

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

3SHAPE A/S and 3SHAPE INC.
Petitioners

v.

MEDIT CORPORATION
Patent Owner

Case No. IPR2024-01266
Patent 9,262,864

**DECLARATION OF ELI SABER IN SUPPORT OF
PETITION FOR *INTER PARTES* REVIEW
OF U.S. PATENT NO. 9,262,864**

3SHAPE EXHIBIT 1006
3Shape v. Medit

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 9,262,864

TABLE OF CONTENTS

I.	INTRODUCTION	1
II.	BACKGROUND AND QUALIFICATIONS	2
III.	INFORMATION CONSIDERED	8
IV.	RELEVANT LEGAL STANDARDS	8
A.	Claim Interpretation	8
B.	Perspective of One of Ordinary Skill in the Art.....	9
C.	Anticipation	9
D.	Obviousness.....	10
V.	SUMMARY OF OPINIONS.....	13
VI.	IDENTIFICATION OF CHALLENGES TO THE CLAIMS	13
VII.	LEVEL OF ORDINARY SKILL IN THE ART	13
VIII.	TECHNICAL BACKGROUND	14
A.	The '864 Patent	14
B.	The '864 Patent Examination History.....	15
C.	Overview of the Prior Art.....	17
1.	Kawai (EX1010)	17
2.	Quadling (EX1011).....	19
3.	Durbin (EX1012)	20
IX.	CLAIM CONSTRUCTION	21
X.	CLAIMS 1, 2 AND 15-20 WOULD HAVE BEEN OBVIOUS OVER KAWAI (EX1010) IN VIEW OF QUADLING (EX1011) (GROUND 1). .	22

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 9,262,864

A.	Claim 1 (Preamble): A method comprising:	22
1.	[1.1]: creating a three-dimensional model with a processor from a sequence of image sets stored in a memory, each image set including a plurality of images of a subject including dentition, each one of the plurality of images captured from a different optical axis, the plurality of images including at least one video image;	25
2.	[1.2]: rendering the three-dimensional model in a user interface of a display from a perspective;	29
3.	[1.3]: automatically selecting a video image with the processor from the sequence of image sets that contains a view of the subject most closely corresponding to the perspective;	30
4.	[1.4]: displaying the video image in the user interface of the display concurrently with the three-dimensional model; and	35
5.	[1.5]: providing a tool with the processor in the user interface for marking a margin of the dentition.	37
B.	Claim 2 (Preamble): A system comprising:	38
1.	[2.1]: a memory storing a three-dimensional model of a subject and a sequence of image sets used to create the three dimensional model, each image set including a plurality of images of a subject including dentition, each one of the plurality of images captured from a different optical axis, the plurality of images including at least one video image;	39
2.	[2.2]: a display configured to provide a user interface presenting the sequence of image sets; and	40
3.	[2.3]: a processor configured to render the three-dimensional model in the user interface from a perspective, select a video image from the sequence of	

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 9,262,864

	image sets that contains a view of the subject most closely corresponding to the perspective, display he video image in the user interface concurrently with the three-dimensional model, and provide a tool for marking a margin of the dentition.	40
C.	Claim 15 (Preamble): A system comprising:	41
1.	[15.1]: displaying a three-dimensional model of dentition from a perspective in a display;	41
2.	[15.2]: providing a plurality of video images of the dentition in a memory;	42
3.	[15.3]: automatically selecting one of the plurality of video images with the processor that shows the dentition from the perspective; and	42
4.	[15.4]: displaying the one of the plurality of video images in a user interface of the display concurrently with the three-dimensional model as an aid to visually determining a margin of the dentition.....	43
D.	Claim 16: The method of claim 15 further comprising displaying a margin on one or more of the three-dimensional model or the one of the plurality of video images.	43
E.	Claim 17: The method of claim 16 further comprising receiving a user modification of the margin and updating the display with a modified margin.	45
F.	Claim 18 (Preamble): A system comprising:	45
1.	[18.1]: a display having a window for displaying a three-dimensional model of dentition from a perspective;	45
2.	[18.2]: a camera providing a plurality of video images of the dentition; and.....	47
3.	[18.3]: a processor configured to select of one of the plurality of video images that shows the dentition from	

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 9,262,864

	the perspective and display in a second window in the display the one of the plurality of video images concurrently with the three-dimensional model as an aid to visually determining a margin of the dentition.....	48
G.	Claim 19: The system of claim 18 wherein the processor is configured to display a margin on one or more of the three-dimensional model or the one of the plurality of video images.....	49
H.	Claim 20: The system of claim 19 wherein the processor is configured to receive a user modification of the margin and update the display with a modified margin.	50
I.	Explanation of Why Claims 1, 2 and 15-20 Would Have Been Obvious (Ground 1).	50
1.	Kawai combined with Quadling	50
a)	Difference between the claimed invention and the prior art.	51
b)	A POSITA would have had motivation to combine the disclosures of Kawai and Quadling.....	51
c)	A POSITA would have had a reasonable expectation of success based on the disclosures of Kawai and Quadling and knowledge generally available in the art.....	54
2.	Kawai and Quadling, when combined with Durbin	56
a)	Difference between the claimed invention and the prior art.	56
b)	A POSITA would have had motivation to combine the disclosures of Kawai and Quadling.....	58
XI.	ANY PURPORTED SECONDARY CONSIDERATIONS EVIDENCE DOES NOT OVERCOME THE STRONG EVIDENCE OF THE OBVIOUSNESS OF THE CLAIMS.....	59

