20 is that right?

21 A. That is correct.

22 Q. And can you tell me or describe for me how you noticed

1 that this material was missing from the declaration
2 you submitted?

3 A. I don't remember off the top of my head how it came
4 about. I don't recall off the top of my head.

5 Q. So was it a process where you were reviewing your
6 original declaration and noticed that this sentence
7 was missing?

8 A. I don't recall off the top of my head how -- why
9 initially it was -- why it was missing. I guess I
10 don't remember.

11 Q. Okay. And is it fair to say that as part of making
12 this change to your original declaration, you did
13 review your original declaration; is that right?

14 A. You said I did or did not?

15 Q. That you did review your original declaration as part
16 of the process for making this additional change --
17 this additional statement in your substitute
18 declaration; is that right?

19 A. Well, at the time when this statement was made,
20 when -- you know, back in July, I would -- I did
21 review it at that time. But in preparation for this
22 one I just reviewed the substitute declaration, which

1 is obviously essentially the same with that extra
2 couple of sentences.

3 Q. No, that's fair, and I'm just focusing right now on
4 the process for making the -- drafting the substitute
5 declaration, not your preparation for today. Okay?
6 Is that fair?

7 And so in terms of making your substitute
8 declaration, this was the only change that you wanted
9 to make. Is that a fair statement?

10 A. Yeah, I think that's a fair statement off the top of
11 my head. I do not believe any other changes were
12 made.

13 Q. So did you draft your original declaration?

14 A. So I have a process that works for me as I've worked
15 on -- through all these -- as I've done this type of
16 work over the years. So I typically have discussions
17 with counsel after I study the materials carefully.
18 I provide the initial draft for a declaration, and
19 then it's a collaborative and iterative effort back
20 and forth, and then I review the final draft
21 obviously very carefully and then sign it.

22 Q. And you say -- my understanding is that you provide

1 the first draft as part of this process; is that
2 correct?

3 A. That's what I said, yes.

4 Q. Okay. And as part of this process for this particular
5 declaration and the substitute declaration, do you
6 recall if there were much in the way of edits that
7 were made along the way?

8 And I don't want to know the substance of
9 any conversations or edits that you may have had with
10 counsel, I'm just trying to get a sense of whether
11 there were a lot of changes, not very many changes,
12 somewhere in-between, from your first draft.

13 A. I don't recall off the top of my head how many, you
14 know, drafts or versions there were, where the edits
15 were. It's been several months.

16 Q. Okay. So I'm going to put into the Chat -- actually,
17 I'm going to stop sharing your substitute declaration,
18 but I understand you have both a hard copy and a local
19 electronic copy in front of you; is that right?

20 A. I have a hard copy that counsel sent in a three-ring
21 binder and I have the electronic copy that you just
22 uploaded into the Chat box.

1 Q. Okay. So I'm going to introduce what's going to be
2 Exhibit Number 3, and let me know when you've had a
3 chance to download it and review it.

4 MR. DANLEY: And for the record, this is a
5 redline comparison between Dr. Saber's substitute
6 declaration and the patent owner's response that
7 3Shape filed in this matter.

8 MARKED FOR IDENTIFICATION:

9 EXHIBIT 3

10 11:10 a.m.

11 BY MR. DANLEY:

12 Q. So, Dr. Saber, just let me know when you are ready to
13 proceed.

14 A. I do have it. Let me open up your document.

15 Okay, I do have your document open.

16 Q. Okay.

17 MR. DANLEY: So just so the record is
18 clear, I'm going to go ahead and share my screen.

19 BY MR. DANLEY:

20 Q. Okay, so do you see the redline being shared as part
21 of the Zoom proceedings?

22 A. I do.

1 Q. Okay. And you're familiar with the way that
2 redlining -- the redlining process works. Correct?

3 A. Yes, I am, generally speaking. I mean, I'm not an
4 expert at it, but yes, I am.

5 Q. And can you just describe for me and for the record
6 your understanding of how the redlining process works?

7 A. Well, typically when I've used it with the Microsoft
8 Word, I turn track changes on and then, as changes
9 are made, things that are deleted are struck out and
10 things that are added get added in a certain color.

11 Q. So referring to the title page of Exhibit Number 3, is
12 it fair to say that the material that is in red and
13 struck through is material that would have been
14 deleted from your substitute declaration?

15 A. I mean, I don't know what you're providing here
16 exactly, but I see material that's been struck
17 through. I don't know what you've done with this
18 document, so I can't speak to that.

19 Q. So just so the record's clear, what we did is we took
20 your substitute declaration and ran a compare through
21 Microsoft Word to the patent owner's response. So the
22 document that's in front of you shows the changes that

1 were made -- the changes -- the differences between
2 your substitute declaration and the patent owner's
3 response.

4 Is that explanation clear to you,
5 Dr. Saber?

6 A. I guess that's what you're saying. I don't know
7 exactly what you have done details-wise, but -- so
8 just trying to clarify. So you started with my
9 substitute declaration?

10 Q. Correct.

11 A. And then you did a compare to the patent owner's
12 response?

13 Q. Correct.

14 A. And so the redlines are struck out, are what?

15 Q. That is material from your substitute declaration that
16 is not included in the patent owner's response.

17 A. Okay.

18 Q. Okay? And the blue underlined material is material
19 that is not in your substitute declaration but is in
20 the patent owner's response. Is that clear?

21 A. Okay.

22 Q. Okay. So as you can see at the beginning of the

1 report, if you go down to page 1, 2, and 3, there's a
2 lot of material that's added -- that's been added. Do
3 you see that?

4 MS. MARKOWSKI: Objection. Foundation.

5 BY MR. DANLEY:

6 Q. Or strike that, let me ask a better question.

7 So I'm showing to you page number 2 on the
8 screen. Do you see that?

9 A. Page number 2, yes, I see that.

10 Q. And it's titled The '151 Patent. Correct?

11 A. Correct.

12 Q. And this material is all included as blue and
13 underlined; is that right?

14 A. That is correct.

15 Q. And so based upon our previous conversation, would it
16 be your understanding that this is material that was
17 added as part of -- or -- strike that.

18 Based on our previous conversation, would
19 it be your understanding that this is material that's
20 included in the patent owner's response, but not
21 included in your substitute declaration?

22 MS. MARKOWSKI: Objection. Foundation.

1 A. I mean, I would have to compare them, I guess,
2 side-by-side. I don't -- you know, I'm not
3 100 percent familiar with this process, but I'll take
4 your word for it. That sounds like that would be
5 correct, but, I mean, I would have to sit down and
6 compare them side-by-side on, you know, hard copy, or
7 whatever, to make sure that things are clear, but it
8 seems -- it seems correct.

9 BY MR. DANLEY:

10 Q. Okay. So moving through the first about 20 pages, and
11 you can scroll through them on the exhibit that I put
12 into the Chat, there's not much, if any, overlap
13 between your substitute declaration and the patent
14 owner's response, but I'll represent to you that when
15 you get down to page 21 of this document, that there
16 starts to be a significant amount of overlap between
17 your substitute declaration and the patent owner's
18 response.

19 And I will just direct your attention to
20 the material that's currently being displayed on the
21 screen. And you see how this material is not struck
22 through and it's not underlined. Correct?

1 MS. MARKOWSKI: Objection. Foundation.

2 Form.

3 A. So you are looking at page -- so I have the thing
4 open in front of me because sometimes it's a little
5 harder to see it on the share screen. It's a little
6 small. So you're on page 21, which I am on page 21.

7 BY MR. DANLEY:

8 Q. Correct.

9 A. Yeah, so the black material is material that's common
10 to both?

11 Q. Correct.

12 A. Okay. So what's your question?

13 Q. So my question is, starting on page 21, there is
14 material that is common to both your report -- your
15 substitute declaration and the patent owner's
16 response. Correct?

17 MS. MARKOWSKI: Objection. Foundation and
18 form.

19 A. I mean, I would have to sit down and do the
20 examination myself page-by-page, but it seems
21 reasonable.

22 BY MR. DANLEY:

1 Q. And as we go down to page 22, there's also material
2 that is in black that would indicate that it's
3 material common to both your substitute declaration
4 and to the patent owner's response; is that right?

5 MS. MARKOWSKI: Objection. Foundation and
6 form.

7 A. That seems reasonable, I guess. I mean, yes.

8 BY MR. DANLEY:

9 Q. And if you go down to page 24, virtually the entire
10 page indicates that there's an overlap between the
11 material in your substitute declaration and in the
12 patent owner's response; is that right?

13 MS. MARKOWSKI: Objection. Foundation.
14 Form.

15 A. I'm looking at the patent owner's response here that
16 I have in hard copy, and that page doesn't look like
17 the page you have on the screen. So I guess I don't
18 know -- I would have to sit down and do some analysis
19 to really look at this carefully, but the one I have
20 in front of me doesn't seem to have that. Let me
21 see...

22 I have in front of me Exhibit -- well, it

1 doesn't have an exhibit number, it just says "patent
2 owner response" on it, and when I look at page 24 of
3 it, it looks different from the one you have on the
4 screen.

5 So I guess I'm not sure where you're at
6 or... yes, please go ahead.

7 BY MR. DANLEY:

8 Q. Sure. Just a second.

9 So is it your testimony that you believe
10 that there are differences between this portion of
11 your substitute declaration and the patent owner's
12 response?

13 MS. MARKOWSKI: Objection. Foundation.
14 Form.

15 A. Again, I mean, I haven't sat down and did a detailed
16 analysis between the two documents word-for-word or
17 line-for-line, so I can't tell you exactly where are
18 the similarities or where are the differences. I'm
19 sure there are similarities and I'm sure there are
20 differences, I just haven't done that. So I can't --
21 I can't speak to it.

22 BY MR. DANLEY:

1 Q. So I'll represent to you that this is a comparison we
2 made, and the comparison that we made indicated that
3 there was a significant amount of overlap between your
4 substitute declaration and the patent owner's
5 response.

6 So my question to you is, do you know why
7 that -- there would be that significant amount of
8 overlap?

9 MS. MARKOWSKI: Objection. Foundation.
10 Form.

11 A. Well, I mean, the arguments, I would assume, would be
12 the same, you know. That the arguments that are
13 elaborated on in the declaration would be somewhat
14 summarized, and because I understand the petitions
15 and the patent owner responses have certain word
16 counts to them and limitations, I don't understand
17 the details of any that, so I don't -- I'm not a
18 legal attorney so I don't know where are the
19 limitations and all of the different things that go
20 with them.

21 But the declaration that I provided
22 provides the technical analysis, should we say, or the

1 details, and I would assume a lot -- much of that
2 details would go into the POR, the patent owner
3 response.

4 BY MR. DANLEY:

5 Q. Do you know why those details would be taken verbatim
6 from your declaration and put into the patent owner's
7 response?

8 MS. MARKOWSKI: Objection. Foundation.
9 Form. And to the extent any conversations between
10 counsel have occurred between Dr. Saber and ourselves,
11 such substance should not be disclosed.

12 A. So, again, the declaration is basically my analysis
13 of the current, you know, IPR that's in front of me,
14 the details in front of me, so I would assume that
15 that information would also make its way into the
16 petition -- or the patent owner response. So it's
17 that -- and if you take a paragraph from one and put
18 it in the other, I think that makes it clear that
19 we're saying the same things. There aren't any
20 contradictions or misinterpretations of wording or
21 that type of thing. So, to me, that would make
22 sense.

1 BY MR. DANLEY:

2 Q. Okay. So I'll take down Exhibit 3 and go back to, I
3 think, Exhibit 2, which is your substitute
4 declaration.

5 A. Okay, so I'm closing Exhibit 3 on my end.

6 Q. Okay. And let me share -- and this is -- Exhibit 2,
7 your substitute declaration, should be currently
8 displayed on the screen; is that right?

9 A. Yes, I see that, but I do have it open in front of
10 me, so if you can just point me to the right
11 paragraph, it's a lot easier to see on my screen
12 because your screen is a little on the small side.

13 Q. Okay, yeah, no problem.

14 MS. MARKOWSKI: And, Jeff, just so it's
15 clear on the record, this is 3Shape Exhibit 2008.

16 MR. DANLEY: Correct.

17 THE WITNESS: Yes, so your --

18 MR. DANLEY: I'm sorry, you were talking
19 over each other. If you can --

20 MS. MARKOWSKI: The exhibit that you, Jeff
21 Danley, and Dr. Saber are referring to is 3Shape
22 Exhibit 2008, for the record.

1 MR. DANLEY: Okay.

2 BY MR. DANLEY:

3 Q. And, Dr. Saber, did you have anything you wanted to
4 add?

5 A. No. What I said is, on the screen I see
6 paragraph 24, and I have -- on my document that you
7 uploaded that I have opened, I am at paragraph 24.

8 Q. Okay. Yeah. And I just have some general questions
9 about the substitute declaration right now, so that
10 just happened to be the page it was opened to. So I
11 can pull it up to the title page if that makes it a
12 little bit more clear.

13 But, Dr. Saber, my understanding is that
14 your substitute declaration provides the opinions and
15 direct testimony that you wanted to provide related to
16 patent number -- or patent number 10,695,151 in this
17 IPR matter; is that correct?

18 A. That is correct.

19 Q. And that there is no additional material or no
20 additional opinions that you wanted -- that you would
21 want to provide as part of your direct testimony in
22 this matter; is that right?

1 A. Not at this time. Yes, that is correct.

2 Q. Okay. So I do want to go down to section number 5,
3 which is page 13. And I apologize. I have the actual
4 page numbers, not the PDF page numbers, so it's
5 actual -- the page that is labeled page number 13 in
6 your substitute declaration. And this would be
7 section number V, titled The '151 Patent.

8 A. Yeah, I think the easiest way, if you can just name
9 the paragraph number, that's usually a lot easier.

10 Q. Okay. So this would be section number V. It only has
11 one paragraph, which is paragraph number 31. So let
12 me know when you're there, Dr. Saber.

13 A. I am there, sir.

14 Q. Okay. So it's my understanding that section V,
15 paragraph 31, provides an overview of the '151 patent;
16 is that correct?

17 A. That is correct. It's obviously a brief overview,
18 yes.

19 Q. And is it fair to say that this brief overview doesn't
20 discuss any of the components of -- that are described
21 in the '151 patent?

22 A. Yeah, this is just a brief summary, so to speak, you

1 know, from the abstract, from the patent. And I'm
2 assuming you are going to upload the patent?

3 Q. Correct. I can do that now if it would help you. I
4 assume you have a copy in front of you, but just so
5 the record is clear and to make it an exhibit number,
6 I can go ahead and upload the patent for you.

7 A. Yes, please do so. It's easier. Because it's a lot
8 easier to work from electronically.

9 Q. Yeah.

10 MR. DANLEY: So I am uploading as Exhibit
11 Number 4 in this deposition the '151 patent. This
12 would be Exhibit 1001 from Medit, the petitioner in
13 this IPR proceeding.

14 MARKED FOR IDENTIFICATION:

15 EXHIBIT 4

16 11:27 a.m.

17 BY MR. DANLEY:

18 Q. Just let me know when you have the '151 patent open,
19 Dr. Saber.

20 A. Give me a moment. I see it now in the Chat box.

21 I do have it open in front of me.

22 Q. Okay. And what's your understanding of what the

1 abstract of the patent provides?

2 A. Essentially, it provides a brief overview of what's
3 being described in the patent.

4 Q. And the abstract is the only part of the '151 patent
5 that you cited in section number V; is that right?

6 A. In section number V, paragraph 31, that is the only
7 thing I have cited, yes.

8 Q. Okay. And as you noted here, paragraph 5 -- or
9 section V, paragraph 31, does not provide any
10 description of the components described in the '151
11 patent, does it?

12 A. It just refers -- it just cites the abstract in that
13 particular section.

14 Q. And is it fair to say that section V and paragraph 31
15 do not describe any of the methods that are disclosed
16 in the '151 patent?

17 A. Well, if you look at the first sentence of
18 paragraph 31, it says that, "The '151 patent
19 discloses a method." So it describes that it
20 "discloses a method, a user interface, and a system
21 for use in determining shade of a patent's tooth,
22 wherein a digital 3D representation including shape

1 data and texture data for the tooth is obtained."

2 So obviously it gives a brief overview of
3 what -- you know, what is being described in the
4 specification and the claims of the patent, but it
5 doesn't provide those details in paragraph 31.

6 Q. Okay. So it doesn't provide any details about the
7 actual method, does it?

8 MS. MARKOWSKI: Objection. Form.

9 A. No, it doesn't provide details about the actual
10 method, but it does disclose that such a method is
11 being described in the patent. But obviously the
12 specification and the claims provide additional
13 details.

14 BY MR. DANLEY:

15 Q. And paragraph 31 in section V doesn't provide any
16 details regarding the user interface, does it?

17 A. It discloses that the user interface exists. It
18 doesn't provide details about the user interface.

19 Q. And the same is true in terms of system. Right? That
20 paragraph 31 in section V discloses that there is a
21 system, but it doesn't provide any details about that
22 system; is that right?

1 A. That is correct. It discloses that such a system is
2 being described in the '151, and obviously the
3 details will be in the specification and in the
4 claims.

5 Q. Is it fair to say that the details regarding the
6 method in the '151 patent are not described elsewhere
7 in your substitute declaration?

8 MS. MARKOWSKI: Objection. Form.

9 A. I don't know what you mean, "not described
10 elsewhere." They're described as needed to provide
11 the proper analysis on each of the claims in response
12 to the petition.

13 BY MR. DANLEY:

14 Q. So I'm going to move down to section VI, Claim
15 Construction. This would be paragraph 32.

16 A. Yes, sir.

17 Q. And is it fair to say that this section provides your
18 understanding of the claim construction process that
19 should be applied in this proceeding?

20 A. That's generally correct, yes.

21 Q. And can you describe for me the process for
22 determining what claim terms mean as part of that

1 claim construction process -- or, actually, strike
2 that.

3 Maybe a clearer question is, how did you go
4 about determining what certain claim terms meant --
5 mean as part of your analysis?

6 A. I've applied, you know, plain and ordinary meaning
7 from the eyes of a POSITA at the time of the alleged
8 invention. But as you see here in paragraph 32,
9 looking at the fourth line, you see where it says, "I
10 have been informed that the words of a claim are
11 first given their plain meaning that those words
12 would have had to a POSITA at the time of the alleged
13 invention."

14 So that's what I have applied in my
15 analysis. The only difference is when it comes to
16 paragraph 33 with regards to deriving a certainty
17 score.

18 Q. And so for the process of determining the plain
19 meaning, how do you do that?

20 A. Well, I read through the claim terms from the eyes of
21 a POSITA and these terms have a certain meaning in
22 the art, and I apply plain and ordinary meaning -- as

1 you read the claims -- obviously the claim terms, you
2 read those in light of the specification.

3 So I read the claims carefully. I read
4 through the specification very carefully. And I apply
5 plain and ordinary meaning to the claims.

6 Q. Okay. So the first -- it sounds like the initial step
7 that you take is that you do interpret, construe the
8 claims -- or determine the plain and ordinary meaning
9 based upon the specification in the claims themselves;
10 is that right?

11 A. Well, you read -- I mean, I'm not an attorney, so I'm
12 not -- I read the claims from the eyes of a POSITA,
13 so reading them at the time of the alleged invention.
14 So I read through that, I apply plain and ordinary
15 meaning, and as I'm reading through the claims, I
16 also have studied the specification in detail. So I
17 read the claims in light of the specification.

18 Q. Okay. I want to go to page 15, paragraph 37.

19 Actually, before we do that, page 14,
20 paragraph 33.

21 A. Yes.

22 Q. It looks like there's an incomplete sentence. You

1 say, "Petitioner asserted that the term 'deriving a
2 certainty score' recited in Claim 1 as adopted by the
3 District Court in the parallel litigation."

4 And then there's a period. Did you mean to
5 include a complete sentence there?

6 A. Well, that is, in a sense, a complete sentence, so...

7 Q. All right. Strike that. Did you mean to add any
8 additional information to that sentence?

9 A. Well, the additional information is the next
10 sentence. So I understand the "Petitioner asserted
11 that the term 'deriving a certainty score' recited in
12 Claim 1," and that has been adopted by the District
13 Court in the parallel litigation. It's my
14 understanding that the District Court has construed
15 this term to mean "determining an accuracy value
16 based on the tooth shade value, the texture data,
17 and/or texture information."

18 And I've adopted that construction in my
19 analysis.

20 Q. Okay. So now going to page 15, paragraph 37. And,
21 actually, the questions I'm going to ask are the
22 portion in paragraph 37 on page 16, just if that helps

1 you.

2 A. Okay.

3 Q. So on paragraph 37, you start off with -- or you start
4 off by quoting the '151 patent. Correct?

5 A. That is correct.

6 Q. And the quote here states that -- or involves
7 determining the tooth shade from a 3D representation;
8 is that right?

9 A. That's the start of the quote, yes.

10 Q. And the quote says that there's an advantage provided
11 in the '151 patent and "that [the] shade and geometry
12 information are directly linked." Correct?

13 A. That is correct.

14 Q. And that is a quote directly from the '151 patent.
15 Right?

16 A. That is correct.

17 Q. And is it fair to say that the remaining two sentences
18 in paragraph 37 are your opinion? Correct?

19 A. That is correct. That's the next sentence and
20 obviously the next paragraphs.

21 Q. And so just so the record's clear, the two sentences
22 that we're referring to are, "By determining the tooth

1 shade value from data in the 3D digital
2 representation, one gains numerous additional
3 advantages. For example, determining the tooth shade
4 value from data in the 3D representation allows the
5 user to rely on multiple subscans of the same or
6 different points or locations of the tooth."

7 Is that right, Dr. Saber?

8 A. You read that correctly.

9 Q. Okay. So you don't provide any citations for these
10 opinions, do you?

11 A. Not in that particular sentence, but the next
12 paragraph starts to provide citations.

13 Q. Okay. And is it your testimony that the next
14 paragraph is -- provides the support for the opinions
15 in paragraph 37?

16 A. Well, it starts -- yeah, it starts to provide more
17 analysis, more details, provides citations to the
18 '151.

19 Q. So isn't it fair to say that your opinion in
20 paragraph 37 relates to finding the tooth shade value?

21 A. Well, it's essentially talking about use of the
22 subscans to create the 3D representation, which --

1 from which you derive the tooth shade values.

2 Q. And one advantage -- and it's my understanding that
3 one advantage provided by using numerous -- or strike
4 that.

5 So it's my understanding based upon this
6 paragraph -- your statements in paragraph 37, that the
7 advantage of having multiple subscans is that you can
8 use the same or different points or locations of a
9 tooth to determine the tooth shade value; is that
10 right?

11 MS. MARKOWSKI: Objection. Form.

12 A. I mean, let's just be clear of the sentence exactly.
13 So for the record, the sentence states, "For example,
14 determining the tooth shade value from data in the 3D
15 representation allows the user to rely on multiple
16 subscans of the same or different points or locations
17 of the tooth."

18 And if you look at paragraph 38, it starts
19 to describe more in detail -- you know, adds more
20 detail to this particular sentence.

21 BY MR. DANLEY:

22 Q. Okay. So we'll get to paragraph 38 in a bit. What

1 did you mean, in paragraph 37, when you said "same or
2 different points or locations"?

3 A. Well, you have points on the tooth and, you know, as
4 you see, when you look at paragraph 38, you see that
5 first sentence that's quoted from the patents. You
6 have points on the tooth and you are creating
7 subscans using instrumentation that's being discussed
8 in the '151. You are creating subscans of,
9 basically, the tooth or parts of the tooth that you
10 are measuring. These subscans capture certain points
11 multiple times. One captures points multiple times.

12 Q. And these points could be the same points or they
13 could be different points; is that right? According
14 to your opinion?

15 A. Well, the subscans are going to capture the location
16 that you are measuring on the tooth. Those subscans
17 are going to contain points. Each subscan is going
18 to contain a series of points on the tooth.
19 Different -- a different subscan will contain a
20 series of points on the tooth. It may not be exactly
21 the same points when you look at the resolution and
22 assembling process, but you're essentially going

1 after the same area on the tooth.

2 Q. And what do you mean when you say a "subscan"? Or
3 what is a subscan?

4 A. Well, I'm looking at '151 at this point. So if you
5 look at the '151 patent, column 15, and starting at
6 lines 52 to column 16, line, let's say, 9, you have a
7 decent description of subscans and the particular
8 process.

9 So you see it says different scanner
10 configurations can be used to acquire subscans
11 comprising both shape and texture data. And then it
12 describes, "In some [scanner] designs the scanner is
13 mounted on axes with encoders which provide [that] the
14 subscans acquired from different orientations can be
15 combined using position and orientation readings."

16 And then it gives an example: "When the
17 scanner operates by the focus-scanning technique the
18 individual subscans of the tooth are derived from a
19 sequence of 2D images obtained while scanning a focus
20 plane over a portion of the tooth."

21 Q. So it's -- go ahead.

22 A. Go ahead. Please, go ahead.

1 Q. I was going to ask, so if you were trying to explain
2 to a student what a subscan is, what would be your
3 explanation?

4 A. Well, as you see there, I mean, let's say -- let's
5 just take the example of focus-scanning, just to --
6 just so it's easy and clear. So we see where it
7 says, "When the scanner operates by the
8 focus-scanning technique the individual subscans of
9 the tooth are derived from a sequence of 2D images
10 obtained while scanning a focus plane over a portion
11 of the tooth."

12 So essentially you have a focus -- you
13 focus at a certain point of the tooth. We're talking
14 at the millimeter or micrometer level. We're not
15 talking, you know, at the meter level. So we're
16 talking at the micrometer level. You have a plane of
17 focus on where the tooth is and you're capturing a 2D
18 image. Then you change your focus by, let's say, a
19 few micrometers one way or the other, you capture
20 another 2D image.

21 So as you move your focus in different
22 planes, because a tooth is a three-dimensional object,

1 some points will become more focused and some points
2 will become defocused.

3 So those stack of 2D images that you have
4 captured can be compacted together or, you know,
5 concatenated together, in a sense, using, you know,
6 interpolation and averaging proper, you know,
7 filtering techniques to provide you with a subscan for
8 this particular location of the tooth. And then you
9 repeat that process as you move the scanner to
10 different -- to different parts of the tooth.

11 Obviously this is happening in very fast
12 time. Right?

13 Q. Would the subscan then be -- strike that.

14 Would the subscan be two-dimensional?

15 A. Well, the subscan -- you know, you have like a grid,
16 in a sense. You have a grid of points, but the
17 information within these points is captured at
18 different -- you know, different levels on the tooth.
19 So the points that are at the focus plane will be
20 more focused. The points that are not at the focus
21 plane will be slightly defocused, and as you move
22 away from the focus plane, you get more defocussed.

1 That's -- the advantage of the subscan is
2 then you can determine the Z-axis, if you wish. If I
3 were to call X-axis and Y-axis the plane that we're
4 talking about, the Z-axis is the depth across the
5 structure. So that's how you get the depth
6 information with the use of subscans.

7 Q. And so the subscan would, as you testified before, be
8 the concatenation of all these various scans taken at
9 different -- at these various focal lengths. Correct?

10 MS. MARKOWSKI: Objection. Form.

11 A. So I think the sentence that is stated in the patent
12 probably states it more accurately. So you can see,
13 if I'm looking at column 15, line 57, to let's say
14 60, 61 or so, "when the scanner operates by the
15 focus-scanning technique," this is one example,
16 obviously, "the individual subscans of the tooth are
17 derived from a sequence of 2D images obtained while
18 scanning a focus plane over a portion of the tooth."

19 And they have -- they site this WO where
20 they describe the focus-scanning technique. But the
21 point is -- to answer your question is, you have 2D
22 images that are obtained at a given focus plane. So

1 if I have a focus plane at a certain -- at a certain
2 height at the tooth, let's say right at the very top
3 of the tooth level, some points on the tooth are going
4 to be very -- in good focus because they're right in
5 that focus plane.

6 Some points above the tooth will maybe be
7 defocused. Some points below that particular plane
8 will also have a defocus to them. And as you drop
9 down from there, you get more defocus. So then you
10 would change your plane, your 2D image, you would
11 change your focus level. So as you change your focus
12 level you move to different planes. And different
13 points will become focused and different points will
14 become defocused because the tooth is a
15 three-dimensional structure. Right? So not all
16 points are in the same plane.

17 BY MR. DANLEY:

18 Q. All right. So is it fair to say that the subscan
19 would actually be a three-dimensional object?

20 A. Well, the subscan will capture -- the 2D images that
21 you capture here from a sequence of 2D images, those
22 2D images, when you concatenate them, when you take

1 them together to derive a subscan, the subscan will
2 contain, in essence, points that are focused
3 throughout this 2D, you know, structure of --
4 throughout this salient grid. So the different
5 points in focus, but now you have an understanding of
6 their Z direction because you know where they've been
7 focused at.

8 Q. So just so the record's clear, my understanding is
9 that the subscan would be the combination of all these
10 2D images taken at different focal planes. Correct?

11 A. Yes. So what I would like to -- to just to keep
12 clear for the record, so you see it says the
13 individual subscans -- I'm reading at line 58 of
14 column 15. "The individual subscans of the tooth are
15 derived from a sequence of 2D images obtained while
16 scanning a focus plane over a portion of the tooth."

17 I like that definition because I think it's
18 fairly clear. So you have 2D images that you have
19 taken. Each 2D image is taken at a different focal
20 point, focal plane, in a sense. So you imagine at the
21 micrometer level you have 2D image 1 taken at focus 1,
22 and then you move down 1 micrometer and you have 2D

1 image focus 2, and you move down and you get 2D image
2 focus 3, and et cetera.

3 So I'm making this up as an example to
4 illustrate. Then those concatenated 2D images,
5 because some points on those images will be -- in each
6 image will be in focus, some will be less focused, and
7 more less focused, and so on. So when you concatenate
8 these together you have a fairly good subscan, but you
9 also have where they were in focus. So that gives you
10 the Z-axis, if you would.

11 Q. So is it fair to say that the information contained in
12 a subscan would include X, Y, and Z information?

13 A. It would certainly include X, Y, and you can compute
14 the Z from the focus -- from the focus plane because
15 you know where the focus is, so you can derive the Z.

16 Q. And so I guess what I'm trying to understand is, for
17 the subscan, does the subscan, as you understand it,
18 also include the Z information or does the subscan --
19 strike that.

20 Based upon your understanding, does the
21 subscan that is described in the '151 patent include
22 the Z information?

1 A. So, yeah, you would have the Z information because
2 you know where the focus is. So the -- so you focus
3 the instrument -- we're talking again at the micron
4 level here. We're not talking like an outdoor scene.
5 We're talking at the micron level.

6 You focus the instrument, so you know the
7 focal length. You can -- you know this point is in
8 focus at that focus length, so you can compute the Z
9 information for that point because you know where it
10 is in focus. Then as you move the focus of the
11 instrument, that Z point will change and you keep
12 track -- you know where that is.

13 Q. And so is it fair to say that the subscan would
14 consist of points that have X, Y, and Z information?

15 A. So it consists of the XY points because you're
16 scanning on -- let's say you have 2D images, you have
17 a grid, and because of the focal length of the
18 instrument and where you focus, you derive the Z
19 point for each one of these XY points.

20 Q. And so each point --

21 A. And you have all that information.

22 Q. Okay. That was going to be my next question, so thank

1 you.

2 So going back to paragraph 37 --

3 A. Of my substitute dec?

4 Q. Of your substitute declaration.

5 A. Yes, sir.

6 Q. The last sentence, you state that, "Determining the
7 tooth shade value from data in the 3D representation
8 allows the user to rely on multiple subscans of the
9 same or different points or locations of the tooth."

10 Is that right?

11 A. You read that correctly.

12 Q. So my understanding is that one of the advantages
13 provided by the '151 patent is that by using multiple
14 subscans -- strike that.

15 My understanding from this part of your
16 opinion is that one of the advantages provided by the
17 '151 patent is that multiple subscans can be used to
18 determine the tooth shade value; is that right?

19 MS. MARKOWSKI: Objection. Form.

20 A. I mean, that's a very vague understanding, but that's
21 generally the right direction, yes. You are using
22 multiple subscans to generate the 3D representation.

1 BY MR. DANLEY:

2 Q. Okay. So if I can direct your attention to the '151
3 patent.

4 A. And which portion of it, sir?

5 Q. Yeah, let me stop sharing that, and I'll share the
6 '151 patent.

7 A. If you tell me where the column and number is, it
8 probably would be easier because I have it open in
9 front of me, and these eyes are getting old, so it's
10 a lot easier to see it at a bigger magnification.

11 Q. No problem. I also want to make sure that the record
12 is clear, so part of this is just making sure that --

13 A. I understand.

14 Q. -- we have on the screen like what we're discussing.
15 So I appreciate your concern, and whenever I get
16 there...

17 A. Yeah, if you can just tell me the column and the
18 number -- and the line number, that would be
19 fantastic.

20 Q. Yeah, so it's going to be Claim Number 1.

21 A. Claim Number 1.

22 Q. Yeah.

1 A. Yes, sir.

2 Q. And the '151 patent should be displayed on the screen
3 for this Zoom conference; is that right?

4 A. That is correct. I see it on the screen.

5 Q. Okay. And you can, of course, use the electronic
6 copy, your local electronic copy or your hard copy,
7 whichever you prefer.

8 But going down to Claim Number 1, which is
9 in column 21 of the '151 patent -- do you see that?

10 A. Yes, but just to be clear, I'm using your electronic
11 copy that you have uploaded in the Chat box that I
12 have open here.

13 Q. Okay.

14 A. I don't have other copies besides that.

15 Q. Okay. That's fine. So using that copy, let me know
16 when you're to Claim Number 1.

17 A. I am at Claim Number 1.

18 Q. So isn't it accurate to say that Claim Number 1 does
19 not include the term "subscans"?

20 A. Well, the word "subscan" doesn't appear in the
21 typing -- in the sentences of Claim 1, if that's what
22 you're asking.

1 Q. Correct. Isn't it also fair to say that Claim Number
2 1 doesn't require that multiple subscans be obtained?

3 A. Well, Claim Number 1 claims "obtaining a digital 3D
4 representation of the tooth, where the digital 3D
5 representation comprises shape data and texture data
6 for the tooth."

7 So as long as you're able to obtain a
8 digital 3D representation where the digital 3D
9 representation comprises shape, data, and texture data
10 of the tooth, you've met limitation or element 1a of
11 Claim 1.

12 Q. And is there any element in Claim 1 that requires that
13 multiple subscans be obtained or used?

14 A. Well, again, the word "subscan" doesn't appear in
15 Claim 1 directly. It's not typed there in Claim 1.
16 You know, when you read Claim 1 in light of the
17 specification, you understand for the '151 that one
18 of the methodologies they have applied is the use of
19 subscans to compute or derive -- to obtain a digital
20 3D representation. But the claim element 1a just
21 states that you obtain a digital 3D representation
22 which contains shape and texture data.

1 Q. And it doesn't matter -- is it fair to say that for
2 Claim 1, it doesn't matter how that 3D representation
3 is obtained?

4 A. It matters that it just has shape data and texture
5 data. As long as it has shape data and texture data,
6 then it meets element 1a.

7 Q. And it meets element 1a without regard as to how that
8 shape data and texture data was obtained; is that
9 right?

10 A. That's generally correct. As long as you're
11 obtaining a digital 3D -- so the element 1a says
12 "obtaining a 3D digital representation of the tooth,
13 where the digital 3D representation comprises shape
14 data and texture data for the tooth."

15 So as long as that digital 3D
16 representation has shape and texture data, you've met
17 element 1a.

18 Q. And going to Claim 13, isn't it fair to say that
19 Claim 13 also does not require obtaining multiple
20 subscans?

21 A. Again, the word "subscan" doesn't appear in Claim 13.

22 Q. And so, again, as long as you obtain a 3D

1 representation that includes shape data and texture
2 data, it doesn't matter how you obtained that digital
3 3D representation, does it?

4 A. So the word "subscan" doesn't appear there, so as
5 long as you are obtaining a digital 3D representation
6 of the tooth where the digital 3D representation
7 comprises shape data and texture data of the tooth,
8 you've met element 13a of Claim 13.

9 Q. And going back to Claim 1, the second element states
10 "determining a tooth shade value for at least one
11 point on the tooth based on the texture data of the
12 corresponding point of the digital 3D representation
13 and on known texture values of one or more reference
14 tooth shade values."

15 Did I read that correctly?

16 A. You read it correctly.

17 Q. Isn't it fair to say that that limitation does not
18 require the use of texture data from multiple points
19 on the 3D representation?

20 A. Well, it states "determining a tooth shade value for
21 at least one point on the tooth based on the texture
22 data of the corresponding point of the digital 3D

1 representation."

2 So this tooth shade value is being
3 determined for at least one point. It could be more,
4 but at least one point on the tooth based on the
5 texture data of the corresponding point of the digital
6 3D representation and on known texture values from one
7 or more reference to shade value.

8 So you have a reference set of tooth shade
9 values, you have known texture values there, and then
10 you make your determination.

11 Q. And so that wasn't quite my question. My question is
12 that based upon this limitation in Claim Number 1,
13 this limitation does not require the use of multiple
14 points -- strike that.

15 Isn't it fair to say that this limitation
16 in Claim 1 doesn't require the use of texture data
17 from multiple points in the digital 3D representation?

18 A. Well, you're determining a tooth shade value for at
19 least one point on the tooth based on the texture
20 data of the corresponding point. So texture data
21 usually is not just one point. Right? So you have
22 texture data is essentially -- when you're

1 determining that particular point, you may not be
2 looking at one point because texture data isn't
3 just -- you might be looking at the neighborhood of
4 that point, but you're determining the tooth shade
5 value for at least one point based on the texture
6 data and on known texture values.