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 9,262,864

XII. CONCLUSION.....	60
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APPENDIX A

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 9,262,864

EXHIBIT	DESCRIPTION
1001	U.S. Patent No. 9,262,864, issued on February 16, 2016 to J. Rohaly <i>et al.</i> (“the ’864 Patent”)
1002	File History of U.S. Patent Application No. 14/487,371, filed on September 16, 2014
1004	U.S. Provisional Application No. 60/947,009, filed on June 29, 2007
1007	<i>Curriculum Vitae</i> of Eli Saber
1010	U.S. Patent No. 5,417,572 (“Kawai”)
1011	U.S. Patent Publication No. 2004/0254476 (“Quadling”)
1012	U.S. Patent Publication No. 2002/0055082 (“Durbin”)
1013	U.S. Patent Publication No. 2005/0089822 (“Geng”)
1014	U.S. Patent Publication No. 2006/0020363 (“Orth”)
1017	Claim Construction Order for U.S. Patent Nos. 7,912,257; 9,191,648; 9,245,374; 9,262,864 filed on May 31, 2024 in <i>Medit Corporation v. 3Shape A/S</i> , Civ. Action No. 6:23-cv-00658 (WDTX)
1018	PCT Publication No. WO2000/008415, published February 17, 2000
1019	Multiple View Geometry in computer vision, Richard Hartley and Andrew Zisserman, Second Edition (2003), Introduction pp. 1-21.

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 9,262,864

I, Eli Saber, hereby state as follows:

I. INTRODUCTION

1. I have been retained by Buchanan Ingersoll & Rooney (“Counsel”) on behalf of 3SHAPE A/S (“Petitioner”) as an independent expert consultant in this *inter partes* review (“IPR”) proceeding before the United States Patent and Trademark Office (“PTO”).

2. I have been asked by Counsel to provide opinions regarding Claims 1, 2 and 15-20 of U.S. Patent No. 9,262,864 (“the ’864 Patent”). My opinions and the bases for my opinions are set forth below.

3. I am being compensated at my ordinary and customary consulting rate for my work, which is \$500 per hour. My compensation is in no way contingent on the nature of my findings, the presentation of my findings in testimony, or the outcome of this or any other proceeding. I have no other financial interest in this proceeding.

4. This report is based on information currently available to me. I reserve the right to continue my investigation and analysis, which may include a review of documents and information not listed above. I also reserve the right to expand or otherwise modify my opinions and conclusions as my investigation and study

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 9,262,864

continues, and to supplement my opinions and conclusions in response to any additional information that becomes available to me.

II. BACKGROUND AND QUALIFICATIONS

5. All my opinions stated in this declaration are based on my own personal knowledge and professional judgment. In forming my opinions, I have relied on my knowledge and experience in designing, developing, researching, and teaching the technology referenced in this declaration.

6. I am over 18 years of age and, if I am called upon to do so, I would be competent to testify as to the matters set forth herein. I understand that a copy of my current curriculum vitae, which details my education and professional and academic experience, is being submitted as EX1007. The following provides a brief overview of some of my experience that is relevant to the matters set forth in this declaration.

7. I am a Professor in the Department of Electrical and Microelectronic Engineering (EME) and the Chester F. Carlson Center for Imaging Science at the Rochester Institute of Technology (RIT) in Rochester, New York. I also serve as the Director of the Image, Video and Computer Vision Laboratory. I joined RIT's full-time faculty in 2004. I have over thirty-four (34) years of industry and academic experience, thirty (30) of which are in the fields of Computer Vision, Digital Image/Video Processing, Pattern Recognition, and Machine Learning.

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 9,262,864

8. I received a Ph.D. in Electrical Engineering from the University of Rochester in 1996. My concentration was in Signal/Image/Video Processing, Pattern Recognition, and Computer Vision. I received a Master of Science Degree in Electrical Engineering from the University of Rochester in 1992 in the same concentration as listed above, and I received a Bachelor of Science Degree in Electrical and Computer Engineering, Summa Cum Laude, from the State University of New York at Buffalo in 1988.

9. Before becoming a full-time professor, I worked for Xerox Corporation for 16 years, from 1988 to 2004. During my years at Xerox, I was responsible for delivering color management, image processing innovations, architectures, and algorithms; xerographic sub-systems for a variety of color products; and control systems for toner production facilities. One of several roles I held at Xerox was Advanced Development Scientist and Manager. In that capacity, I established the Advanced Design Laboratory—an Imaging/Xerographics lab—and provided technical and managerial leadership for the Electrical, Imaging and Xerographics Department. In another role, as Product Development Scientist and Manager, I led the research and development of image quality metrics for various product platforms. I also led the Image Science, Analysis, and Evaluation area, with 12 to 15 direct reports and a budget of approximately \$2 million.