7 So it's not necessarily saying that you
8 just have to use that one point only.

9 Q. I guess that's what I'm saying. What I'm trying to
10 understand is, Claim 1 doesn't require the use of
11 multiple points, does it? Because the claim
12 limitation says that you determine the tooth shade
13 value for at least one point of the tooth based on the
14 texture data of the corresponding point of the digital
15 3D representation.

16 So isn't it fair to say that this element
17 in Claim Number 1 just requires the use of the texture
18 data from the corresponding point?

19 MS. MARKOWSKI: Objection. Form.

20 A. So, again, let's -- let me give you an example. If I
21 were to say to you I am going to determine something
22 based on the average value of some point, that

1 average value may have been computed as an average of
2 nine pixels or something.

3 So it's not -- so when you are determining
4 a tooth shade value for at least one point on the
5 tooth based on the texture data of the corresponding
6 point on the digital 3D representation, that texture
7 data of the corresponding point of the 3D -- digital
8 3D representation isn't -- you know, there's a
9 neighborhood there for that texture, right, so you're
10 not -- you may not just be using only the point to
11 compute that.

12 BY MR. DANLEY:

13 Q. But the claim doesn't require you to use multiple
14 points. Right?

15 MS. MARKOWSKI: Objection. Form.

16 A. Well, the claim requires that you use -- that you use
17 the texture data of the corresponding point on the --
18 of the digital 3D representation, and that texture
19 data is -- you know, texture isn't just a single
20 point, in a sense. Right? Like you look outside and
21 you see grass there, it's not just -- you know, the
22 texture is kind of a, how to say this... it's got a

1 neighborhood property to it. Right?

2 The only -- you can see texture when you
3 see more than one point. So you're determining the
4 tooth shade value for at least one point on the tooth,
5 so you pick a point on the tooth, you're determining
6 its tooth shade value based on the texture data of the
7 corresponding point of the digital 3D representation.

8 So when you go to the corresponding point
9 on the digital 3D representation, the texture data of
10 that point isn't -- is -- obviously it has a point --
11 a value at that point, but it also has a value in the
12 neighborhood of that point that you may utilize to
13 compute that.

14 BY MR. DANLEY:

15 Q. So is that a limitation that you are incorporating
16 into Claim Number 1?

17 MS. MARKOWSKI: Objection.

18 A. Well, it's not a limitation that I've incorporated.
19 I'm just reading, you know -- it's plain and ordinary
20 meaning. You're -- for at least one point on the
21 tooth based on the texture data of the corresponding
22 point of the digital 3D representation. So the

1 texture data of that corresponding point of the
2 digital 3D representation is its texture data, so
3 obviously that point has a texture data, but so does,
4 essentially, its neighborhood.

5 So it's based on that texture data.

6 BY MR. DANLEY:

7 Q. So is it your testimony that, in your opinion, the
8 texture data of the digital 3D -- of a point on the
9 digital 3D representation as recited in Claim Number 1
10 actually includes texture data from multiple points?

11 MS. MARKOWSKI: Objection. Form.

12 A. It's just -- it includes -- basically, it includes
13 texture data of the corresponding point. I think
14 we're saying the same thing. So it's texture data of
15 the corresponding point of the digital 3D
16 representation, but that texture data of the
17 corresponding point is in light of what's around that
18 point, in a sense.

19 BY MR. DANLEY:

20 Q. What do you mean, "in light of what's around that
21 point"?

22 A. I mean, again, when you look at a texture, if I were

1 to just show you one point of that texture and
2 nothing else, you just have one location there.
3 Right? So for you to see texture, you have to see
4 more than one point. So the texture data, you know,
5 is essentially like a neighborhood property in a
6 sense.

7 Q. So I'm just trying to understand. The claim says that
8 you determine the tooth shade value for at least one
9 point on the tooth based on the texture data of the
10 corresponding point of the digital 3D representation.
11 This limitation in Claim 1 does not recite using
12 multiple points, does it?

13 MS. MARKOWSKI: Objection. Form.

14 A. Again, it doesn't -- that doesn't recite using
15 multiple points, but it does recite based on the
16 texture data. So data is a plural, right? So datum
17 is singular, data is plural. So it essentially says
18 based on the texture data of the corresponding point
19 of the digital 3D representation.

20 So the corresponding point of the digital
21 3D representation has the certain texture data that's
22 defined.

1 BY MR. DANLEY:

2 Q. But again, claim -- this limitation in Claim 1 doesn't
3 recite using multiple points from the digital 3D
4 representation, does it?

5 MS. MARKOWSKI: Objection. Form.

6 A. Again, as I said, the word "multiple points" doesn't
7 appear there, but it does recite the use of texture
8 data.

9 BY MR. DANLEY:

10 Q. Okay.

11 MR. DANLEY: So we've been going for a
12 little bit over an hour, so if you want to take a
13 break...

14 THE WITNESS: I think that's fantastic. Do
15 you want -- I mean, it's 12:15 on the East Coast here,
16 or 12:11. I think you're on the West Coast, sir.
17 Right?

18 MR. DANLEY: Correct. We can go off the
19 record for this.

20 (Off the record at 12:11 p.m.)

21 (Back on the record at 12:41 p.m.)

22 BY MR. DANLEY:

1 Q. Good afternoon, Dr. Saber.

2 A. Good afternoon to you -- or good morning to you.

3 Q. It's still good morning, that's true. I'll continue
4 sharing my screen, your substitute declaration,
5 Exhibit 2 to the declaration, Exhibit 2008 submitted
6 by 3Shape. Do you see that?

7 A. I do, sir.

8 Q. Okay. So I wanted to direct your attention to
9 paragraph 42, page 18. Just let me know when you're
10 ready.

11 A. I am at paragraph 42.

12 Q. Okay. So I wanted to ask you some questions about one
13 of the sentences appearing in the middle of that
14 paragraph. It says, or you state, "The 3D
15 representation having both shape and texture data is
16 obtained (not independently as in Korten) with an
17 intraoral scanner that obtains subscans of the scanned
18 teeth from a plurality of 2D images."

19 Do you see that sentence?

20 A. I do.

21 Q. What did you mean by the term "independently" in that
22 sentence?

1 A. So "The 3D representation having both shape" and
2 color -- "and texture data is obtained," if you skip
3 the paren for a moment, "with an intraoral scanner
4 that obtains subscans of the scanned teeth from a
5 plurality of 2D images."

6 Now, the parentheses there just says the
7 shape and texture is obtained, in a sense,
8 simultaneously while you're doing, you know -- as part
9 of the subscan.

10 As I explained to you earlier, a subscan
11 contains the 2D grid of the points. It also has -- so
12 that gives you the texture data, and it also has the
13 XY locations and you compute the Z based on a focus.

14 So that gives you the shape information,
15 which then is used -- so the 2D images are used to
16 create the subscans. The subscans containing shape
17 and texture data are used to create the 3D, digital 3D
18 representation in the '151.

19 That is not the case in Korten. Korten
20 does shape and color independently.

21 Q. And how does Korten do -- obtain shape and data -- or
22 shape data and texture data independently?

1 A. Well, do you want to upload Korten for me, please?

2 Q. Yes, of course.

3 MR. DANLEY: So this will be Exhibit 5 to
4 the deposition. It will be Exhibit 1009 from the IPR
5 proceedings. And this is patent number 10,028,810 to
6 Korten.

7 MARKED FOR IDENTIFICATION:

8 EXHIBIT 5

9 12:44 p.m.

10 BY MR. DANLEY:

11 Q. And just let me know when you have it and are ready to
12 proceed.

13 A. I see it now in my Chat box, so give me a moment.

14 So I do have it open. So what was your
15 question, sir?

16 Q. Yeah, so the question was, how does Korten disclose
17 obtaining shape data and texture data independently?

18 A. Well, the easiest disclosure to look at is, go to
19 column 2 of Korten, and if you look at column 2 and
20 starting right at line 1 -- and I'm going to talk
21 about line 1 to about line 13.

22 So you see Korten positions the first

1 optical sensor relative to the patient's dentition, on
2 the first lines. Then Korten captures via the optical
3 sensor -- the first optical sensor at least a portion
4 of the shape of a tooth of the patient's dentition and
5 based thereon provides a first virtual dentition model
6 representing that shape in a three-dimensional
7 coordinate system.

8 So Korten uses the first optical sensor to
9 capture the shape and creates a first virtual
10 dentition model that represents the shape in a
11 three-dimensional coordinate system.

12 Then you see in the next sentence on
13 line 8, it says, "Independent from capturing the
14 shape" -- and I guess I stress the word "independent"
15 there -- "measuring a first color at a first location
16 on the tooth portion." And then Korten provides "a
17 correlation between the first location of the first
18 color and a coordinate in the first virtual dentition
19 model."

20 So Korten captures the shape with one
21 instrument, captures the color with a different
22 instrument, independently as clearly stated there, and

1 then correlates the color that's captured with --
2 independently with the first virtual dentition model
3 that's created by Korten.

4 Q. So is it fair to call the -- or -- strike that.

5 Is it fair to refer to a first optical
6 sensor and a second optical sensor in Korten?

7 A. Well, Korten refers to them as -- well, he refers to
8 capturing via the first optical sensor the shape.
9 Now, if you -- so if you look at column 2, starting
10 at line 13, he talks about the advantages of the --
11 of the -- you know, capturing the color and
12 what-have-you.

13 But if you look at line 31, you see it
14 says, "In one embodiment the method comprises the step
15 of positioning a second optical sensor relative to the
16 patient's dentition," and measures the color via a
17 second optical sensor.

18 Q. I'm just trying to use some shorthand as opposed to
19 "first instrument" and "second instrument" and say
20 "first optical sensor" and "second optical sensor," is
21 all I'm trying to do.

22 So is it fair to refer to a first optical

1 sensor and second optical sensor as described in
2 Korten?

3 A. Sure, if that's what you would want.

4 Q. And so the first optical sensor would capture shape
5 information. Correct?

6 A. As stated in Korten, as you see in column 2, lines 2
7 through, say, 6 or 7.

8 Q. And the second optical sensor would capture color
9 data; is that correct?

10 A. That would be correct.

11 Q. And it's your opinion that, in Korten, the first
12 optical sensor captures shape data independently from
13 the second optical sensor capturing color data; is
14 that right?

15 MS. MARKOWSKI: Objection. Form.

16 A. So just to make sure we're clear. I'm not sure if I
17 understood your question correctly, but just to make
18 sure we're clear, so if you look at column 2, those
19 lines I was just pointing you to, it says "capturing
20 via the first optical sensor," et cetera, et cetera,
21 and then it gives you the shape, which creates the
22 first virtual dentition model in Korten in a

1 three-dimensional coordinate system.

2 Independently of doing that, Korten
3 captures color and then correlates the color with the
4 three-dimensional coordinate system.

5 BY MR. DANLEY:

6 Q. So if the -- hypothetically, if the first optical
7 sensor in Korten is contained within the same scanner
8 housing as the second optical sensor in Korten, would
9 those be operating not independently from each other?

10 MS. MARKOWSKI: Objection. Form and
11 foundation.

12 A. The answer to that would be no.

13 BY MR. DANLEY:

14 Q. So it would still be operating independently from each
15 other, just to get rid of the double negative.

16 MS. MARKOWSKI: Objection. Form.

17 A. Correct. So if you look, for instance, at the
18 figures of Korten, like you look at Figure 2,
19 Figure 3, Figure 4, different sensor configurations,
20 just because you put the two on the same handle,
21 let's say, or the same instrument, you are still
22 capturing the two independently from each other.

1 It's not whether they're mounted on the
2 same piece or mounted independently, it's the process
3 of the capturing that is being discussed here in
4 Korten that's different from the '151.

5 So the '151, as we discussed with the
6 subscans, the subscans capture the shape and the
7 texture at the same -- at the same time, in a sense,
8 or in the same -- in the same image, you have -- in
9 the same one of those 2D images of the subscans, you
10 have the texture information and you also have the Z
11 information that talks about where the focus was so
12 that you have the shape information.

13 The next 2D image has the same thing. The
14 next 2D image has the same thing. So it's being
15 captured, you know, simultaneously, in a sense, versus
16 Korten they are captured independently.

17 BY MR. DANLEY:

18 Q. So it's -- with that understanding, if,
19 hypothetically, shape data and color data are captured
20 from the same camera or the same optical sensor but at
21 different times, would that also be not independent?

22 MS. MARKOWSKI: Objection. Foundation and

1 form.

2 A. I don't understand your question.

3 BY MR. DANLEY:

4 Q. So you said that in the '151 patent, the shape data
5 and the color data are captured as part of the same
6 image, and therefore that capture was not done
7 independently.

8 So what I'm trying to understand is that if
9 you have a single camera and you capture data that's
10 used for shape in one image and you capture data
11 that's used for color in a second image, would it be
12 your opinion that that would not be capturing shape
13 data and color data independently? Or they would
14 not -- or they would be capturing shape data and color
15 data independently as well?

16 MS. MARKOWSKI: Objection. Form.

17 A. So you are mixing multiple concepts here, and apples
18 and oranges, and convoluting a lot of concepts.

19 So first of all, if you have a camera like
20 a -- you know, say, you know, iPhone camera or a
21 camera, you are capturing -- you know, a camera has a
22 CCD array in it. When you click that button and you

1 capture an image, that image is a two-dimensional
2 image. There's no Z. There's no third dimension in
3 that image.

4 You -- typically they use a Bayer pattern
5 and they capture on a CCD array and they create RGB
6 channels. So you are capturing the XY, so to speak,
7 where if you think of X as horizontal and Y as
8 vertical, but there's no Z, there's no depth captured
9 in a camera unless you have a specific, you know,
10 well-designed or something camera that has three
11 dimensions to it, which is a very different camera
12 than your normal camera.

13 BY MR. DANLEY:

14 Q. Well, you testified earlier that the -- in the '151
15 patent, that the shape and texture data was obtained
16 not independently because it was captured as part of
17 the same image. So I'm trying to explore what you
18 meant by that statement.

19 MS. MARKOWSKI: Objection. Foundation.
20 And form.

21 MR. DANLEY: I actually haven't asked a
22 question yet, so...

1 BY MR. DANLEY:

2 Q. In terms of that statement about the color and the
3 shape data being used -- or contained within the same
4 image, if you have one image that's used for shape
5 data and one image that's used for color data,
6 wouldn't that be an instance in which the shape and
7 texture data is captured independently?

8 A. No, no. I don't understand what you're asking. But
9 if you go back to the '151 process or the '151
10 scanning process, as I have explained to you, is the
11 instrumentation that's used in the '151 has the
12 capability of focusing at different planes while you
13 are capturing the 2D image.

14 So when you're capturing a single 2D image,
15 you're focusing at a certain plane and you are able to
16 measure that focus, that focal length, in a sense.
17 You know what that focal length is as a result of the
18 use of the instrumentation.

19 And you are looking at, obviously, a tooth
20 at -- we're talking at the millimeter and micrometer
21 levels. So when you capture a 2D image at a given
22 focal plane, that 2D image has the XY texture data in

1 it, but also is -- you know that image is captured at
2 focal length alpha. Then you move that focal length
3 from alpha 1 to alpha 2, and you capture another 2D
4 image.

5 And as you stack those images together, you
6 form a subscan that has XY locations where points are
7 focused and defocused in each of those 2D images, you
8 get the focus for all the points because of the stack,
9 and you have the Z information that's being captured
10 at the same time. You don't go back and capture Z
11 later.

12 Q. How about color?

13 A. It wouldn't work.

14 Q. And do these same 2D images also contain the color
15 information as described in the '151 patent?

16 A. So the 2D images contain the texture information
17 which you can derive, obviously, color from, so you
18 have the texture information of the 2D images, and
19 because you know the focal length that they were
20 captured at, you have the depth information, the
21 Z-axis, if you want to call it that way.

22 So let's say XY is a 2D image, and Z would

1 be representative of the focal length or computed from
2 the focal length. So that's how you get to the depth
3 of where it is in the stack, in a sense.

4 Q. So is it your testimony that the same images that are
5 used to determine the shape data also contains the
6 color data or the texture information?

7 A. Well, you're mixing a few concepts together, and I
8 think it's perhaps because of, you know, a lack of
9 understanding of the process.

10 So the 2D images, you capture a number of
11 these, let's just say ten for sake of illustration.
12 Those ten create a subscan. One subscan, subscan 1,
13 contains a location on the tooth, XY, 1 millimeter by
14 1 millimeter, and the depth at that location of the
15 various -- so your tooth, let's say, has some various
16 depth to it at that location. That's all contained in
17 that subscan.

18 Then you move the instrument and capture
19 another subscan the same way, et cetera, et cetera,
20 you move around the tooth. Eventually you put the
21 subscans together to create a digital 3D
22 representation. And I'm talking about the '151

1 process.

2 So each subscan contains XY depth
3 information, so it's got the dimensionality and it's
4 got the texture in each of these subscans.

5 Q. I think that you have gone over, multiple times, how
6 the XY and depth information is obtained. What I'm
7 trying to understand is how is the color data obtained
8 as part of that process in the '151 patent.

9 A. So you have the texture data. The color data is
10 essentially calculated from there. Right?

11 Q. How?

12 A. Well, you have the texture data, so every point I
13 have basically -- let's just say an instrument is
14 measuring, I'll say $L^* a^* b^*$, just for discussion
15 sake. So if the instrument is measuring $L^* a^* b^*$ at
16 that location, so the -- if you look at the
17 neighborhood of $L^* a^* b^*$, you see the texture because
18 they're different values. At every point, that's the
19 color value.

20 Q. So let's say that you take an image as part of the
21 subscan process at focal plane alpha, as you mentioned
22 earlier. Okay? Does that image at focal plane alpha

1 also include the color data for that focal plane?

2 A. So the image at focal plane alpha contains the XY
3 grid, let's say, and you know the focal length, so
4 you have the depth, and each point in that XY grid,
5 assuming it's capturing, let's say, using $L^* a^* b^*$,
6 it contains an $L^* a^* b^*$ vector at every point in that
7 grid.

8 So if you look at, say, a 9 x 9 window,
9 let's say, you will see the texture because the $L^* a^*$
10 b^* s differ across this 9 x 9. But at a given point
11 there is the $L^* a^* b^*$ value that basically says it's
12 10, 12, 11, and that gives you the color value at that
13 location.

14 Q. And that is a process that you're saying is not
15 independent, unlike in Korten; is that right?

16 A. That's correct. The process in the '151, texture
17 data and shape data is obtained, it's not
18 independently but simultaneously, in a sense. In
19 Korten, that's done independently, and Korten
20 basically states that more than once.

21 Q. So if we go back to the '151 patent, Claim 1.

22 A. Yes, sir.

1 Q. Where in Claim 1 does it require that the shape data
2 and color data be captured not independently?

3 A. Well, the claim requires that the digital 3D
4 representation comprises shape data and texture data.
5 So as long as the digital 3D representation comprises
6 shape data and texture data, you have met element 1a
7 of Claim 1.

8 Q. So is it your opinion that the requirement that the
9 shape data and color data be captured not
10 independently is not part of Claim 1?

11 A. Well, Claim 1 essentially states that the digital 3D
12 representation -- the digital 3D representation
13 comprises shape data and texture data. So as long as
14 you have shape data and texture data in that digital
15 3D representation, you've met 1a.

16 Q. So I guess I'm not understanding if you're agreeing
17 with me or disagreeing with me, so -- it's a yes-or-no
18 question. Is it your opinion that the requirement
19 that the shape data and color data be captured not
20 independently is not part of Claim 1?

21 A. I guess I'm not understanding your question. What
22 I'm saying is, 1a basically says the -- all that says

1 is the "digital 3D representation" must comprise of
2 "shape data and texture data."

3 Q. And so if the shape data and texture data is captured
4 independently, that would be covered by Claim 1; is
5 that right?

6 A. As long as you have shape data and texture data in
7 that digital 3D representation, you have met 1a.

8 Q. Okay. Is there any other portion of Claim 1 that
9 requires the shape data and texture data to be
10 captured not independently?

11 A. Well, I mean, you obviously read Claim 1 in light of
12 the -- you know, in light of the specification of the
13 process that's being captured, but the digital 3D
14 representation in Claim 1a must comprise shape data
15 and texture data.

16 Q. So is that a yes or a no answer to my question?

17 A. I guess I'm not sure what you're asking -- what I'm
18 saying is Claim 1a -- the digital 3D representation
19 must have shape data in it and must have texture data
20 in it. You're obtaining a digital 3D representation
21 of a tooth where the digital 3D representation
22 comprises shape data and texture data. It's got to

1 have both to meet claim element 1a.

2 Q. And so my question is, is there any other element in
3 Claim 1 that requires that the shape data and the
4 texture data be captured not independently?

5 A. It doesn't say anything about the -- it doesn't talk
6 about the capturing process in Claim 1. It just says
7 the "digital 3D representation" must comprise "shape
8 data and texture data."

9 Q. So now you're saying --
10 Go ahead.

11 A. So what I explained to you was the process described
12 in the specification of how that's being captured,
13 but at the Claim 1a, it's capturing shape and texture
14 data -- the digital 3D representation comprises shape
15 and texture data.

16 Q. And so I have the same question for Claim 13. Is
17 there any portion of Claim 13 that requires that the
18 shape data and the texture data be captured not
19 independently?

20 A. I think it's the same answer for Claim 13a as it is
21 for Claim 1a.

22 Q. And is there any other portion of Claim 13 that

1 requires the shape data and the texture data be
2 captured not independently?

3 A. I don't see any other description in Claim 13 about
4 the capturing besides what I've just mentioned.

5 Q. Okay. And the same for Claim 14. Is there any
6 portion of Claim 14 that requires that the shape data
7 and the texture data be captured not independently?

8 A. The claim doesn't say anything about the capturing
9 part of it, but obviously you read the claims in
10 light of the specification.

11 Q. Are you trying to import that limitation into the
12 claims from the specification?

13 A. No, I'm not importing anything. I'm just saying that
14 you read the claims in light of the specification and
15 what's being described in the specification, but the
16 digital 3D representation in the claims must comprise
17 shape data and texture data.

18 Q. So I want to move to paragraph 74 in your report.

19 Am I still displaying your report on the
20 share screen?

21 A. I'm sorry?

22 Q. Am I still sharing your declaration --

1 A. Yes, yes, yes.

2 Q. Okay. I can't tell from my display on my computer, so
3 I just wanted to make sure.

4 A. Yes. Yes, I see your report on my screen.

5 Q. Your report.

6 A. Yes. I see my report on your screen, you're
7 absolutely correct.

8 Q. Okay. So paragraph 74 on page 33 -- let me know when
9 you are there.

10 A. Paragraph 74, yes.

11 Q. Okay. I just want to talk about the -- I think it's
12 the second sentence. You say, as part of your
13 opinion, "Claim 14 does not require collection of the
14 shape and color data at the same instance within the
15 subscanning period, but it does require a subscan to
16 have collected shape and color data through the
17 subscanning process and within the subscanning
18 period."

19 Did I read that correctly?

20 A. Yes, you did.

21 Q. And so I -- strike that.

22 Can you tell me what you meant by the term

1 "subscanning period" in that sentence?

2 A. Well, we are talking now about Claim 14, so obviously
3 the word "subscan" is contained in Claim 14. And
4 this is in reference to the discussion on Claim 14C.
5 So this section starts on page 28 for Claim 14C.

6 So in Claim 14, you see where it says --
7 you see in Claim 14 where it says "wherein obtaining
8 the digital 3D representation"? Do you see that?

9 A. Yes.

10 Q. So "wherein obtaining the digital 3D representation of
11 the tooth comprises recording a series of subscans of
12 the tooth."

13 So to get the digital 3D representation, as
14 I've explained to you earlier, you need to record a
15 series of subscans to construct it, "where at least
16 one of said subscans comprises both texture
17 information and geometry information for said tooth,
18 and generating the digital 3D representation of the
19 tooth from the recorded series of subscans."

20 So I hope we agree that the -- you record a
21 series of subscans, these generate the digital 3D
22 representation that's discussed in '151. And in this

1 claim element, it says, "where at least one of said
2 subscans" -- obviously there would be more to create a
3 digital 3D representation -- but where at least one &Q
4 comprises both texture information and geometry
5 information," which obviously describes the shape.

6 So the sentence that you refer to there in
7 Claim 14, obviously Claim 14 doesn't say it must be
8 recorded at the same instance, although in the process
9 described in the specification, that's how it's done.
10 But to meet the claim requirement, it doesn't have to
11 be computed at the same instant, in a sense, within
12 the subscanning period, but it does require a subscan
13 to have collected shape and color data. Or in this --
14 in the claim, obviously it says shape and texture
15 information through the subscanning process.

16 So by the time you're done with the
17 subscan, you say, I have subscan 1, that subscan must
18 contain texture and geometry information or shape
19 data.

20 Q. Okay.

21 A. So it's not after you complete -- it's not after you
22 create a digital 3D representation that you slap on

1 the texture data afterwards. It's the subscan that
2 is used to construct the digital 3D representation.

3 As soon as you've got subscan 1, it
4 contains texture and geometry information. You get
5 subscan 2, it contains texture and geometry
6 information. And you take all of those, concatenating
7 them properly, and create a digital 3D representation.

8 Q. And so as part of that process, can you describe for
9 me what the subscanning period is?

10 A. Well, as I mentioned to you, a subscan is created
11 in -- as a series of 2D images. Right? So you're
12 collecting a series of 2D images. They're not done
13 in zero time. So if I collected the first one at
14 1 nanosecond and the next one at another nanosecond
15 or microsecond, and the next one in another
16 microsecond, and let's just assume a subscan has ten
17 of those, so ten microseconds later I have all the
18 images I need to create a subscan.

19 So that's essentially your subscanning
20 period for subscan 1. So ten milliseconds, or
21 whatever, microsecond, I have subscan 1 that contains
22 texture and shape information. I now start the next

1 period for subscan 2, and I collect another series of
2 images, and do it again, and et cetera.

3 Q. So does the -- this Claim 14 use the term "subscanning
4 period"?

5 A. The words "subscanning period" is not in Claim 14.
6 The word "subscan" is. The word "period" is not. So
7 it's not typed --

8 Q. The word --

9 A. Let me be clear. It's not literally typed in
10 Claim 14.

11 Q. Where in Claim 14 does it require that the color and
12 shape data be captured during the same subscanning
13 period?

14 A. Well, "Where at least one of said" -- "where at least
15 one of said sub-scans comprises both texture and
16 geometry information."

17 So the subscan -- before you move on, that
18 subscan has to contain texture and geometry
19 information. So you wouldn't be able to capture a
20 texture now and come a week later and capture the
21 other one. It didn't -- it just -- the process
22 wouldn't work.

1 It has to be registered. Right? You have
2 to be -- otherwise, the instrument has moved somewhere
3 else and you get into all sorts of different problems.
4 And things have changed and your tooth have changed
5 and lighting conditions have changed. A lot of
6 things.

7 So when you are capturing -- when you are
8 compiling a subscan, it comprises both texture and
9 geometry information, that has to be done because it
10 has to be correlated, properly registered to each
11 other. You need to know which point texture is in
12 that XY grid.

13 Q. And so if you were capturing shape data and texture
14 data simultaneously, then you would be within what's
15 described in Claim 14, in your opinion; is that right?

16 A. Well, you need to capture it so that both texture
17 information and geometry information for a given
18 subscan is captured such that it's properly
19 registered to each other. Right? It's not just
20 captured like randomly. It has to have -- it has --
21 you have to know this X, Y, Z point has this texture
22 in it. Otherwise, it's useless if you just capture

1 texture and two days later capture something else.

2 While the instrument is in a given location
3 for a millisecond of time, you've got to capture the
4 texture information and you've got to capture the
5 shape or geometry information so that it all registers
6 and makes sense and you know which points are which.

7 Q. And so if you have an instrument that captures shape
8 data simultaneously with color data and provides the
9 relationship between the shape data and the color
10 data, then that would meet the requirements of
11 Claim 14; is that right?

12 A. Well, it's got to record a series of subscans, so
13 you've got to have a series of subscans. We
14 discussed that already. So you have to have a series
15 of subscans where at least one of said subscans
16 comprises both texture information and geometry
17 information. So you've got to have both in that
18 subscan.

19 It's not you have a 3D representation that
20 has shape and you go on and slap color on top of it
21 like Korten has done. You put color on top of
22 your -- the visual dentition model of Korten, that is

1 not the same process as being described here. The
2 subscans create the digital 3D representation at the
3 subscan level. The texture and shape and geometry
4 information must be there according to this claim.

5 Q. In the instance when you only have one subscan, in
6 that instance, wouldn't the 3D representation be the
7 same as your subscan?

8 A. Well, you construct the 3D representation from the
9 subscan, so you -- it's not the same thing as the
10 subscan. You construct it from the subscan. It's
11 not the subscan.

12 Q. So in the instance in which you have a single subscan,
13 what would be the difference between that single
14 subscan and the 3D representation?

15 A. Well, the digital 3D representation would be, you've
16 got to create a coordinate system. You know, you
17 have to create a virtual coordinate system, if you
18 would. You need to bring that subscan and place it
19 into that coordinate system in the proper X, Y, Z
20 locations and create a digital 3D representation. So
21 it's not the subscan itself.

22 Q. Where is that described in the specification?

1 A. Well, you construct -- I mean, if you go to -- so
2 look at column 15 again, and I'm starting at line 52
3 to column 16, line 8, let's just say. So you see,
4 "Different scanner configurations can be used to
5 acquire subscans." Fine. "In some scanner designs
6 the scanner is mounted on axes with encoders which
7 provides that the subscans acquired from different
8 orientations can be combined using position and
9 orientation."

10 So you need to have, essentially, encoders
11 to know the orientations and all of that because that
12 all makes a difference how you combine them into the
13 3D representation.

14 Q. And I guess --

15 A. Go ahead.

16 Q. I guess my question, though, is that -- or the
17 hypothetical I posed to you, though, is that you only
18 have one subscan. So in that instance, you are not
19 needing to get the orientation information to combine
20 multiple subscans because you only have one.

21 So in that instance, what is the difference
22 between the single subscan that you have and the

1 digital 3D representation?

2 A. Well, the subscan, essentially you can think of that
3 as like an XY with Z not information, Z knowledge of
4 every point, and you have a $L \times a \times b$. You are going
5 to create a 3D representation display on the screen
6 that is essentially a three-dimensional coordinate
7 system from which you import the information from the
8 subscans and place into that 3D coordinate system
9 correctly for visualization and all these types of
10 things.

11 You wouldn't visualize properly if you're
12 just looking at it as a subscan. So you have to place
13 it in that. And that's why if you have multiple
14 subscans, you've got to bring them in with the proper
15 orientation.

16 So you see where it says the shape -- look
17 at line 62 on. You see where it says, "The shape
18 information of the subscans for an object, such as a
19 tooth, can be combined by algorithms for stitching and
20 registration as widely known," et cetera.

21 So you may have to do stitching, you have
22 to do registration, interpolation, because you have a

1 certain resolution that you want to see in the virtual
2 model, and, you know, that's -- you're going to import
3 that from these -- from the subscans and properly
4 stitch it, register it, do the proper interpolation
5 into the three-dimensional digital -- the digital 3D
6 representation.

7 So they're not the same thing.

8 Q. So is it your testimony that a 3D representation as
9 recited in the claims has to include sufficient
10 information to be displayed on a screen?

11 MS. MARKOWSKI: Objection. Form.

12 A. Well, the digital 3D representation has -- they
13 obviously discuss it into the patent. It's got to
14 be -- it's got to form -- it's a digital 3D
15 representation of whatever you just scanned. So it's
16 got to be -- it's got to represent what you have
17 scanned, whether it's for display purposes or
18 whatever.

19 BY MR. DANLEY:

20 Q. And wouldn't the first subscan also represent what you
21 just scanned?

22 A. But that's not a digital 3D representation.

1 Q. And why not?

2 A. It's not. I mean, you have to import that onto the
3 three-dimensional coordinate system that I just
4 explained to you, do the proper interpolations to fit
5 into whatever the 3D digital representation and the
6 proper resolution that you have selected. So it's
7 not the same entity.

8 Q. So if you had nothing to -- if you had nothing
9 existing to fit your -- strike that.

10 If you have no existing 3D representation
11 to fit your subscan onto, again, wouldn't the first
12 subscan be the same as the 3D representation?

13 A. I mean, I think you're just creating hypotheticals
14 that aren't essentially practical. This is not
15 what's being described.

16 You have created a subscan, you have
17 created a series of subscans at multiple orientations.
18 These subscans are not -- are now used to create a
19 digital 3D representation. That digital 3D
20 representation is not a subscan.

21 Q. Doesn't the process have to start off with the first
22 subscan at some point?

1 A. I'm sorry?

2 Q. Doesn't the process have to start off with the first
3 subscan at some point?

4 MS. MARKOWSKI: Objection to form.

5 A. That's typically not how the process starts. You
6 basically create the 3D digital representation that
7 you want, which will be obviously blank when you
8 start. You create that with the proper resolution
9 and the proper coordinate system that you want, and
10 et cetera, and then you start importing, you know,
11 subscans into it because the subscans may have a
12 different resolution than the coordinate system. So
13 you start importing the subscans into it at the
14 various orientations and scales and so on.

15 BY MR. DANLEY:

16 Q. So is it your -- is it your opinion that a blank image
17 can constitute a 3D digital representation?

18 A. That's not what I said. I'm just telling you the
19 process underneath. So the digital 3D
20 representation, typically you import the subscans
21 onto it. You're the one that suggested, well, isn't
22 there one subscan.

1 I'm just telling you, the digital 3D
2 representation, when you're doing it by the computer,
3 you're writing the code, you essentially create a
4 structure, you know, an array, for instance. Let's
5 just say a three-dimensional array, for the discussion
6 sake. You create a structure, you define a structure
7 for it, and you start importing these subscans onto
8 the structure with the proper orientation, et cetera,
9 to create a digital 3D -- to create a digital 3D
10 representation.

11 So the digital 3D representation is not the
12 subscans. It's created from the subscans. It's
13 created by combining multiple subscans.

14 Q. You say that as part of writing the code, you
15 essentially create a structure, an array; for
16 instance, a three-dimensional array that defines a
17 structure for importing the subscans. Is that
18 accurate? Did I get that right?

19 A. I mean, that's an example, I'm saying, of doing it.
20 I mean, I'm just using that as an example, but just
21 to explain to you that the digital 3D representation
22 is not a subscan. It's not the subscan. It's

1 created from the subscan.

2 So there's a -- the process of how you
3 create it, you know, I may create it one way, another
4 expert may create it a different way, but the end
5 result, that structure is not a subscan.

6 Q. Does the -- does a digital 3D representation have to
7 include coordinate or position information -- strike
8 that.

9 Does a digital 3D representation, in your
10 opinion, have to include the shape data for the
11 structure that you're scanning?

12 A. Well, I mean, if you look at the description in the
13 Claim 1, which is the same as Claim 13 and 14, you
14 see it says "obtaining a digital 3D representation of
15 the tooth, where the digital 3D representation
16 comprises shape data and texture data for the tooth."

17 So that digital 3D representation that's
18 being obtained must contain shape data and texture
19 data to meet the limitation of 1a, which is the same
20 as, I think, 13a and 14a.

21 Q. So as long as the 3D representation includes shape
22 data and texture data, then it meets the requirements

1 of that limitation in Claim 1. Correct?

2 A. I think we've been over this ground before.

3 Q. Yeah.

4 A. Yes. So as long as it contains shape data and
5 texture data, it's -- that digital 3D representation
6 must contain shape data and texture data. The 1 --
7 the '151 digital 3D representation must contain shape
8 data and texture data to meet the claim limitation.

9 Q. Okay. So I want to go to paragraph 33 of your report,
10 on page 14.

11 A. Yes, that's the construction.

12 Q. The construction for deriving a certainty score.
13 Correct?

14 A. Correct.

15 Q. And that, just so the record is clear, that
16 construction is "determining an accuracy value based
17 on the tooth shade value, the texture data, and/or
18 texture information."

19 Is that right?

20 A. That is correct. You read it correctly.

21 Q. What's your understanding of what the term "accuracy
22 value" means?

1 A. Well, essentially, you're determining an accuracy
2 value. You're determining -- you have a way of
3 assessing how accurate the value is that you compute
4 it.

5 Q. Is there a way you can express that without using
6 "accuracy" or "accurate" or, like, the term that
7 you're trying to define?

8 A. I don't know if there's a way off the top of my head
9 that I can state it, but you are essentially
10 determining -- when you compute the value, you need
11 to know how close is this value or how -- how
12 representative is this value to the tooth shade,
13 let's say, on a given scale.

14 So if the tooth shade on a given scale has
15 a value of 15 -- and I'm making this up -- and you
16 computed a value of 13, what's the -- what's the
17 certainty -- what's the certainty of this value? Is
18 it, you know -- let's -- you know, how -- you know,
19 what -- how accurate, essentially, this value is,
20 what's the probability that this could be inaccurate
21 or incorrect. So you have to determine its accuracy
22 value.

1 MR. DANLEY: So I was about to change
2 topics, but we've been going for a little bit under an
3 hour, so if you want to take a break, this would
4 probably be a good time to do it.

5 THE WITNESS: Yeah, that would be fair.
6 Maybe -- it's 1:34. Maybe 1:40, 1:45? What would you
7 prefer?

8 MR. DANLEY: It's up to you. Either one's
9 fine by me.

10 THE WITNESS: Let's do 1:45.

11 MR. DANLEY: Okay, sounds good.

12 (Off the record at 1:34 p.m.)