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 9,262,864

10. From 1997 until 2004, I was an adjunct faculty member at the Electrical Engineering Department of the Rochester Institute of Technology and at the Electrical & Computer Engineering Department of the University of Rochester. I was responsible for teaching undergraduate and graduate coursework such as Digital Signal Processing, Digital Image Processing, Digital Video Processing, Pattern Recognition, Detection and Estimation Theory and Communication Systems; and performing research in multimedia applications, pattern recognition, image understanding and color engineering.

11. Since joining RIT full time, I have been responsible for teaching several undergraduate and graduate courses in Digital Signal Processing, Digital Image Processing, Digital Video Processing, Pattern Recognition, Advanced Neural Networks and Deep Learning, Engineering Analysis, Random Signal & Noise, Advanced Engineering Mathematics, Matrix Methods, Communications, Modern Control Theory, and Linear Systems.

12. I proposed, developed and introduced the Digital Video Processing and the Advanced Neural Network and Deep Learning courses; and reestablished the Pattern Recognition course at the Electrical Engineering Department at RIT. These graduate courses were instrumental in providing MS/PhD students with the proper

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 9,262,864

foundation and knowledge in all aspects of the subject areas in order to perform in-depth research in the field and continue to advance the state of the art.

13. The Digital Video Processing course is designed to provide a thorough and comprehensive coverage of the field. Topics covered include the mathematical representation of digital video including motion and time-varying image formation models, spatio-temporal sampling/reconstruction, sampling structure conversions, motion estimation using optical flow, block-based, pel-recursive, Bayesian and point correspondence type methodologies, segmentation, motion tracking, filtering, restoration, super-resolution and image/video compression.

14. The Pattern Recognition course, on the other hand, covers pertinent concepts in Bayes decision theory, linear and nonlinear classifiers, artificial neural networks, feature selection/generation/extraction and various types of clustering algorithms and techniques.

15. The “Advanced Neural Networks and Deep Learning: Theory, Mathematics and Algorithms” course is intended to provide an in-depth comprehensive study of the theory, mathematics and algorithms for advanced neural networks and their usage in deep learning. It is primarily targeted for upper graduate students that are planning to pursue advanced studies/research in the field. The course begins with an in-depth study of the mathematical methodologies for neural

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 9,262,864

networks and optimization (zero-, first- and second-order) techniques. It then progresses to provide a thorough study of shallow and deep neural networks architectures and algorithms, activation functions, regression, two- and multi-class classification, unsupervised learning, feature engineering/selection, backpropagation along with applications to a variety of engineering problems.

16. I am currently working to develop a follow-on course (part 2) to the Advanced Neural Networks and Deep Learning course described above. This course is intended to cover convolutional and recurrent style neural networks, principles of feature engineering, kernel methods, tree-based learners, attention mechanisms/transformers, reinforcement learning and generative adversarial networks. This course is being targeted to debut in Fall 2025.

17. My current research focuses on machine learning for object tracking/remote sensing applications; image/video processing for multimedia, military & biomedical applications; and computer vision and three-dimensional scene reconstruction. As a principal investigator (PI) or co-principal investigator, I have acquired almost \$6 million in research funding since joining RIT and have managed multiple government grants from the Department of Defense as well as several corporate grants from Hewlett-Packard, Lenel, and Data Physics. I am currently managing (as PI) a multiyear government grant from the Department of

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 9,262,864

Defense titled “Target Detection/Tracking and Activity Recognition from Multimodal Data.” In this project, we propose to develop operational target detection/tracking techniques and activity recognition/understanding methods that can leverage multimodal data in a fusion framework using deep learning algorithms while providing accurate and near real-time performance.

18. In 2012, I was awarded the Prestigious Trustees Scholarship, the highest award at RIT with regard to research recognition.

19. I am the author or co-author of thirty-eight (38) peer-reviewed journal publications.

20. I have also authored or co-authored 102 conference and workshop publications and a book entitled Advanced Linear Algebra for Engineers with MATLAB, published by CRC Press in February 2009, and am a named inventor on multiple U.S. and foreign patents.

21. I am a senior member of the Institute of Electrical and Electronic Engineers and a member of the IEEE Signal Processing Society, the Electrical Engineering Honor Society, Eta Kappa Nu.

22. A detailed record of my professional qualifications, including a list of publications, awards, and professional activities, is set forth in my curriculum vitae and is attached to this report as Appendix A.

III. INFORMATION CONSIDERED

23. In preparing this declaration, I have reviewed the '864 Patent, its prosecution history, and the exhibits and documents referenced herein. In addition, my opinions are further based on my education, training, experience, and knowledge in the relevant field.

IV. RELEVANT LEGAL STANDARDS

24. I am not an attorney and offer no legal opinions. For the purposes of this Declaration, I have been informed about certain aspects of the law that are relevant to my analysis, as summarized below.