13 (Back on the record at 1:45 p.m.)

14 BY MR. DANLEY:

15 Q. So, Dr. Saber, I wanted to talk with you a little bit
16 about Korten. So let me go ahead and share my screen.

17 And do you see Korten on the screen?

18 A. I do. And I have it open -- I have the one that you
19 sent me open in front of me.

20 Q. Okay. So I want to direct your attention to column 4
21 of Korten -- actually, strike that.

22 Before we get started, I actually want to

1 stop sharing this and I want to share your report.

2 And so I'm sharing your substitute declaration on the
3 screen. Do you see that?

4 A. Yes, sir. I do.

5 Q. In your substitute declaration, you don't provide any
6 overview of Korten, do you?

7 A. No, it doesn't appear so. I mean, the details
8 obviously are discussed in the grounds, but it
9 doesn't appear I provide a summary overview of
10 Korten, no.

11 Q. So I want to direct your attention to paragraph lower
12 Roman Numeral I.

13 A. Paragraph what?

14 Q. Roman Numeral I. It's your Table of Contents.

15 A. Yes. Introduction.

16 Q. Not your Introduction, the actual Table of Contents as
17 shown on the screen.

18 A. Okay.

19 Q. So looking at your Table of Contents, in particular
20 section VII, you state, "Petitioner fails to
21 demonstrate that Korten discloses each of the features
22 of the claims challenged in Ground 1."

1 Do you see that?

2 A. I do.

3 Q. So you provided an opinion related to claim
4 element 1b. Correct?

5 A. Correct.

6 Q. And you provided an opinion on claim element 1c; is
7 that correct?

8 A. That is correct.

9 Q. You don't provide an opinion on claim element 1a, do
10 you?

11 A. Not specifically, no. I mean, obviously there's
12 discussions in there that refer to different things,
13 but there's no specific table of content element that
14 has 1a in it.

15 Q. Is it fair to say that you do not contest that Korten
16 discloses claim element 1a?

17 A. I didn't provide any opinion on it.

18 Q. Okay.

19 A. I mean about 1a, specifically, in the Table of
20 Contents. But obviously the analysis that goes into
21 1b and 1c refers to different things, so that
22 analysis is valid.

1 Q. Understood. So now I am going to share Korten. And
2 you see Korten on the screen?

3 A. I do.

4 Q. And you also have the electronic copy that I sent to
5 you?

6 A. I do have it, yes, sir.

7 MR. DANLEY: And for the record, this is
8 Exhibit 5 to the deposition, and Exhibit 1009 to the
9 IPR proceedings.

10 BY MR. DANLEY:

11 Q. So I want to direct your attention to column 4 of
12 Korten. Let me know when you're there.

13 A. Column 4 of Korten, yes, sir.

14 Q. Specifically, the description starting at line 24 and
15 going through line 40. So basically -- well, this
16 paragraph right here.

17 A. Yes.

18 Q. Okay.

19 A. I'm very familiar with it.

20 Q. I'm sorry, I didn't get that.

21 A. I said, I'm very familiar with it, yes.

22 Q. This paragraph mentions or identifies a "first

1 dentition model." Can you tell me what a first
2 dentition model is?

3 A. Well, if you go back and look at the -- you look at
4 column 2, line 3 through 7, you see it says
5 "capturing via the first optical sensor at least a
6 portion of the shape of a tooth in the patient's
7 dentition and based thereon providing a first virtual
8 dentition model representing" the shape -- "that
9 shape in a three-dimensional coordinate system."

10 So the first visual dentition model of
11 Korten represents the shape in a three-dimensional
12 coordinate system.

13 Q. And so this first dentition model would include shape
14 data; is that correct?

15 A. Yes, the first virtual dentition model of Korten
16 that's acquired through the first optical sensor
17 talks about, obviously, the shape of the tooth, and
18 you can see it says "providing a first virtual
19 dentition model representing that shape in a
20 three-dimensional coordinate system."

21 Q. And further along in column 4 of Korten, it also
22 discloses that this first dentition model can include

1 X, Y and Z coordinates information; is that correct?

2 A. Where are you referring to in Korten so we can be on
3 the same page?

4 Q. Yes, so I'm looking at column 4, lines 41 through 56,
5 where it discusses the first dentition model being in
6 the format of X, Y, and Z coordinates. Do you see
7 that?

8 A. So I'm assuming you're referring to the sentence that
9 starts on line 48 to -- well, somewhere -- 48 to,
10 say, 55 or so. 56.

11 Q. Correct.

12 A. Talks about an X, Y, Z coordinate system and it
13 distinguishes it from the X, Y, Z tristimulus values,
14 yes.

15 Q. And Korten discloses that the color information
16 described in this paragraph is associated with the
17 coordinates in the first virtual dentition model.
18 Correct?

19 A. What -- let's be specific. What sentence of Korten
20 are you talking about?

21 Q. Well, you said that you were intimately familiar with
22 Korten. Right?

1 A. Yes, but I want to make sure that we're looking at
2 the right -- same sentence at the same time and
3 not -- I'm not thinking about something else while
4 you're referring to something else.

5 Q. Well, I'm asking about Korten in general. Doesn't
6 Korten, in general, disclose that color information is
7 associated with the coordinates on a first dentition
8 model?

9 A. So if you go back to column 2 of Korten, line 10,
10 Korten describes "providing a correlation between the
11 first location of the first color and a coordinate in
12 the first virtual dentition model."

13 So Korten measures shape with one
14 instrument, uses a different instrument independently
15 to measure color, and correlates the color that's
16 measured independently with the first virtual
17 dentition model as described in 2 -- summarized in 2,
18 in column 2, lines 3 through 12, let's say.

19 Q. And as part of this correlation process, isn't it true
20 that Korten associates the color data with the
21 coordinates on the first dentition model?

22 A. That would be correct.

1 Q. And isn't it true that Korten discloses the colors
2 measured at a point on the tooth?

3 A. Well, it talks about, obviously, a first location
4 which would be understood would be a point on the
5 tooth, yes.

6 Q. And if I could direct your attention to paragraph 66
7 of your supplemental declaration -- or substitute
8 declaration.

9 A. 66.

10 Q. On page 29.

11 A. Yes, sir.

12 Q. In that paragraph you opine that, "Korten captures
13 color using an optical sensor preferably a
14 spectrometer which measures color at a point on the
15 surface of a tooth." Correct?

16 A. You're at sentence 2. Right?

17 Q. Correct.

18 A. Yes.

19 Q. So in your opinion, Korten discloses that color is
20 captured at a point on the surface of the tooth.
21 Right?

22 A. Yes. And then the citation that you see there,

1 column -- that's what I was looking at -- column 2,
2 lines 31 to 42, kind of cite to what I'm referring to
3 here.

4 Q. Okay. Korten also discloses the use of a bitmap
5 image; is that right?

6 A. What are you referring -- where are you talking about
7 in Korten?

8 Q. So if you look at column 4, line 25.

9 A. Let's be on the same page. Column 4, line 25. Yes.

10 Q. Korten refers to a bitmap image. Correct?

11 A. Yes.

12 Q. What is a bitmap image?

13 A. What do you mean, "what is a bitmap image"?

14 Q. Can you define for me what a bitmap image is?

15 A. Oh, so, for instance, when you take a picture with a
16 camera, you -- let's say you have a grayscale camera,
17 for just sake of simplicity and discussion. You take
18 a picture with a grayscale camera, that picture
19 contains a grid, XY grid, let's call it, and each
20 grid has a series -- a pixel in it. A value of a
21 pixel, let's say, between zero and 255, so -- because
22 the values are between zero and 255, so that's

1 basically an 8-bit image.

2 And the map, right, would be referred to as
3 a bitmap because you have an image, not just a single
4 point. Right? So every pixel is, say, 8 bits between
5 zero and 255. So it's a 8-bit pixel and you have a
6 collection of them, so you have a bitmap.

7 Q. So if you had a color camera, wouldn't the bitmap
8 image include color data?

9 A. You would get RGB data typically with a color camera,
10 yes.

11 Q. And so going to column 5 of Korten, line 28.

12 A. Column 5, line 28.

13 Q. This is a discussion in Korten that talks about the
14 standard color schemes. Do you see that?

15 A. Yes.

16 Q. What's your understanding of what a standard color
17 scheme is, as described in Korten?

18 A. Well, as you can see, the column 5, the lines that
19 you just pointed to -- just so we're on the same
20 page, I am on column 5, lines 26 -- 28 to 34. So you
21 see it says "method comprises the step of matching at
22 least the first color with a standard color from a

1 standard color scheme. Such a standard color scheme
2 may for example correspond to the widely used
3 VITAPAN" scale.

4 So essentially, the standard color scheme
5 would be a scheme or some representation of, in this
6 case, obviously teeth, but in the printer world where
7 at Xerox Corporation we would have a series of colors
8 that we know the value for each of these colors should
9 be -- so color 1 should have a value of 1, 2, 3.

10 Color 2 should have a value of 4, 5, 6, or
11 whatever. So it's a reference, basically, to know, as
12 you are calibrating an instrument or as you are
13 working with instruments or you are trying to
14 reference -- you know, compute a color value, you can
15 reference it to a standard scheme and say which one of
16 these does it match.

17 Q. And a standard color scheme as described in Korten
18 would be directed towards dentistry. Correct?

19 A. Yes. Because the application of Korten is obviously
20 dentistry, not printing.

21 Q. And the first sentence here in this paragraph says,
22 "In a further embodiment the method comprises the step

1 of matching at least the first color with a standard
2 color from a standard color scheme."

3 What's your understanding about what the
4 term step of -- "comprises the step of matching"
5 refers to?

6 A. Just what it says. You are basically -- you have a
7 method that comprise the step of matching, so you
8 measure the first color on the tooth in Korten. So
9 Korten uses a spectrophotometer or a spectrometer.
10 I'm using that as an example.

11 So Korten uses a spectrometer and measures
12 a first color on the tooth and compares -- matches
13 that first color with the standard color from the
14 standard color scheme.

15 So it tries to say, okay, I measured your
16 tooth, the value is 4, 5, 6, which one of these color
17 schemes, standard color schemes, does it measure.
18 Because the idea here is to find -- you know, when you
19 want to make a prosthesis, or whatever, you are trying
20 to make a tooth that matches as closely as possible
21 what the patient's teeth are color-wise.

22 Q. So just to summarize the disclosure in Korten, at

1 column 2, as you noted earlier, Korten discloses that
2 shape information is obtained as part of a first
3 dentition model. Correct?

4 A. That's correct.

5 Q. And then at column 4, Korten discloses that color
6 information is -- strike that.

7 In column 4, Korten discloses that a first
8 color is associated with a coordinate in that first
9 dentition model; is that right?

10 A. Let's just be specific on the language. Where in
11 column 4 are you referring to?

12 Q. Column 4, lines 41 through 45, that "the method
13 further comprises [the step of] associating the first
14 color with the at least one coordinate in the first
15 virtual dentition model." Correct?

16 A. That's correct. Yeah, I usually like to use the
17 wording directly so it's not paraphrasing and there's
18 no mistakes in the way it's stated.

19 Q. And then later in column 5, Korten discloses that
20 there can be a further step of matching the first
21 color with a standard color from a standard color
22 scheme. Correct?

1 A. Generally speaking, yeah, that is correct.

2 Q. And so the first color is the same color that was
3 associated with the first coordinate in the virtual
4 dentition model. Correct?

5 MS. MARKOWSKI: Objection. Form.

6 A. Well, it's generally correct but not entirely correct
7 because you measure the first color with a
8 spectrometer in Korten. So just to be technically
9 correct, you measure the color with a spectrometer in
10 Korten, where you get L^* a^* b^* , whatever, and you
11 compare that to the scale.

12 Now, when you go associate that color with
13 a dentition model, the dentition model may -- the way
14 you got the resolution of the shape may not hit the
15 exact same point that you just measured, so you might
16 do a little bit interpolation or by linear
17 interpolation to put a color there.

18 So technically speaking, it's not the
19 exact -- because the points that captured with the
20 shape instrument may not be the exact same ideal point
21 in space that you capture with a color instrument. So
22 typically you do some type of bilinear interpolation

1 to try to associate it correctly.

2 BY MR. DANLEY:

3 Q. When you say --

4 A. It's not just getting the point and slapping it on
5 the shape and say there it is. You see what I mean?

6 Q. When you say "interpolation" --

7 A. The idea behind it -- the idea behind it is
8 associating, but it's not the exact same value every
9 time.

10 Q. When you were talking about "interpolation," were you
11 talking about in the coordinate space or in the color
12 space?

13 A. Well, you have -- Korten has a first optical sensor
14 that measures the shape. Okay? So it measures the
15 shape of your tooth. It doesn't measure any color,
16 it just measures the shape using however technology
17 it's using. Maybe it's using LiDAR, or whatever it's
18 using, it's measuring the shape.

19 So it essentially has a resolution for
20 that. It's measuring every micron, every 10 microns,
21 every 100 microns, whatever, it's got some resolution
22 that measures the shape of all the points on your

1 teeth because your tooth is essentially analog. It's
2 continuous. It doesn't have -- it's not a digital
3 looking tooth.

4 So it measures the shape and it puts it in
5 that 3D coordinate system at a series of points in
6 that system, X, Y, Z points.

7 When you go to measure the color with
8 Korten, you are not technically going to be measuring
9 the exact same points as the other instrument has
10 measured. So you didn't measure the exact same
11 location. You might be 10 micron one way or 10 micron
12 the other. You didn't hit the exact same location.
13 So the color that you got may not be exactly one of
14 those, let's say, voxels on the 3D coordinate system.

15 So you have to do a little bit
16 interpolation to get that value there. So you're
17 associating it, but it's not just grabbing the color
18 and smacking it on the other one and say there it is.
19 So associating doesn't mean you just add it to that
20 vector and you're done.

21 Q. But that's not what Korten discloses, does it? It
22 says that the first color as measured is associated

1 with at least one of the coordinates in the first
2 dentition model. Right?

3 A. Yes. So you're associating the color, but it
4 doesn't -- it doesn't necessarily mean that it's just
5 a -- you know, like I said, you may -- underneath,
6 you may do some interpolation to do that association,
7 but the general idea is, yes, you're associating
8 color with the shape that you have measured.

9 Q. And the same color that you've associated with the
10 shape is also used to determine the closest matching
11 tooth reference shade. Correct?

12 MS. MARKOWSKI: Objection. Form.

13 A. So the color that you measured is being -- is being
14 used to measure the -- I guess, the scale. And that
15 color is being associated with a three-dimensional --
16 the virtual dentition model of Korten. That's a
17 totally different process than the '151. '151
18 doesn't do that.

19 And the best way to describe that is if you
20 look at the figures that I put in the supplemental
21 declaration, Figure 1 and Figure 2.

22 BY MR. DANLEY:

1 Q. So in terms of the order in which things are done in
2 Korten, it doesn't impose any specific order, does it,
3 in terms of associating the color with a coordinate in
4 the first dentition model and determining the closest
5 matching reference shade to that color. Right?

6 A. No, you could -- you could measure the color on the
7 tooth with your spectrometer in Korten and do a
8 matching to the scale, and then later on you could
9 put that into the -- associate that with a 3D model,
10 or you could capture the 3D model, associate the
11 color, and then go back to the color itself without
12 the 3D model at all and match that.

13 So it's not a 1-2-3 process, in a sense.
14 But the point I think that needs to be clear is the
15 color that's being measured by the instrument is
16 what's being matched, not what's coming -- what's into
17 the virtual dentition model.

18 Q. But doesn't --

19 A. That's where the difference is significant between
20 Korten and the '151.

21 Q. But doesn't Korten say that the same color that is
22 incorporated -- or associated with the first dentition

1 model is also the same color that's used to match the
2 standard color from the standard reference color
3 scheme?

4 MS. MARKOWSKI: Objection. Form.

5 A. Well, as I mentioned to you, I mean, the color is
6 associated with a virtual dentition model of Korten,
7 but the color is measured with a separate instrument.
8 It's not derived from the 3D -- from the virtual
9 dentition model of Korten. It's -- the measured
10 color with a spectrometer is being matched to
11 whatever's going on with your scale. That's totally
12 different from the '151 process.

13 You know, if you go back to -- go to my --
14 I want to make sure this point is crystal clear
15 because this is a very important point.

16 So if you go back to my supplemental
17 declaration on page 19, and I'm referring to Figure 1
18 that's in the supplemental dec. So you see in that
19 figure it describes the '151 process overview of it.
20 So the '151 process obtains a digital 3D
21 representation of the tooth which has shape and
22 texture, then computes that -- determines the tooth

1 shade value from that 3D -- digital 3D representation.

2 That's a totally different process than

3 Korten, which is described in Figure 2.

4 BY MR. DANLEY:

5 Q. So going to Figure 2 in your report, that is something
6 that you derived yourself, isn't it?

7 A. That is correct.

8 Q. That's not something --

9 A. Yeah.

10 Q. -- that's included in Korten, is it?

11 A. No, that figure is not included in Korten, but that
12 describes the Korten process to illustrate the
13 difference between that and the '151. Those two
14 figures are important to see the difference because
15 sometimes when you see it in a flowchart and the
16 figure, it -- you know, people say an image is worth
17 a thousand words. Right?

18 Q. So going back to your substitute report -- or, yeah,
19 substitute declaration, is that currently displayed on
20 the screen?

21 A. That is correct, sir.

22 Q. Okay. So going down to your chart, Figure Number 2,

1 this is a chart that you, in your opinion -- strike
2 that.

3 This is a chart that you drafted yourself.
4 Correct?

5 A. That is correct. That chart, as -- you know, as
6 we -- as I said earlier, that is not a figure in
7 Korten. I created those two flowcharts, Figure 1 and
8 Figure 2, to illustrate the difference to the board
9 and whoever is reading this, the difference between
10 the '151 process and the Korten process, so as
11 crystal clear as I can get it.

12 Q. So in the right-hand column you talk about
13 independently measuring color at a first location.
14 Correct?

15 A. You are looking at Figure 2, page 21?

16 Q. Correct.

17 A. Yes, that's what Korten says, obviously.

18 Q. And then you say, in the second box in that column,
19 the right-hand part of the flowchart, "Comparing the
20 measured color with a reference color." Correct?

21 A. That is correct.

22 Q. And then at the bottom box, where you assert that

1 these two different processes are combined, you say
2 that providing -- you say, "Providing correlation
3 between the first location of the first color and a
4 coordinate in the first dentition model." Correct?

5 A. Correct.

6 Q. Why did you change the word from "measured color" to
7 "first color" in that flowchart?

8 A. I probably used -- I just used -- I guess I'm -- I'm
9 just trying to make sure that it's clear that this is
10 the -- it's essentially the same thing. You know,
11 the measured color is what you just measured. And so
12 I was basically using the same language as Korten,
13 providing --

14 Q. Doesn't Korten use first -- doesn't Korten use "first
15 color" consistently throughout this portion of the
16 specification?

17 A. I mean, I would have to check every single instance,
18 but generally speaking, Korten refers to it, you
19 know -- like if you look at column 2, he refers to it
20 as a first color. I just wanted to be clear there.

21 Like if you look at the citation that I
22 provided, column 4, 60 to 67. See, look at -- I

1 didn't actually change it. Look at the citation
2 there. Look at column 4 in Korten, lines 60 to 67.
3 Do you see it says -- let me get there myself.

4 So you see where it says, "In an embodiment
5 the method further comprises the step of comparing the
6 measured first color with a reference color." Right?

7 So I probably could have put the word
8 "first" in-between "measure" and "color" in the
9 flowchart, but I was trying to highlight the point
10 here. But Korten does refer to it as the measured
11 first color also.

12 Q. And if you go to column 5, line 28 -- or the paragraph
13 starting at line 28 --

14 A. Yes, sir.

15 Q. -- it starts talking about matching a color to the
16 standard color scheme. Correct?

17 A. That is correct.

18 Q. And it specifically says the first color is matched
19 with a standard color from the standard color scheme.
20 Correct?

21 A. Yes.

22 Q. And so wouldn't that be the first color that is

1 measured -- that is also measured by the spectrometer
2 in Korten?

3 A. Yeah, which is measured -- it's the measured first
4 color that Korten --

5 Q. And that would be -- and that would also be the first
6 color that's associated with the X, Y, Z coordinate in
7 the first dentition model as disclosed in Korten.
8 Correct?

9 A. So let's be 100 percent clear. So Korten measures a
10 color on the tooth, let's call that the first color,
11 which is also the measured first color. Korten
12 measures that with a spectrometer on the tooth, uses
13 that measured first color to do a matching with a
14 scale, and then associates that measured first color
15 with the virtual dentition model of Korten.

16 And I can describe to you the association
17 process, you know, where you might have to use
18 interpolation, but --

19 Q. So isn't it accurate to say that the paragraph
20 starting at column 5, line 28, does not require that
21 the matching of the first color with the standard
22 color from the standard color scheme occurs before

1 that first color is associated with an X, Y, Z
2 coordinate in a first dentition model?

3 A. Yeah, you don't -- you don't have to -- you can
4 associate it before you match it or you can match it
5 before you associate it in Korten. So this doesn't
6 say anything about it has to be measured first or --
7 or matched first, then associated. It's a totally
8 separate process.

9 Q. Isn't it accurate to say that Korten also discloses
10 that there's a relationship between the shape data and
11 the color data?

12 A. What sentences of Korten are you referring to? What
13 section of Korten are you referring to?

14 Q. Well, again, you said that you were very familiar with
15 Korten, so I'm just trying to understand your opinion.

16 A. Well --

17 MS. MARKOWSKI: Objection to form.

18 BY MR. DANLEY:

19 Q. Is it your understanding that Korten discloses that
20 there is a relationship between the shape data that's
21 captured and the color data that's captured?

22 A. Well, I think you're mis, perhaps, quoting or

1 misrepresenting. That's why I'm asking you where are
2 you reading that from Korten?

3 So if you look at -- if you look at column
4 2 of Korten, you see it talks about the capturing of
5 the shape, independent capturing of the color,
6 providing a correlation.

7 Now, if you look at, for instance, at
8 column 4 of Korten, earlier than what you have quoted,
9 you notice it says -- I'm looking at column 4, line
10 roughly 16 -- or 19. Do you see where it says "and
11 the measuring of the color are otherwise performed
12 independent from each other"?

13 So it's talking about the shape --
14 "although the capturing of the shape and the measuring
15 of the color are otherwise performed independently
16 from each other. The independency of the capturing of
17 the shape and the measuring of the color may for
18 example be provided by the first and second sensor
19 being based on different technical principles as
20 described herein."

21 So Korten describes the independent process
22 between shape and color as you see in column 2, and

1 discusses it further in column 4, as I just pointed
2 out to you.

3 Q. So is the color -- strike that.

4 So is the color as captured in Korten
5 randomly assigned to various X, Y, Z coordinates in
6 the first dentition model?

7 A. That's not what I said, and that's not what is done.
8 Obviously that's not the case. When you capture the
9 color on the tooth of Korten with a spectrometer, the
10 association, that correlation that you provide,
11 correlates the right location on the tooth of Korten
12 color-wise with the virtual dentition model.
13 Otherwise, it wouldn't make sense. You can't just
14 randomly slap the colors on the shape stuff.

15 Q. So if you turn to column 7 in Korten, starting at
16 line 13.

17 A. Yes, sir.

18 Q. And, actually, is Korten now displayed for you on my
19 screen?

20 A. Korten is displayed on the screen, yes, sir, but I am
21 looking on mine because your screen is on the smaller
22 side. I'm looking on the PDF that you sent me, which

1 is much bigger size.

2 Q. No problem. So if you look at Korten, column 7,
3 starting at line 13, can you read to yourself lines 13
4 through 21?

5 A. Yes.

6 Q. And can you describe for me your understanding of
7 what's disclosed in that portion of Korten?

8 A. So you see -- so you might start, actually, on
9 line 4. So you see where it says, "In one embodiment
10 the correlation is provided by a known, for example
11 fixed, geometric relationship between the first and
12 second sensor."

13 So obviously you can have a first -- let's
14 say I have a handle in my hand, some kind of
15 instrument in my hand. I could have the shape sensor
16 mounted at location alpha and I could have the color
17 sensor obviously means -- they both have a certain
18 physical space, so they can't be mounted in the same
19 spot.

20 I would have the color sensor mounted at
21 location beta, but I know between location alpha and
22 location beta it's 10 millimeters or whatever. So

1 there's a fixed known distance that I know. There's a
2 geometrical relationship that I know how far apart
3 they are, what's the difference in angle, or whatever,
4 between them.

5 Such a fixed relationship may be provided
6 by the design of the handpiece. So let me call it a
7 handpiece. I think that's a good terminology for it.

8 So when you design this handpiece, you
9 might have mounted the shape on this location, the
10 alpha, and you mounted the color sensor on location
11 beta, and they're 10 millimeters apart and have
12 certain offset.

13 So you see where your sentence starts on
14 line 11, you see, "The position of the second optical
15 input," which is the color in this case, "may be
16 determined by a fixed three-dimensional offset from
17 the known or derived position of the first optical
18 input."

19 Let's say the first optical input is shape,
20 the second optical input is color, and they're -- in
21 the three-dimensional world inside the handpiece,
22 they're located -- this first one is located at

1 X1-Y1-Z1 and the second one is located at X2-Y2-Z2,
2 and I know where they are relative to each other, thus
3 an image captured from a certain direction and
4 distance from the dentition may be automatically
5 correlated.

6 So when you capture the color and you
7 capture the shape, because you know -- because while
8 you're capturing the shape at a point on the tooth,
9 you are capturing a color at a different point because
10 they're not in the same location. They're, let's say,
11 10 millimeters apart. And I'm making the number up,
12 but let's say 10 millimeters apart.

13 So while your shape is capturing point
14 alpha on the tooth, the color is capturing a different
15 point on that tooth. So when your handpiece gets to
16 the -- that different point beta on the tooth and
17 captures its shape, you can now correlate that color
18 that you captured earlier with that shape, but they're
19 not captured at the same time. You see? Because of
20 the difference -- the offset between them, whichever
21 point you are capturing with the shape, the color is
22 capturing some other point, you know, at that -- at

1 that time with the handpiece.

2 Q. Doesn't it say -- doesn't Korten say that the shape
3 data is captured at the same time as the color data?

4 A. You're mixing the same time with the same location.

5 So, yes, you are capturing -- when I put the
6 handpiece in person ABC mouth, I have the shape
7 sensor located at X1-Y1-Z1 and the color sensor
8 located 10-millimeter different, let's just say.

9 While the shape sensor is capturing
10 point -- the front point of the tooth, the color
11 sensor is capturing the back point of the tooth, as an
12 example. So at that same time instant, they are
13 capturing two different spots because they're not --
14 they're offset from each other. They can't capture
15 the same spot. They're capturing two different spots
16 on the tooth, given the design of it, but as you go
17 through the whole tooth, you might have -- obviously
18 you would capture the details and then you would
19 correlate them because you know how far they are from
20 each other.

21 Q. Where in Korten does it say that the shape data is
22 being performed at a different location from the

1 capturing of the color data?

2 A. Well, you see where it says, "The position of the
3 second optical input may be determined by a fixed
4 three-dimensional offset from the known or derived
5 position of the first optical input"?

6 Q. You can go ahead, yes.

7 A. There's an offset between it, so obviously they can't
8 capture the same point if they're offset. So if I
9 place that on tooth alpha and they have an offset
10 between them that is 5-millimeter, whatever the shape
11 is capturing a point, the color is capturing an
12 offset of 5-millimeter. It's not the same point.

13 Q. Wouldn't it be possible to angle the sensor so that
14 they would be capturing data from the same point?

15 A. No, because now you start to get into, you know, the
16 lighting conditions and all these other different
17 things to try to get the color correctly. You have
18 to have certain lighting conditions for the color.
19 So that's why you have this correlation. Otherwise,
20 you capture them at the same time, you don't need a
21 correlation.

22 Q. How does the angle of the sensor change the lighting

1 conditions? Wouldn't the lighting conditions be
2 consistent?

3 A. Well, you place the color sensor X millimeter offset
4 from the shape sensor, so the color sensor is going
5 to see things at a different angle from the shape
6 sensors. So you would want the lighting condition
7 when you're capturing the color to have a certain --
8 you know, to have a certain consistency. You don't
9 want different angles because then you start to get
10 into different measurements of color.

11 So when you take a spectrophotometer or a
12 spectrometer and you put it on a piece of paper and
13 measure color, if you angle it, you get a different
14 color than if you put it straight on.

15 Q. But if you have two separate sensors that are, in your
16 words, offset from each other and you have to move the
17 sensor -- you have to move the handpiece so that the
18 color sensor now captures what the shape sensor
19 captured, isn't that true process also going to
20 introduce variability in terms of the angle at which
21 the color is captured? I mean, you're moving the
22 handpiece.

1 A. I think you're misunderstanding what I'm saying. So
2 you have the color mounted at, let's say, an offset
3 from the shape, as Korten is describing. You have
4 the shape mounted on the handpiece, and let's say
5 10 millimeters later you have the color sensor
6 mounted. So when you place the handpiece on the
7 tooth, the shape sensor will take point A, the color
8 sensor will take point B. The color sensor has its
9 own, let's say, design lighting or whatever. It's
10 got a -- it's got a way to measure the color
11 accurately.

12 Now, when you move the handpiece, then you
13 get a different shape point and you get a different
14 color point, but you have the consistency of --
15 because the handpiece is directly physically -- it's
16 not flexible. Right? It's a design instrument. The
17 lighting and everything is set properly for it to
18 capture shape and color independently, as Korten has
19 described.

20 That's why Korten says you have a fixed
21 three-dimensional offset between them that you know --
22 because you designed the instrument, you know where

1 they are. And it also described earlier the
2 orientation and all this that we talked about.

3 And now you can automatically correlate
4 with the position because you know the offset
5 geometrically, so you can say, okay, I can now
6 correlate these two instrument measurements.

7 Q. But you said earlier that you would not want to angle
8 the optical sensors so that the shape sensor captures
9 the same information as the color sensor because then
10 you're introducing variability in terms of the angle
11 at which -- or differences in terms of the angle at
12 which the shape data is captured compared to the color
13 data. Correct?

14 MS. MARKOWSKI: Objection. Form.

15 A. I think the point I'm getting at, which I think we're
16 confusing these points, the point -- the Korten
17 instrument measures shape and color independently,
18 period. It doesn't measure -- while it's measuring
19 shape, it's measuring -- it independently measures
20 color. The shape instrument doesn't measure color,
21 the color instrument doesn't measure shape, and you
22 then correlate these -- associate these two together

1 as described in Korten.

2 They don't measure at the same point both
3 information at the same time instant. They're
4 independent instruments. And that's clearly described
5 in Korten more than one spot.

6 BY MR. DANLEY:

7 Q. The independent measurement is just related to
8 differences in the technology, or different
9 technological or different technical principles for
10 measuring shape and data -- or shape data -- let me
11 strike that and start over.

12 So the independent measurement described in
13 Korten relates to the fact that different technical
14 principles can be used to measure the shape data as
15 compared to the color data. Correct?

16 A. I'm not sure what you're asking. The shape
17 instrument of Korten measures only shape, period.
18 The first optical, as I described to you earlier, you
19 go back and look at column 2, capturing via first
20 optical sensor shape, and that shape constructs its
21 first three [ph] virtual dentition model.

22 The second instrument of Korten, the second

1 optical sensor, or whatever, the second instrument of
2 Korten captures color. The first one doesn't capture
3 color. The second one doesn't capture shape.

4 And then there's an association, there's a
5 correlation between them that's needed because they've
6 captured these things independently, so you have to
7 correlate it to know which shape point has which
8 color. Otherwise, you don't need a correlation if
9 they capture -- like '151 does it using different kind
10 of technology like focus-scanning, for instance, where
11 it's captured at the same time.

12 Q. So if you look at column 4, line 14 of Korten, it
13 discloses or describes a further embodiment in which,
14 quote, "the positioning of the first sensor and the
15 second sensor is performed simultaneously or at least
16 over a period of time simultaneously. Thus the first
17 color may be measured simultaneously with capturing of
18 the shape, although the capturing of the shape and the
19 measuring of the color are otherwise performed
20 independent from each other."

21 A. Yes.

22 Q. So doesn't Korten disclose that color and shape are

1 measured simultaneously?

2 A. But I pointed you to this disclosure earlier. It's
3 just as I described to you. When you have the shape
4 instrument on the handpiece at location X1-Y1-Z1 and
5 the color instrument on the handpiece at location
6 X2-Y2-Z2, offset from each other, you are capturing
7 shape and color simultaneously. So as you move the
8 handpiece, you get a shape reading, and independently
9 you get a color reading.

10 But that color reading and that shape
11 reading are of different locations on the tooth which
12 then you correlate to on the virtual dentition model
13 of Korten.

14 Q. But this portion of Korten doesn't state that there's
15 an offset, does there?

16 A. Well, it states that they are captured independently.
17 See? It says "simultaneously," but "performed
18 independent."

19 Q. Sure. But it also says that -- go ahead.

20 A. Totally different. Totally independent instruments.
21 And then when you start reading through Korten, you
22 know, he gives you different configurations of that

1 instrumentation as you see in his Figures 2, 3, and
2 4.

3 Q. But Korten doesn't say that the shape data is at some
4 different location from the color data. It says that
5 the shape and color data are measured simultaneously.
6 Correct?

7 MS. MARKOWSKI: Objection. Form.

8 A. I think I've already answered this question multiple
9 times. The shape data and the color data might be
10 captured simultaneously, as he's describing here, but
11 that's not the same location. And that's why Korten
12 says -- you know, when you read the specification of
13 Korten, it describes obviously I have to correlate
14 them now because they're at different locations.
15 They're captured potentially simultaneously but not
16 of the same exact location. Otherwise, you don't
17 need a correlation.

18 BY MR. DANLEY:

19 Q. Maybe you need a -- actually, I think Korten says
20 "associate" as well as "correlate." Wouldn't you
21 need -- if you capture two different images, one with
22 shape data and one with color data, wouldn't you need

1 to associate or correlate the shape data and the color
2 data even though they're taken of the same location?

3 A. No. If they're taken at the same location, you
4 already have it. You don't need -- it's already
5 done. You have one array that has everything in it.

6 Q. But you have two different images.

7 A. Well, that's not the case in Korten. So, I mean,
8 you're trying to fit a round peg in a square hole.
9 It's not the case in Korten.

10 Q. What isn't it the case in Korten?

11 A. Korten measures them independently. They're not
12 measuring the same point at the same time, with the
13 Korten instrumentation, especially when you are using
14 a spectrophotometer which has, typically, an aperture
15 of 4-millimeter to, say, 20-millimeter. If you go
16 online right now and type in spectrometer apertures,
17 you're looking at, say, 4- to 20-millimeter type
18 apertures.

19 The more -- the smaller they become, they
20 are -- potentially you get a higher resolution with
21 measurements, but that's a 4-millimeter aperture
22 compared to the first optical instrument what might

1 be at a completely different resolution.

2 So you have resolution issues, you have
3 independency of instruments. You are mixing apples
4 and oranges.

5 Q. But this is a -- we are still talking about a single
6 reference, Korten. Correct?

7 A. I'm sorry?

8 Q. We're talking about a single reference, Korten.
9 Correct?

10 A. I'm talking about Korten. Correct.

11 Q. And so Korten does include shape data and color data.
12 We can at least agree upon that part. Correct?

13 A. Korten -- as I've described to you earlier, Korten
14 measures shape data with a first optical sensor,
15 measures color data with a different optical sensor.
16 Second -- let's call it second optical sensor,
17 independently, and then provides a correlation
18 between them because they're measured independently.
19 That's why the correlation is needed.

20 Q. And so Korten discloses a first dentition model that
21 includes both shape data and color data. We can at
22 least agree upon that point. Correct?

1 A. Korten provides -- when Korten process is done, his
2 visual dentition model will have shape data and color
3 data in it.

4 Q. You said "visual dentition model." I think you meant
5 virtual dentition model. Correct?

6 A. I'm sorry. You're right, you're right. Yes, I
7 misspoke. My apologies.

8 Q. Okay. No problem. I just wanted to make sure that
9 the record was clear.

10 A. No, I appreciate that. Thank you for the correction.

11 So the virtual dentition model, the first
12 virtual dentition model of Korten, which has the shape
13 information in it, when -- after you've done the
14 independent color measurements and you've correlated
15 that, that first virtual dentition model will now have
16 shape information in it and color information.

17 Q. And just to make sure it's clear, the first virtual
18 dentition model will have shape information in it and
19 color information. Correct?

20 A. When Korten's process is complete, when you've done
21 the capturing with the first optical sensor, you've
22 created a first virtual dentition model that has

1 shape in it, you've captured color independently with
2 the Korten instrumentation, and you have color. When
3 you've correlated the color that you have captured
4 with the first virtual dentition model, that first
5 virtual dentition model essentially will have color
6 information and shape information.

7 It states that in Korten, if you look at
8 column 2, lines 12 or 11, "providing a correlation
9 between the first location of the first color and a
10 coordinate in the first visual dentition model." So
11 now you have a correlation between them, so you know,
12 at that coordinate, the color is L* a* b* 123.

13 MR. DANLEY: Okay, we've been going for
14 about an hour, if you want to take a break.

15 THE WITNESS: That would be fantastic.

16 (Off the record at 2:43 p.m.)

17 (Back on the record at 2:53 p.m.)

18 BY MR. DANLEY:

19 Q. Dr. Saber, I wanted to direct your attention back to
20 your Figure 2.

21 A. Figure 2.

22 Q. Correct. It is currently being shared on the screen.

1 A. Yes.

2 Q. So in the second box on the right-hand column, you --
3 just a second. You say, "Comparing the measured color
4 with a reference color and determining validity of the
5 measured color."