A. Claim Interpretation

25. I have been informed that during an *inter partes* review proceeding, claims are to be construed in light of the specification as would be read by a person of ordinary skill in the relevant art at the time the application was filed. I have been informed that claim terms are given their ordinary and customary meaning as would be understood by a person of ordinary skill in the relevant art in the context of the entire disclosure. A claim term, however, will not receive its ordinary meaning if the patentee acted as his own lexicographer and clearly set forth a definition of the claim term in the specification. In that case, the claim term will receive the definition set forth in the patent.

B. Perspective of One of Ordinary Skill in the Art

26. I have been informed that a patent is to be understood from the perspective of a hypothetical “person of ordinary skill in the art” (“POSITA”). Such an individual is considered to possess normal skills and knowledge in a particular technical field (as opposed to being a genius). I have been informed that in considering what the claims of a patent require, what was known prior to that patent, what a prior art reference discloses, and whether an invention is obvious or not, one must use the perspective of such a POSITA.

C. Anticipation

27. I have been informed that a claim is not patentable if it is anticipated. I have been informed that anticipation of a claim requires that every element of a claim is disclosed expressly or inherently in a prior art reference, arranged as in the claim, when considered from the perspective of a person of ordinary skill in the relevant art. I have been informed that when the structure recited in a reference is substantially identical to that of the claims, claimed properties or functions are presumed to be inherent. I have been informed that extrinsic evidence may be used to explain but not expand the meaning of terms and phrases used in the reference relied upon as anticipatory of the claimed subject matter.

D. Obviousness

28. I have been informed that a patent claim is obvious under 35 U.S.C. §103, and therefore invalid, if the claimed subject matter, as a whole, would have been obvious to a POSITA as of the priority date of the patent based on one or more prior art references and/or the knowledge of a POSITA.

29. I have been informed that an obviousness analysis must consider (1) the scope and content of the prior art, (2) the differences between the claims and the prior art, (3) the level of ordinary skill in the pertinent art, and (4) secondary considerations, if any, of non-obviousness (such as unexpected results, commercial success, long-felt but unmet need, failure of others, copying by others, and skepticism of experts).

30. I have been informed that a prior art reference may be combined with other references to disclose each element of the invention under 35 U.S.C. §103. I have been informed that a reference may also be combined with the knowledge of a POSITA, and that this knowledge may be used to combine multiple references. I have been informed that a POSITA is presumed to know the relevant prior art. I have been informed that the obviousness analysis may take into account the inferences and creative steps that a POSITA would employ.

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 9,262,864

31. In determining whether a prior art reference would have been combined with other prior art or other information known to a POSITA, I have been informed that the following principles may be considered:

- whether the references to be combined involve non-analogous art;
- whether the references to be combined are in different fields of endeavor than the alleged invention in the patent;
- whether the references to be combined are reasonably pertinent to the problems to which the inventions of the patent are directed;
- whether the combination is of familiar elements according to known methods that yields predictable results;
- whether a combination involves the substitution of one known element for another that yields predictable results;
- whether the combination involves the use of a known technique to improve similar items or methods in the same way that yields predictable results;
- whether the combination involves the application of a known technique to a prior art reference that is ready for improvement, to yield predictable results;

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 9,262,864

- whether the combination is “obvious to try”;
- whether the combination involves the known work in one field of endeavor prompting variations of it for use in either the same field or a different one based on design incentives or other market forces, where the variations are predictable to a POSITA;
- whether there is some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill in the art to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention;
- whether the combination requires modifications that render the prior art unsatisfactory for its intended use;
- whether the combination requires modifications that change the principle of operation of the reference;
- whether the combination is reasonably expected to be a success; and
- whether the combination possesses the requisite degree of predictability at the time the invention was made.

32. I have been informed that in determining whether a combination of prior art references renders a claim obvious, it is helpful to consider whether there is

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 9,262,864

some teaching, suggestion, or motivation to combine the references and a reasonable expectation of success in doing so. I have been informed, however, that a teaching, suggestion, or motivation to combine is not required.

V. SUMMARY OF OPINIONS

33. It is my opinion that Claims 1, 2 and 15-20 of the '864 Patent are unpatentable under 35 U.S.C. §103 at least under the grounds discussed below.

VI. IDENTIFICATION OF CHALLENGES TO THE CLAIMS

34. The '864 Patent contains 20 claims. I have been asked to opine on the validity of Claims 1, 2 and 15-20. Ground 1, which is discussed below in greater detail, is as follows:

Ground	References	Basis	Claims Challenged
1	U.S. Patent No. 5,417,572 (“Kawai”) (EX1010), in view of U.S. Patent Publication No. 2004/0254476 (“Quadling”) (EX1011), and in further view of U.S. Patent Pub. No. 2002/0055082 (“Durbin”) (EX1012)	§103	1, 2 and 15-20

VII. LEVEL OF ORDINARY SKILL IN THE ART

35. I have been informed that a POSITA is presumed to be aware of all pertinent art, thinks along conventional wisdom in the art, and is a person of ordinary creativity.