6 Do you see that box?

7 A. Yes.

8 Q. What did you mean by "determining validity"?

9 A. Well, if you go to column 4 of Korten, that's
10 essentially what Korten states. So if you see
11 column 4, line 60 to 67, you see it's -- Korten
12 states that "comparing the measured first color with
13 a reference color, and - depending on the degree of
14 similarity or the match between the measured first
15 color and the reference color - determining the
16 validity of the measured first color."

17 That's what Korten states.

18 Q. So is it accurate to say that this portion of Korten
19 discloses how close the measured color is with the
20 reference color?

21 A. Well, discloses determining the validity of the
22 particular color.

1 Q. And that's based upon the degree of similarity or the
2 match. Correct?

3 A. That's correct.

4 Q. And so, again, wouldn't that be a measurement of how
5 close the measured color is to the reference color?

6 A. Well, all Korten says is, discloses a "degree of
7 similarity." So how similar it is and determining
8 the validity. Korten doesn't provide any details of
9 how exactly that is done, just states it.

10 Q. So what's your understanding of what the "degree of
11 similarity" or the "match" means in Korten?

12 A. Well, Korten doesn't provide a specific equation or
13 details that say exactly how that's done, just says
14 that it takes place.

15 Q. Well, as an expert who's providing an opinion in this
16 matter and who has reviewed Korten intimately, what's
17 your understanding of what this disclosure in Korten
18 means?

19 A. Well, it provides a degree of similarity. Will
20 basically state, you know, how similar is this color
21 to a reference color.

22 Q. And again, isn't that the same as saying how close the

1 measured color is to the reference color?

2 MS. MARKOWSKI: Objection. Form.

3 A. Yes. So essentially you could say, you know, "degree
4 of similarity" may be how close -- how similar is
5 this color to a reference color.

6 BY MR. DANLEY:

7 Q. So wouldn't that same measurement also indicate how
8 close the reference color is to the measured color?

9 A. Yeah, if you were to say how close the measured color
10 to the reference color is, it would obviously be how
11 close the measured color -- the reference color to
12 the measured color.

13 But again, Korten doesn't provide any
14 details of how that's done.

15 Q. You don't provide any opinion in your declaration
16 about whether Korten has enabled this process, have
17 you?

18 A. No, I don't believe I do. I'm just stating that
19 Korten states it, but doesn't provide any details on
20 how exactly it's done.

21 Q. Wouldn't a POSITA know how to determine the degree of
22 similarity or match between two colors?

1 A. Well, there are different ways of doing that, so, I
2 mean, there are different ways -- there's not just
3 one methodology for doing that. There are different
4 ways of doing that. So Korten -- all Korten does is
5 just states it, doesn't say anything about how it's
6 done.

7 Q. But a POSITA would have various capabilities -- or
8 strike that.

9 A POSITA would have at least one or a
10 number of methods that they would know to determine
11 the degree of similarity or match between two colors.
12 Right?

13 MS. MARKOWSKI: Objection. Foundation and
14 form.

15 A. Yeah, so a POSITA would know, for instance, I can
16 compute Delta E, look at the Euclidean distance
17 between two colors in a color space and compute
18 Delta E.

19 BY MR. DANLEY:

20 Q. And this is something that a POSITA would have been
21 able to do in 2014. Correct?

22 A. Yes. The point is, Korten doesn't state what that

1 is, and I think that's important to understand that.

2 Q. And Korten later describes that -- strike that.

3 Korten later discloses that a mismatch
4 might occur between the measured color and the
5 reference color. Right?

6 A. Are you referring to column 5, line 2?

7 Q. Correct.

8 A. Yeah, Korten states that, "A mismatch between the
9 measured first color and the reference color may
10 trigger a further method step of issuing an error
11 signal," et cetera, et cetera.

12 Q. What's your understanding of what the term "mismatch"
13 means there as disclosed in Korten?

14 A. Well, it doesn't match exactly. So if the color I'm
15 trying to match is tooth color A1, and you found the
16 measured color is A3, they don't -- it doesn't match
17 exactly. A mismatch would be something where you may
18 be -- to an observer, it would be visible that the
19 two do not match.

20 Q. And Korten in line 5 says, "The limits of an
21 acceptable mismatch may be adjustable by user input."
22 Correct?

1 A. Yes, you read that sentence correctly.

2 Q. And what does that sentence indicate to you in terms
3 of the technology in Korten?

4 A. Well, you may say, for instance, I'm willing to live
5 with a plus or minus Delta E of maybe three units or
6 two units. So -- because, you know, beyond that it's
7 too visible that my tooth and the prosthesis you're
8 putting in look very different in color. But within,
9 say, two Delta Es, I'm willing to live with it.

10 Q. And that would be the value. Correct? Two Delta --
11 let me just state that more succinct -- or let me ask
12 a better question.

13 When you said that you would be willing to
14 live within, for example, two Delta Es, that would be
15 a value. Correct?

16 A. Yes. So the limits of an acceptable mismatch may be
17 adjustable. So you might say, okay, I'm willing to
18 accept two units in one direction or the other, or
19 one unit or three units, but you have some limits of
20 acceptable mismatch.

21 Q. And so going down -- oh, go ahead.

22 A. Go ahead.

1 Q. So going down to column 5, line 28, where it discloses
2 the standard color scheme that we discussed earlier.

3 A. Yes, sir.

4 Q. And you're familiar with the VITAPAN classic color
5 scheme?

6 A. Well, I've looked at it. I'm not -- I'm not a
7 dentist, obviously.

8 Q. Right. But you understand that there are 16 values
9 that are part of that color scheme. Correct?

10 A. Yes.

11 Q. How would you find a color -- strike that.

12 So if I measured a color of a tooth and I
13 have a value for that color, how would I find the
14 closest matching tooth reference color from the
15 VITAPAN tooth color scheme?

16 A. Well, you would measure the VITAPAN tooth color with
17 the same instrumentation that you measured your color
18 with. So you can measure the VITAPAN teeth with it
19 and then do some type of matching.

20 Q. And how would you do that matching?

21 A. Well, if you look at Korten, you'll see it says, "A
22 mismatch between the measured first color and the

1 reference color" -- so you have measured the first
2 color, you have a reference color potentially you
3 might have measured -- "may trigger a further method
4 step of issuing an error signal or message and/or may
5 cause skipping of the measured first color."

6 So you would -- you have a measured first
7 color, you have a VITAPAN, let's say, A2, you measured
8 that and you're looking to see how close the color
9 that you measured to that A2 in the VITAPAN.

10 Q. And so wouldn't you want to do that for each of the
11 reference tooth shade values in the VITAPAN color
12 scheme, define the closest matching reference tooth
13 shade?

14 A. Yeah, potentially, but you may not need to. I mean,
15 if your tooth is between -- let's say as you start
16 moving away from A3 to A4 to B1, it starts to get
17 very dissimilar. You may not need to do that for all
18 of them. You may just need to do that for the few
19 that are very close.

20 Q. So you can determine how accurate the VITAPAN tooth
21 shade color is to the measured color as part of this
22 process; is that right?

1 A. Well, that's what Korten is stating, basically, that
2 if you look back at column 4, "the method comprises
3 the step of comparing the measured first color with a
4 reference color, and - depending on the degree of
5 similarity or the match between the measured color
6 and the reference color - determining the validity of
7 the measured first color."

8 So you're essentially -- you have a
9 process -- Korten has a process to -- you have a
10 measured color, you compare that to a reference color
11 and, ideally speaking, find the best reference color
12 that you would use to create a prosthesis with.

13 Q. So I want to direct your attention to paragraph 69 of
14 your report -- or your substitute declaration on
15 page 30.

16 A. Paragraph 69.

17 Q. Yes. And it actually bridges page 30 to 31.

18 A. So this is in section B that has to do with Claim 14c
19 and the subscan stuff.

20 Q. Correct. So I was going to direct your attention, now
21 that we have this location in your report, to Claim 14
22 in the '151 patent.

1 A. Okay, so I'm going to Claim 14 now.

2 Q. And element 14c, "wherein obtaining the digital 3D
3 representation of the tooth comprises recording a
4 series of subscans of the tooth, where at least one of
5 said subscans comprises both texture information and
6 geometry information for said tooth." And it goes on
7 after that.

8 Did I read that correctly?

9 A. You read it correctly.

10 Q. Okay. So if I go back to paragraph 69 of your report,
11 you state, quote, that "measuring color at a second
12 point on a tooth or a further tooth is not a subscan
13 let alone a subscan containing both texture
14 information...and geometry information."

15 Is that accurate except for I omitted the
16 parenthetical?

17 A. I'm -- I lost you when you read that. So you're in
18 paragraph 69?

19 Q. Yes.

20 A. So did you -- I guess I didn't capture what you read.

21 Q. Let me re-read it.

22 A. You read the second sentence. Correct?

1 Q. Correct.

2 A. Yes, yes. Assuming you read it correctly, yes, you
3 read the second sentence.

4 Q. Okay. So isn't it fair to say that if you have a
5 first subscan that has texture and geometry
6 information, that according to Claim 14, the second
7 subscan does not necessarily need to include texture
8 and geometry information?

9 A. Well, the claim says "where at least one of said
10 subscans comprises both texture information and
11 geometry information." So you would have to have at
12 least one that contains both texture and geometry
13 information.

14 Now, practically speaking, obviously when
15 you're using instrumentation, you don't -- you don't
16 just turn it on and off. It either does it or doesn't
17 do it. So you get a subscan. The next subscan
18 doesn't just compute one or the other, so it's the way
19 the instrument is designed. You get -- but the claim
20 states, "where at least one of said subscans comprises
21 both texture information and geometry information."

22 Q. And so my question was, under your understanding of

1 the claim, if there's a first subscan that includes
2 texture information and geometry information, the
3 second subscan would not necessarily need to include
4 that same information, would it?

5 A. Well, "where at least one of said subscans comprises
6 both textural information and geometry information."
7 So at least one of the said subscans comprises both.

8 Q. And so does that -- are you agreeing with the question
9 or are you disagreeing with the question? I can't --
10 I don't quite understand.

11 A. The claim states "where at least one of said subscans
12 comprises both texture information and geometry
13 information." So one of them has to have both.
14 Maybe others may not, but one of them has to have
15 both.

16 Q. So if the first subscan has both, then the second
17 subscan does not necessarily have to include both; is
18 that right?

19 A. Well, again, you're reading -- you're reading
20 literally the claim language. But what I'm stating
21 to you is, when you read that in light of the
22 specification and the instrumentation that's being

1 used, you don't get one subscan that has both and the
2 others don't. That doesn't -- that's not technically
3 or practically the case.

4 Q. So are you importing that requirement into -- from the
5 specification into the claim?

6 A. I'm not importing any requirement. I'm just
7 explaining to you technically or practically that's
8 not the case, but the claim just requires at least
9 one of said subscans comprises both.

10 Q. So, again, if the first subscan includes both texture
11 and shape data, then the second subscan would not need
12 to necessarily include both texture and shape data; is
13 that right?

14 A. The literal language of the claim, that would be
15 correct. But what I'm explaining to you technically
16 is that's practically not the case. You don't just
17 get one with them and the rest of them without
18 because then it wouldn't -- you don't have, you know,
19 color information for the rest of the representation.
20 So it wouldn't make sense.

21 I mean, like, for instance, just to follow
22 up -- to clear this up, so you have a digital 3D

1 representation where the digital 3D -- I'm looking at
2 Claim 14 -- the digital 3D representation comprises
3 shape data and texture data. So the whole thing has
4 to have shape and texture data, so however -- that has
5 to be there at the end of the day.

6 So if you just had one subscan have it and
7 the rest of them don't, then you don't have a 3D
8 representation that has shape data and texture data.
9 So practically that doesn't make sense to a POSITA.

10 Q. So if you go to Claim 14 of the patent --

11 A. Yes, sir.

12 Q. -- it says "wherein obtaining the digital 3D
13 representation of the tooth comprises recording a
14 series of subscans of the tooth, for element 1c."
15 Correct?

16 A. Yes.

17 Q. What does the term "recording" mean in that claim
18 element to you?

19 A. Recording. You've got a subscan, you've done
20 something and you've created a subscan. So
21 recording, you've established a subscan. You've
22 obtained a subscan.

1 Q. So when you were -- in your understanding, recording a
2 series of subscans would be the same or at least
3 encompass the same language as obtaining a subscan; is
4 that right?

5 A. Well, I'm not here to start to -- to basically get
6 into, you know, the language descriptions and the
7 details. Technically speaking, as a POSITA, when you
8 say "comprises recording a series of subscans" means
9 you are taking on, you are capturing, you have a
10 subscan 1 that you've recorded in your database. You
11 have a subscan 2 that you've recorded in the
12 database. You've done some work, you've captured it,
13 and you've recorded it in the database. So you have
14 it and it's not lost when you go and do the next
15 subscan. You've recorded it. You've kept track of
16 it.

17 Q. So in the sense, would there be a difference between
18 "obtaining" versus "recording"? And, I mean, I'm not
19 trying to ask trick questions, I'm just trying to
20 figure out if there's a difference to you, as a person
21 of ordinary skill, between the use in the claim of
22 obtaining a 3D representation versus recording a

1 series of subscans.

2 A. Right. You're obtaining a digital 3D representation,
3 so I have this 3D -- I've obtained this 3D
4 representation by -- "comprises recording a series of
5 subscans." So I've taken a subscan, I've captured it
6 with my instrument, and before I go capture the next
7 one, I've recorded that into some file or database or
8 place somewhere, a record. I made a record of the
9 first subscan. So it's not lost.

10 When I move my instrument, let's say,
11 2 millimeters in one direction, the first one isn't
12 just lost. So I've recorded a series of -- I've
13 recorded the first one, I still have it. I recorded
14 the second one, I still have it. Now I create my --
15 obtain my digital 3D representation, I have it, but my
16 subscans weren't all thrown away at this point.
17 They're still recorded in my database. I can go back
18 and look at them if I want.

19 Q. So is it fair to say that, as part of this process,
20 you can capture images and then process those images
21 and that would become a record of a subscan?

22 A. I don't know what you're asking. What do you mean,

1 "capture images"? I'm not sure what you're talking
2 about.

3 Q. So the subscan can be derived from multiple 2D images.
4 Correct?

5 A. We've gone over that earlier in the morning, yeah.

6 Q. Yeah, so I was just trying to lay a base or a
7 foundation for the questions.

8 So the '151 patent, the subscans are
9 derived from a set of 2D images. Right?

10 A. As I showed you in column, I think, 15. Right? So
11 "acquire subscans comprising both shape and texture."
12 Yes. So if you look at column 15, for instance, I
13 think we were here this morning, line 57, as an
14 example, he's giving, "When the scanner operates by
15 the focus-scanning technique the individual subscans
16 of the tooth are derived from a sequence of 2D images
17 obtained while scanning a focus plane over a portion
18 of the tooth."

19 And so those 2D images are scanning each of
20 them. You get a focused plane. You move the focus,
21 you get another 2D image at another focused plane, and
22 that's how you get the 3D, essentially.

1 Q. And making a record of each of those focal planes,
2 that is a recording of a subscan. Is that your
3 opinion?

4 A. So when you capture those images, you can record
5 them. So you can record them and keep them. You can
6 just put them into a subscan and record the subscan.

7 So the patent basically says, when you
8 capture, let's say, a stack of ten images at ten
9 different focal planes, you concatenate those
10 together and you now have a subscan. You record
11 that. You put that in a file or somewhere in your
12 database so that's recorded and not lost.

13 Q. And so that subscan, that record of that subscan would
14 include XY information, it would include depth
15 information, and it would include color information;
16 is that right?

17 A. Correct. It would include the shape data and would
18 include the texture data.

19 Q. So I want to talk a little bit about some of the
20 combinations that were part of your declaration.
21 Okay?

22 A. Sure. And you would need to upload whichever one you

1 want to talk about.

2 Q. So I'm going to -- and first of all, I just wanted to
3 talk in general about some of the -- about your
4 opinions on the combinations. Okay?

5 A. Okay.

6 Q. So we've established that Korten provides a digital 3D
7 representation in the form of a first dentition model
8 that includes shape data and color data. Correct?

9 A. Correct.

10 Q. So once you have that color data you can determine or
11 calculate how close that color data is to a reference
12 value. Correct?

13 A. Once you have the color data that you measured with
14 your instrument, you can calculate -- you can compare
15 that to a reference value, but that is not the color
16 data that's in the dentition model. We've talked
17 about that earlier.

18 Q. Well, I think that there's a disagreement about that
19 because Korten uses "first color" and "measured color"
20 interchangeably and uses "first color" in terms of
21 determining the tooth shade value and the reference to
22 the tooth shade system. Correct?

1 MS. MARKOWSKI: Objection. Form.

2 MR. DANLEY: Yeah, let me just withdraw
3 that question. That probably wasn't a very good one.

4 BY MR. DANLEY:

5 Q. So setting that disagreement aside in terms of what
6 color is actually stored in the first dentition model
7 from Korten, once you have a color value that is
8 stored within that first dentition model, can you use
9 that color value to determine how close the -- that
10 color value is to a reference color value?

11 A. What do you mean, "can you use that color value"? I
12 mean, '151 has a digital 3D representation that they
13 established from a series of subscans. They have
14 taken a series of subscans, they've created a 3D
15 representation, as you go back to my Figure 1. So
16 they've created a 3D representation.

17 From that 3D representation, that digital
18 3D representation, they compute -- basically they now
19 have shape and texture information. They derive or
20 determine the tooth shade value from there and then
21 they provide a certainty score to it.

22 So '151 does that, creates a digital 3D

1 representation, has shape and texture in it, and then
2 proceeds to compute -- to determine the tooth shade
3 value from that digital 3D representation.

4 The '151 does that. Korten does not do
5 that.

6 Q. And I'm displaying -- am I displaying the '151 patent
7 on the screen?

8 A. I think so.

9 Q. Okay.

10 A. Give me one second. Yeah, it looks like it. Wait a
11 minute. Yeah, it looks like it.

12 Q. So isn't it fair to say that Korten discloses, again,
13 the 3D representation in the form of a first dentition
14 model. Correct?

15 A. Korten discloses a -- as we discussed earlier,
16 discloses a first virtual dentition model. That's
17 not the same digital 3D representation that's
18 disclosed in the '151. I want to keep the wording in
19 the proper context.

20 Q. You said that for -- that the first dentition model in
21 Korten includes both shape data and color data.
22 Correct?

1 A. The first dentition model in Korten includes shape
2 data, and once you've correlated the color data to
3 it, it includes shape and color data. The digital 3D
4 representation of -- so if you look at Claim 1a, you
5 see "obtaining a digital 3D representation of the
6 tooth, where the digital 3D representation comprises
7 shape data and texture data for the tooth."