36. I believe that a POSITA would have at least (1) a bachelor's degree in electrical engineering, computer engineering, computer science, or an equivalent field, as well as at least two to three years of industry or research experience with computer vision/graphics making use of three-dimensional virtual models; or (2) a master's degree in electrical engineering, computer engineering, computer science, or an equivalent field with a focus in making use of three-dimensional virtual models in the area of computer vision/graphics

VIII. TECHNICAL BACKGROUND

A. The '864 Patent

37. I understand that the '864 Patent was filed on September 16, 2014 as U.S. Patent Application No. 14/487,371 ("the '371 Application"). EX1001. I also understand that the '371 Application is a continuation of U.S. Patent Application No. 12/666,464, filed on November 15, 2010 (U.S. Patent 8,866,883), which is a National Stage of PCT International Application No. PCT/US08/68522, which claims priority to U.S. Provisional Application No. 60/947,009, filed on June 29, 2007 (EX1004).

38. The '864 Patent is generally directed to display of three-dimensional dental data acquired intraorally from a dental patient. EX1001, Abstract. More particularly, the claims challenged in this proceeding concern display of a three-

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 9,262,864

dimensional dental model alongside still images that were acquired during a three-dimensional scan of the dentition, such that “the two views (model and still image) may be synchronized to provide a common perspective of the model's subject matter.” EX1001, Abstract.

39. According to the '864 Patent, that synchronized display “provides useful visual information for disambiguating surface features of the model during interactive model processing steps such as marking a margin of a prepared tooth surface for a restoration.” EX1001, Abstract. That marking of a margin of a prepared tooth surface for a restoration is a claimed feature of all the challenged independent claims.

B. The '864 Patent Examination History

40. A single office action issued rejecting all claims over U.S. Pat. Pub. No. 2005/0089822 (“Geng”) (EX1013) as anticipated and Claim 1 as anticipated by U.S. Pat. Pub. No. 2006/0020363 (“Orth”) (EX1014). Important to the claims discussed in this Declaration, Applicant amended independent Claims 1, 15, and 18¹ to recite display of a video image “concurrently with the three-dimensional model.”

¹ The issued and pending claims share the same numbering.

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 9,262,864

41. In connection with these amendments, Applicant explained that “a system can store a three-dimensional model that was derived from a sequence of still frames of video data,” and that “the source data – the sequence of still frames from the video feed – can be retained to provide visually clear two-dimensional data of dental content from a variety of poses that were used to generate the three-dimensional model.” EX1002, pp. 52-53. Regarding the amendments, Applicant noted that “these two data sources can usefully be presented into a single workspace to concurrently provide the two different and useful sources of visual information as visual context for accurately determining a margin. The claims have been amended to clarify this inventive concept, and to more explicitly claim at least three distinct features: a three-dimensional model rendered in a display, two-dimensional source images for the model, also rendered in the display, and a margin marking tool that enable [sic] a user to mark margin data using both of these sources of visual information.” *Id.* at 53. Applicant successfully achieved allowance by arguing Geng (EX1013) and Orth (EX1014) both fail to disclose the claimed features of amended independent claims 1, 15, and 18 reciting display of a video image “concurrently with the three-dimensional model.” Instead, both of the applied references are directed solely to rendering and manipulation of three-dimensional models alone.

42. The prior art discussed in this Declaration explicitly discloses the synchronized three-dimensional model and two-dimensional video image display that was absent from the prior art applied by the Examiner.

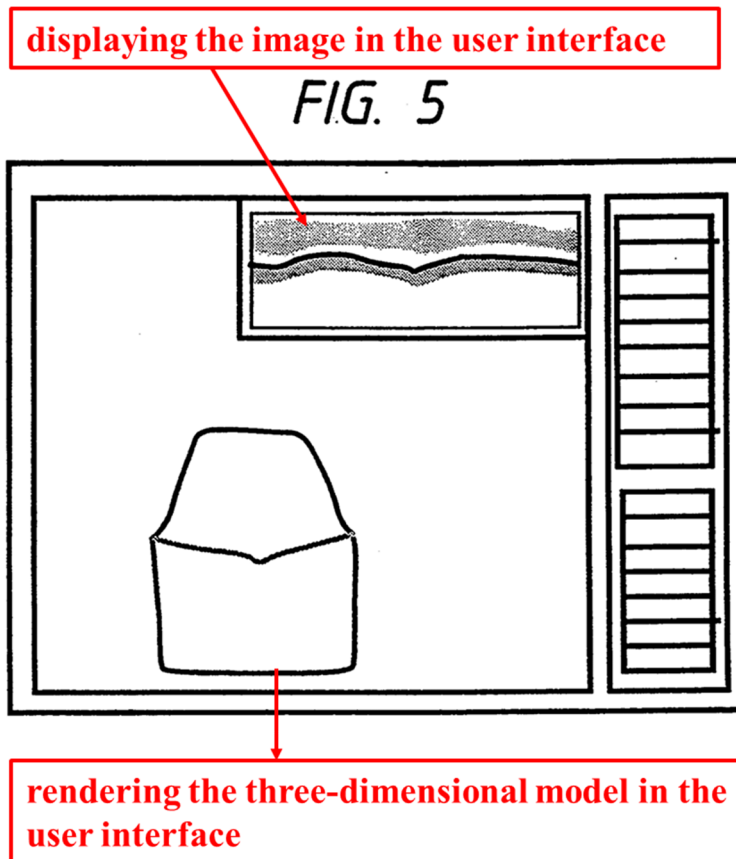
C. Overview of the Prior Art

43. I have been informed that Kawai, Quadling, and Durbin all qualify as prior art to the '864 Patent. EX1019 provides some background on three-dimensional computer modeling.

1. Kawai (EX1010)

44. Kawai also discloses a system for margin line definition and correction that displays a three-dimensional model and a two-dimensional “developed view” image concurrently as an aid to visually determine that margin line of the dentition. *See* EX1010, Abstract and Figure 5. Kawai succinctly explains and illustrates its concurrent three-dimensional and two-dimensional image display (with annotations in **red**):

FIG. 5 is a view, showing a three-dimensional shape and a development view [image], both shown in a display device, in an embodiment of the margin line extracting method of the present invention. EX1010, 2:17-20 (emphasis added).

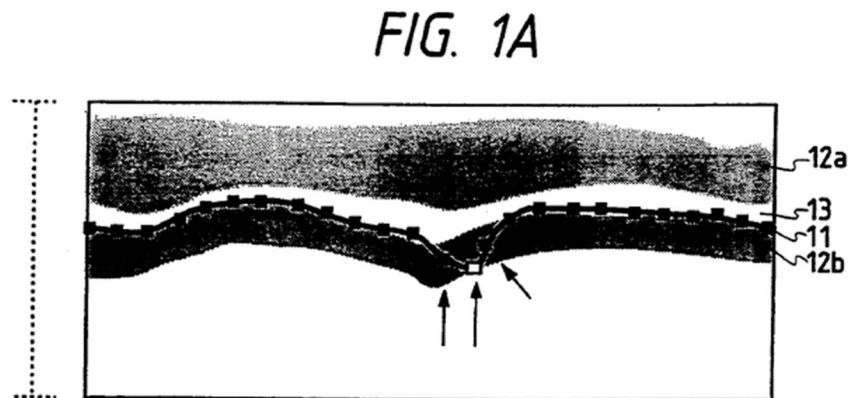


45. Figure 1A of Kawai and its associated disclosure explain its margin marking and correction tool:

FIG. 1A shows the display of [a] point train of the margin area on the developed view, wherein said points are connected by straight lines, **and such connection can be made by hitting the points with a mouse.** EX1010, 3:26-30 (emphasis added).

Subsequently there is executed a correction operation for the point train of the margin area extracted by calculation and the lines connecting the points. Said correction is

conducted by hitting a displayed point and moving said point by giving an amount of variation by keys or a dial. EX1010, 3:35-40 (emphasis added); *see also* 3:52-60, 3:66-4:11, Claim 4; Claim 7.



46. Kawai explains that its system is usable with any one of a number of known three-dimensional measurement instruments. *See* EX1010, 2:31-35. Quadling—discussed below—discloses such a known three-dimensional measuring instrument.

2. Quadling (EX1011)

47. Quadling discloses a known three-dimensional measuring instrument, specifically designed to scan dentition. *See* EX1011, Abstract (“A intra-oral laser digitizer system provides a three-dimensional visual image of a real-world object such as a dental item through a laser digitization.”).

48. Quadling explains that its scanner acquires a sequence of images that are stored in memory and from which a three-dimensional model is created with a processor. EX1011, ¶[0012] (“Multiple images of the object may be recorded and processed by the computer to produce a 3D map of the object.”); *see also* Figure 1 and ¶[0067] (illustrating and discussing Quadling’s computer and image processor). Quadling’s images include video images acquired using a video camera as its image sensor. EX1011, ¶[0059].

3. Durbin (EX1012)

49. Durbin “relates to intra-oral methods and apparatus for optically imaging a structure and creating representative 3D models from the images.” EX1012, Abstract.

50. Significant to the analysis in this Declaration, Durbin evidences the understanding of a POSITA concerning multi-aperture scanning systems and the capture of image sets with each image in the set captured from a different optical axis;

FIG. 3 shows another embodiment with multiple image apertures that require only lateral motion. In this embodiment a plurality of image apertures 132A and the illuminator(s) 134A are mounted in a known orientation to one another on a laterally moveable apparatus. The number of image apertures and their orientation is selected

to provide sufficient coverage and overlap of the dental structure to be modeled at the desired resolution. At each lateral position, an image from each of the apertures 132A is recorded for later processing. EX1012, ¶[0047].

IX. CLAIM CONSTRUCTION

51. For purposes of my analysis in this IPR proceeding, I have been informed that terms that appear in the claims of the '864 Patent should be interpreted according to their plain and ordinary meaning under the *Phillips* standard. This is reflected in the Claim Construction Order from the District Court proceeding included as Exhibit 1017. In determining the ordinary and customary meaning, I have been informed that the words of a claim are first given their plain meaning that those words would have had to a POSITA at the time of the alleged invention. I also have been informed that the claims, specification, and file history may be used to better construe a claim insofar as the plain meaning of the claims cannot be understood. I have been informed that even treatises and dictionaries may be used under limited circumstances to determine the meaning attributed by a POSITA to a claim term at the time of filing.