8 Q. And Korten discloses a first dentition model that
9 includes both shape data and texture data for the
10 tooth. Correct?

11 A. Well, it discloses shape data and color data.

12 Q. And color data -- is there -- strike that.

13 Doesn't texture data include color data?

14 A. Yes. Texture data would include color data.

15 Q. So in that sense, Korten discloses a first dentition
16 model that includes both shape data and texture data.
17 Correct?

18 A. Well, texture data includes color data. Color data
19 doesn't necessarily include texture. I mean, as I
20 said to you earlier, you know, it's -- I think I've
21 said this earlier, you know. It's my view that, you
22 know -- looking at this as a POSITA, okay, it is my

1 opinion that texture data would be more than color
2 alone, as understood by a POSITA. So texture isn't
3 exactly the same as color, as understood by a POSITA.

4 However, as I mentioned earlier, I do
5 recognize in this case that Medit and maybe the board
6 has interpreted texture to mean that it could be color
7 alone.

8 So in this particular case, this
9 interpretation has taken place. And as I mentioned
10 earlier, my opinions do not change regardless of this
11 interpretation. I've done my analysis with that
12 interpretation. But I just want it to be clear, as a
13 POSITA, that color and texture aren't the same thing,
14 generally speaking as a POSITA. But in this case,
15 there is that interpretation. I understand that.

16 Q. So in this -- in this specific instance where that
17 interpretation has taken place, doesn't Korten
18 disclose a digital 3D representation in the form of a
19 first dentition model that includes both shape data
20 and texture data?

21 A. Well, Korten discloses a first visual dentition model
22 that includes shape data and color data. And given

1 what I just said about this particular case, the
2 digital 3D representation of the '151 has shape data
3 and texture data, and given this interpretation, then
4 they both have -- the '151 has a digital 3D
5 representation with shape and color in it, and Korten
6 has a virtual dentition model with shape and color in
7 it.

8 Q. And Korten also discloses that you -- strike that.

9 Korten also discloses a step in which
10 the -- in which color data is compared to a first
11 reference color to find the closest match or reference
12 model scheme. Correct?

13 MS. MARKOWSKI: Objection to form.

14 A. Korten, as we discussed earlier, if you're looking at
15 my Figure 2 in my supplemental dec, so Korten
16 measures the color data, the color of the particular,
17 you know, first location on the tooth, and has the
18 ability to compare that to a reference scale and
19 determine the closest match.

20 BY MR. DANLEY:

21 Q. And there are secondary references that also
22 disclose -- or that have been part of this process

1 that disclose determining a tooth reference shade
2 based upon a measured color; isn't that right?

3 MS. MARKOWSKI: Objection. Foundation.
4 Form.

5 A. Well, I mean, I want to be clear. I mean, I would
6 ask that you upload whichever one you want to talk
7 about so we can talk specifically about what they do.
8 I mean, Lehman II has a process, Lehman I has a
9 process, Pye has a different process. So we want to
10 talk specific in details, not just overview and
11 hypotheticals.

12 BY MR. DANLEY:

13 Q. So did you review the secondary references as part of
14 this process in preparing for today's deposition?

15 A. Yes, I have.

16 Q. And which of the secondary references did you review?

17 A. I reviewed them all.

18 Q. And you were -- is it fair to say that you were
19 familiar with what is disclosed within those secondary
20 references?

21 A. Yes, but I don't have them memorized. So, yes, I'm
22 familiar with what's there, but I don't have them --

1 I don't have the language all memorized. I wish I
2 could, but I don't have them memorized.

3 Q. Well, it's not a memory contest in terms of citing
4 specific locations or quotes from the references, but
5 I'm just trying to get a general understanding of what
6 you remember from those secondary references with
7 respect to finding a tooth shade value.

8 So isn't it fair to say that the secondary
9 references disclose methods in which a tooth color can
10 be compared to a reference tooth shade to find the
11 closest matching reference tooth shade?

12 MS. MARKOWSKI: Objection. Foundation.

13 A. Again, generally speaking, you're talking from
14 memory, and I don't have the reference in front of
15 me. I don't know which one you're referring to. So
16 generally speaking -- you know, for instance, if you
17 look at Lehman II, you know, Lehman II talks about a
18 tooth shade analyzer. Lehman II describes 2D images,
19 doesn't say anything about 3D at all, strictly using
20 2D imagery, so it -- the devil is in the details.

21 So hypotheticals is very different from
22 details, and the devil is in the details. Lehman

1 uses, for instance, at 2D, a camera, doesn't use a
2 spectrometer. So they're different instrumentation,
3 different details, so the devil is in the details.

4 BY MR. DANLEY:

5 Q. So let's say you had a hypothetical where you have a
6 3D model that includes color data. Okay?

7 A. Yes.

8 Q. And so that color data would be, I think you said, L*,
9 what, a* b*?

10 A. That's one way of representing it.

11 Q. Okay. So the L* a* b* would be represented by three
12 different values; is that correct?

13 A. I'm sorry, hang on one second. I'm sorry.

14 Sorry about that. Please go ahead.

15 Q. No problem. So is it fair to say that the L* a* b*,
16 each of those items would include -- would have an
17 associated value, a value associated with them? Is
18 that right?

19 A. So if I take a spectrometer and I place it on, let's
20 say, a piece of fabric or a piece of paper that has a
21 color on it, so I have a color red on a piece of
22 paper, I place the spectrometer on that piece of

1 paper, I place the aperture at, say, around
2 4 millimeters on that square block that's red, and I
3 push the button, I can read an L* a* value -- L* a*
4 b* value of that patch on that piece of paper.

5 Q. Okay.

6 A. An L* value of, you know, let's say 2, an a* value of
7 3, and a b* value of 4, as an example.

8 Q. Okay. So whenever you want to find the closest
9 matching tooth reference shade to that color value,
10 then you would use the L* or the a* and the b* values
11 that you measured. Correct?

12 MS. MARKOWSKI: Objection. Foundation.

13 A. Yes. So I'm not sure I understand what you're
14 asking, but I can take my spectrometer and go to the
15 VITAPAN scale and pick a tooth out of there, place it
16 on that tooth, push the button, and out comes an L*
17 a* b* value for that tooth.

18 And I can take that spectrometer and put
19 it in your mouth on the tooth and push the button and
20 get a value, and I can compare those two, let's say,
21 using Delta E, just like I think, if I remember off
22 the top of my head, I believe Lehman I does that. I

1 don't recall off the top of my head. I think one of
2 Lehman's do that.

3 BY MR. DANLEY:

4 Q. So let's say you have an instance in which you had
5 determined a $L^* a^* b^*$ value for a point of the tooth
6 and you associated that value with your first -- with
7 a coordinate on your first dentition model.

8 Are you with me so far?

9 A. No, I lost you. Can you -- can you repeat that,
10 please?

11 Q. Yeah. So you have an $L^* a^* b^*$ value and you
12 associated that $L^* a^* b^*$ value with a coordinate on a
13 first dentition model.

14 Are you with me so far?

15 A. Yes. I'm assuming you've done that correctly. We've
16 talked about the interpolation stuff earlier, but
17 let's just say, putting that aside for the moment to
18 understand your hypothetical, you've associated the
19 proper color with an X, Y, Z location on your visual,
20 first visual dentition model of Korten.

21 Q. And so you have a color that's associated with a
22 coordinate on your first dentition model, and then you

1 can use a process to find a closest matching tooth
2 reference shade to that color, can't you?

3 A. Are you asking whether you can or are you asking
4 whether Korten does?

5 Q. No, I'm asking if you can.

6 A. Well, '151 does that, obviously, so it can be done.
7 It doesn't do what Korten does, but it does have a
8 digital -- '151 -- let's be clear for the record.
9 '151 constructs a digital 3D representation. So as
10 you -- so if you go back to the Claim 1 that you
11 pointed to.

12 So '151 does obtain a digital 3D
13 representation of the tooth that contains shape data
14 and texture data, so it has both, then determines the
15 tooth shade value for at least one point on the tooth
16 based on the texture data of the corresponding point
17 of the digital 3D representation.

18 So it doesn't measure it off the tooth with
19 a spectrometer. It looks at a digital 3D
20 representation and, from that representation, that
21 point, it measures -- it compute -- it determines the
22 tooth shade value based on the texture at that point

1 and on known texture values from a reference scale.

2 That's what '151 does. Korten doesn't do
3 that.

4 Q. I'm just asking about a hypothetical now, about,
5 hypothetically, you have a first 3D representation
6 that includes shape data and color data, and we've
7 agreed that the color data can be in the form of an
8 L* a* b* value. Correct?

9 A. Yes.

10 Q. And then once you have that L* a* b* value, you can
11 perform calculations to determine how close the tooth
12 reference shade is to that L* a* b* value, can't you?

13 A. Well, as I mentioned to you, '151 does that, so you
14 don't have to --

15 Q. I'm not asking about the '151. I'm just asking, as a
16 person of ordinary skill in the art, if you have a
17 color value that you have associated with points or a
18 coordinate on the 3D model, you can take that color
19 value and determine how close a reference tooth shade
20 is to that color value, can't you?

21 A. And as I mentioned to you, yes, because that's what
22 '151 does. It takes the digital 3D representation

1 that it has obtained that has -- that has shape
2 information and color information in it, and it
3 obtains the tooth shade value from that digital 3D
4 representation. So that's what the '151 does, so,
5 yes, you can do that.

6 Q. And you would use a set of well-known equations to --
7 or calculations to determine -- strike that.

8 So as we discussed earlier, you can use a
9 set of well-known procedures to determine the
10 difference between the color value that is in the 3D
11 model versus the color value for the reference tooth
12 shade. Right?

13 A. Yes, you can use, let's say, a distance measure or
14 some -- that's what '151 does, it takes that --

15 Q. Okay.

16 A. It takes that value from the digital 3D
17 representation and it computes a tooth shade value
18 from that digital 3D representation and then computes
19 a certainty score for that tooth shade value.

20 Q. So I want you to keep that in mind. Now I want you to
21 consider a different situation in which you have a 2D
22 image, and the 2D image has associated with it color

1 values on a per pixel basis. So you have a pixel that
2 has an L^* , an a^* , and a b^* value.

3 Are you with me so far?

4 A. No, I'm not with you because -- how did you obtain
5 that color image?

6 Q. In terms of -- in terms of the color values that are
7 in that image, does the matter -- means in which you
8 capture the image matter?

9 A. Well, I mean, everything matters. Right? Everything
10 matters. At the end of the day, the devil is in the
11 details. So it's not, well, can I take a Toyota
12 engine and dump it in a Dodge Ram? Hypothetically,
13 I'm sure somebody will say, oh, sure, you can dump a
14 Toyota engine in a Dodge Ram. But the point is --

15 Q. But I'm not -- I'm not taking about any sort of
16 combinations here. What I'm talking about is that you
17 have a situation in which you have a 2D image, the
18 tooth; that 2D image has L^* , a^* , and b^* values
19 associated with portions of that image.

20 A. And I'm asking you, how did you get that 2D image?
21 The details are important. Did you use a camera and
22 capture RGB and then convert it to L^* ? How --

1 what -- how did you get this 2D image?

2 So you're trying to construct a case to fit
3 a round peg in a square hole. I'm trying to --

4 Q. What different ways could you use to capture that 2D
5 image?

6 A. I mean, there are different ways of doing that.
7 Obviously Korten has one way.

8 Q. I'm not talking about Korten or the '151. I'm talking
9 to you, as an expert, how would you capture a 2D image
10 of a tooth that includes color data?

11 A. And as I'm explaining to you, Korten has one
12 approach. It has a spectrometer, for instance. You
13 can walk through the tooth with a spectrometer and
14 capture a color at different locations and put that
15 into a grid and you have a 2D image.

16 Q. Okay, so let's say we have a 2D image in which the
17 color data has been measured by a spectrometer. Is it
18 fair to say that the color data in that 2D image is an
19 L*, a*, and b* value?

20 A. You could do that. Yes.

21 Q. Okay. So once you have an L* a* b* value for a
22 portion of the tooth and you want to determine the

1 closest matching tooth shade to that $L^* a^* b^*$ value,
2 wouldn't you use the same -- the same equations that
3 you would use in a 3D instance?

4 MS. MARKOWSKI: Objection. Form.

5 A. I mean, you could. You don't have to -- you could --
6 I'm not sure I understand what you're asking, but if
7 I have an $L^* a^* b^*$ value of a given sample color,
8 doesn't matter whether it's in a 2D image or hanging
9 on the wall, I have an $L^* a^* b^*$ value of a sample, I
10 can compare that to a reference using various
11 methodologies. You know, the closest distance would
12 be -- like a Delta E obviously would be the simplest
13 one.

14 MR. DANLEY: Okay, I think we can go off
15 the record.

16 (Off the record at 3:42 p.m.)

17 (Back on the record at 3:50 p.m.)

18 BY MR. DANLEY:

19 Q. Dr. Saber, I did want to introduce as Exhibit
20 Number 6, the Pye reference. And this is patent
21 number 7,341,450, Exhibit 1012 in the IPR proceedings.
22 Just let me know when you have that and you've opened

1 it.

2 MARKED FOR IDENTIFICATION:

3 EXHIBIT 6

4 3:51 p.m.

5 A. I have it open.

6 BY MR. DANLEY:

7 Q. Okay. So actually I wanted to ask you just a handful
8 of questions about your opinion on the Pye reference,
9 and I've shared your report on the screen. I'm
10 showing paragraph 122, which is on page 54, if you
11 want to look at a larger copy on your screen.

12 A. Yeah, paragraph?

13 Q. 122.

14 A. 122, okay.

15 Q. And so this is Figure 5 from Pye. Just let me know
16 when you're ready to move on.

17 A. Yeah, what's your question?

18 Q. My question is, what is your understanding -- my
19 question is, do you see the Figure 5 that is produced
20 at paragraph 122 of your report?

21 A. I do.

22 Q. And this is Figure 5 from Pye. Correct?

1 A. That is correct. That is Figure 5 of Pye reproduced
2 below.

3 Q. And can you explain to me what your understanding is
4 of what's shown in this figure?

5 A. Yes. If you go to -- well, the easiest way to do it
6 is to go to Pye. So if you go to Pye to -- so if you
7 go to Pye, what you just uploaded to me, and if you
8 look at column 3, line 62-ish, it says, "Figure 5 is
9 a diagram of an illustrative graphical user interface
10 in a shade analyzing system in accordance with one
11 embodiment of the present invention."

12 Q. And what is your understanding of what is shown in
13 this graphical user interface?

14 A. Okay. So image -- so if you go now to column 7 of
15 Pye, starting at line 46, 47-ish, you can see here
16 Pye starts to describe Figure 5, and you can see that
17 he says, "As mentioned above, image information may
18 be divided using two lines (e.g., two parallel
19 lines)."

20 And then he gets into the description as an
21 example for implementing processes described herein as
22 illustratively shown in Figure 5.

1 So now if you go to Figure 5, the next
2 sentence, 51, the image is labeled -- so if you look
3 at Figure 5, I guess on your hard copy while you're
4 looking at the screen, so Figure 5 -- the image is 60,
5 so that's the whole image there, "is an intraoral
6 image of a patient's [mouth]" -- that's a typo there,
7 it's not a month, it's a mouth -- "that may be
8 displayed on display equipment of a shade analyzing
9 system." And obviously can be displayed with
10 software, et cetera.

11 Now, you see where it says the object is
12 currently -- "the object that is currently of
13 interest," on line 57, "may be tooth 62."

14 So 62, that kind of a -- that whole, like,
15 oval -- not oval, but kind of a shape, is 62, is the
16 tooth. You can see a tooth to the right of it and you
17 see a tooth to the left of it and you see a little
18 space between them. That's his diagram of a tooth.

19 And then what he says is, "Lines 64," what
20 you see, two lines there, "may be displayed over
21 image" 50 -- "60. Lines may be used," and he's got
22 another typo here, so "Lines 64 may be used to divide

1 the [two]," not the tooth, "to divide the two 62 into
2 three regions," which you have the incisal region,
3 which is kind of closer to where you chew, you have
4 the central region that he shows there, and you have
5 the cervical region, which is closer to your gums.

6 So that's what's described in that picture,
7 in that figure.

8 Q. How do you define a line?

9 A. What do you mean, "how do you define a line"?

10 Q. How can you define -- or maybe I can ask a little bit
11 more direct question. Can you use two points to
12 define a line?

13 A. Yes. Two points can define a line.

14 Q. And you can use three points to define a plane; isn't
15 that right?

16 A. That's correct. We're talking about geometry now.

17 Q. Exactly.

18 A. Yes, that's correct.

19 Q. So doesn't Korten disclose that the first dentition
20 model can be comprised -- or can include X, Y, Z
21 coordinates?

22 A. The first dentition model of Korten, the first

1 virtual dentition model of Korten has the
2 three-dimensional coordinate system, so it would have
3 X, Y, Z coordinates, yes.

4 Q. And those X, Y, Z coordinates would constitute points.
5 Right?

6 A. Yes. Obviously you have an X, Y, Z coordinate
7 system, so yes.

8 MR. DANLEY: All right, I don't have any
9 further questions.

10 MS. MARKOWSKI: We don't have any questions
11 for redirect.

12 MR. DANLEY: Okay.

13 (Proceedings concluded at 3:58 p.m.)

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1 CERTIFICATE OF NOTARY

2 STATE OF MICHIGAN)

3) SS

4 COUNTY OF OAKLAND)

5 CERTIFICATE OF SHORTHAND REPORTER - NOTARY PUBLIC

6

7 I, ALISON C. WEBSTER, Certified Reporter and
8 Notary Public within and for the State of Michigan
9 do hereby certify:

10 That Eli Saber, Ph.D., the witness whose
11 deposition is hereinbefore set forth, was duly sworn
12 by me before the commencement of such deposition and
13 that such deposition was taken before me and is a
14 true record of the testimony given by such witness.

15 I further certify that the adverse party was
16 represented by counsel at the deposition.

17 I further certify that the deposition of
18 Eli Saber, Ph.D. occurred via remote on
19 Thursday, August 8th, 2024, commencing at 9:58 a.m.
20 to 3:58 p.m.

21 I further certify that I am not related to
22 any of the parties to this action by blood or

1 marriage, I am not employed by or an attorney to any
2 of the parties to this action, and that I am in no way
3 interested, financially or otherwise, in the outcome
4 of this matter.

5
6 IN WITNESS WHEREOF, I have hereunto set my
7 hand this 20h day of August, 2024.

8
9
10 
11

12 _____
13 ALISON C. WEBSTER, CSR-6266, RPR, RMR, CRR, RDR
14 Notary Public, Oakland County, Michigan
15 My commission expires: May 1, 2029
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21
22

ACKNOWLEDGMENT OF DEPONENT

I, ELI SABER, PH.D., do hereby acknowledge
that I have read and examined the foregoing testimony
and the same is a true, correct, and complete
transcription of the testimony given by me and any
corrections appear on the attached errata sheet signed
by me.

(SIGNATURE)

(DATE)

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