52. I have reviewed the '864 Patent and its prosecution history as well as additional documents and have used a plain-meaning understanding for each claim term.

X. CLAIMS 1, 2 AND 15-20 WOULD HAVE BEEN OBVIOUS OVER KAWAI (EX1010) IN VIEW OF QUADLING (EX1011) (GROUND 1).

53. In my opinion, Claims 1, 2 and 15-20 are unpatentable over Kawai in view of Quadling. The following sections explain where each element of these claims is found in the prior art.

A. Claim 1 (Preamble): A method comprising:

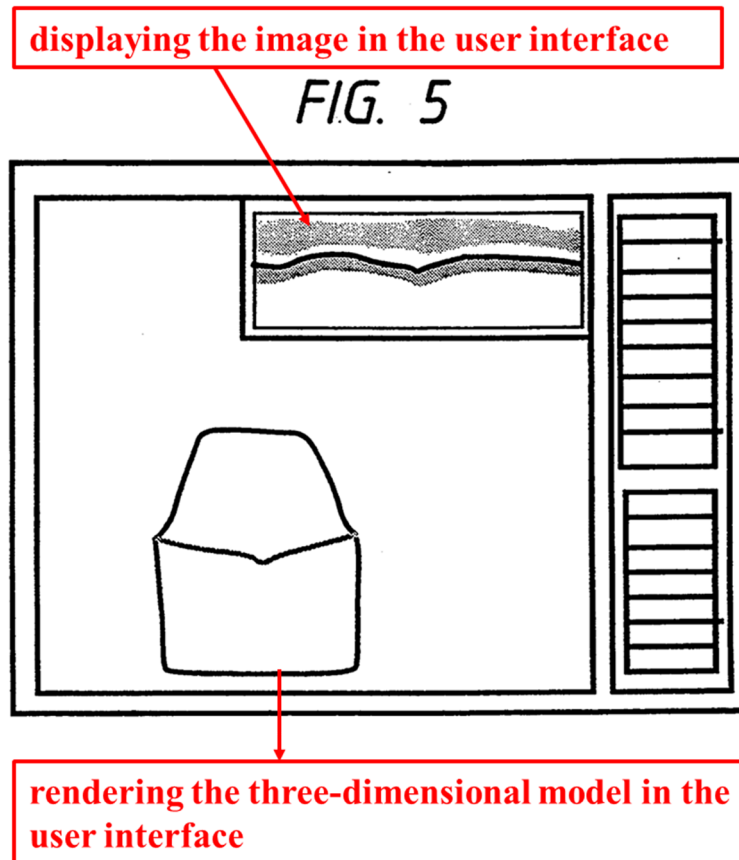
54. Kawai discloses a method that includes the steps (among others) of creating a creating a three-dimensional model [1.1] and rendering that three-dimensional model in a user interface from a perspective [1.2], automatically selecting an image that contains a view of dentition corresponding to the perspective [1.3], displaying the image in the user interface concurrently with the three-dimensional model [1.4], and providing a tool in the user interface for marking a margin of the dentition [1.5].

55. Kawai succinctly explains and illustrates its concurrent three-dimensional and two-dimensional image display (with annotations in **red**):

FIG. 5 is a view, showing a three-dimensional shape and a development view [image], both shown in a display

device, in an embodiment of the margin line extracting method of the present invention. EX1010, 2:17-20 (emphasis added).

56. Kawai's Figure 5 in annotated form is shown below:



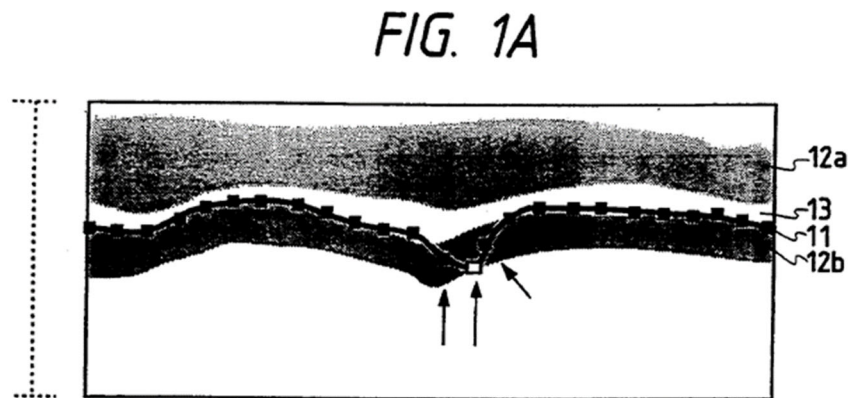
57. Kawai also succinctly explains and illustrates its tool in the user interface for marking a margin of the dentition:

FIG. 1A shows the display of [a] point train of the margin area on the developed view, wherein said points are connected by straight lines, **and such connection can be**

made by hitting the points with a mouse. EX1010, 3:26-30 (emphasis added).

Subsequently there is executed a correction operation for the point train of the margin area extracted by calculation and the lines connecting the points. Said correction is conducted by **hitting a displayed point and moving said point by giving an amount of variation by keys or a dial.** EX1010, 3:35-40 (emphasis added); *see also* 3:52-60, 3:66-4:11, Claim 4; Claim 7.

58. Kawai's Figure 1A is shown below:



59. In my opinion, Kawai in view of Quadling discloses all of the requirements of the preamble of Claim 1.

1. **[1.1]: creating a three-dimensional model with a processor from a sequence of image sets stored in a memory, each image set including a plurality of images of a subject including dentition, each one of the plurality of images captured from a different optical axis, the plurality of images including at least one video image;**

60. Element [1.1] is disclosed in Kawai (EX1010).

61. Kawai explains its three-dimensional model of an abutment tooth (*i.e.*, a tooth for a crown preparation) may be obtained using known three-dimensional measuring instruments:

“At first, the shape of a plaster cast of the abutment tooth, prepared in the same manner as in the conventional art, is measured to obtain shape data of said abutment tooth. Said measurement can be achieved by a **known technology**, such as by CT scanning or by **a three-dimensional measuring instrument**. Thus the data indicating the three-dimensional shape of the abutment tooth are obtained from the measurement data.” EX1010, 2:31-35 (emphasis added).

62. Quadling discloses such a known three-dimensional measuring instrument, specifically designed to scan dentition. *See* EX1011, Abstract (“A intra-oral laser digitizer system provides a three-dimensional visual image of a real-world object such as a dental item through a laser digitization.”).

63. While Kawai's disclosure is directed to scanning a plaster model outside the mouth, its disclosure is not limited to scanning of dentition in that form, and a POSITA would have appreciated that Quadling's more sophisticated in-vivo scanner was capable of scanning a plaster model outside the mouth and also in-vivo scanning to provide the three-dimensional model data useable by Kawai's disclosure.

64. Quadling explains that its scanner acquires a sequence of images that are stored in memory and from which a three-dimensional model is created with a processor. EX1011, ¶[0012] ("Multiple images of the object may be recorded and processed by the computer to produce a 3D map of the object."); *see also* Figure 1 and ¶[0067] (illustrating and discussing Quadling's computer and image processor).

65. Quadling's stored two-dimensional images used to create its three-dimensional model are sets of images, and each one of the plurality of images in each image set was captured from a different optical axis.

66. As explained by Quadling:

"Multiple images of the object may be recorded and processed by the computer to produce a 3D map of the object. **The multiple images can be captured from multiple positions and orientations with respect to the object.** The individual images are merged to create an

overall 3D map of the object.” EX1011, ¶[0012]
(emphasis added).

67. While Quadling does not expressly state precisely how its two-dimensional images were obtained from different optical axes and stored in its sets, multi-aperture scanner/camera arrangements were known to obtain a plurality of two-dimensional image sets such that “each one of the plurality of images in each image set [is] captured from a different optical axis.”

68. In such arrangements, images are obtained from different optical axes and stored in sets not by simply moving the imaging apparatus (e.g. an intra-oral scanner) relative to the structure being imaged, but instead multiple images from different optical axes are captured at the same overall position of the imaging apparatus relative to the structure being imaged using the multiple apertures.

69. Additionally, the '864 Patent acknowledges that multi-aperture scanner/camera systems were known to obtain a plurality of two-dimensional image sets such that “each one of the plurality of images in each image set [is] captured from a different optical axis.”

70. As stated by the '864 Patent:

“While Rohály discloses one multi-aperture system, it will be appreciated that any multi-aperture system suitable for

reconstructing a three-dimensional point cloud from a number of two-dimensional images may similarly be employed.” EX1001, 9:9-13.

71. Durbin discloses a multi-aperture arrangement that a POSITA would have understood is exemplary of how the two-dimensional images of Quadling’s system would have been captured and organized to implement its system:

FIG. 3 shows another embodiment with multiple image apertures that require only lateral motion. In this embodiment a plurality of image apertures 132A and the illuminator(s) 134A are mounted in a known orientation to one another on a laterally moveable apparatus. The number of image apertures and their orientation is selected to provide sufficient coverage and overlap of the dental structure to be modeled at the desired resolution. At each lateral position, an image from each of the apertures 132A is recorded for later processing. EX1012, ¶[0047].

72. Additionally, Quadling’s plurality of images also include video images acquired using a video camera as its image sensor:

The image sensor 111 captures an image of the scanned surface of the object 108. The image sensor 111 may be a photo-sensitive or light sensitive device or electronic circuit capable of generating signal representative of

intensity of a light detected. The image sensor 111 may include an array of photodetectors. The array of photodetectors may be a charge coupled device (“CCD”) or a CMOS imaging device, or other array of light sensitive sensors capable of generating an electronic signal representative of a detected intensity of the light. The image sensor 111 **may comprise a commercially available CCD or CMOS high resolution video camera** having imaging optics, with exposure, gain and shutter control, such as the Silicon Imaging USB Camera SI-1280F-U. EX1011, ¶[0059] (emphasis added).

73. In my opinion, Kawai in view of Quadling discloses all of the requirements of Element [1.1].

2. [1.2]: rendering the three-dimensional model in a user interface of a display from a perspective;

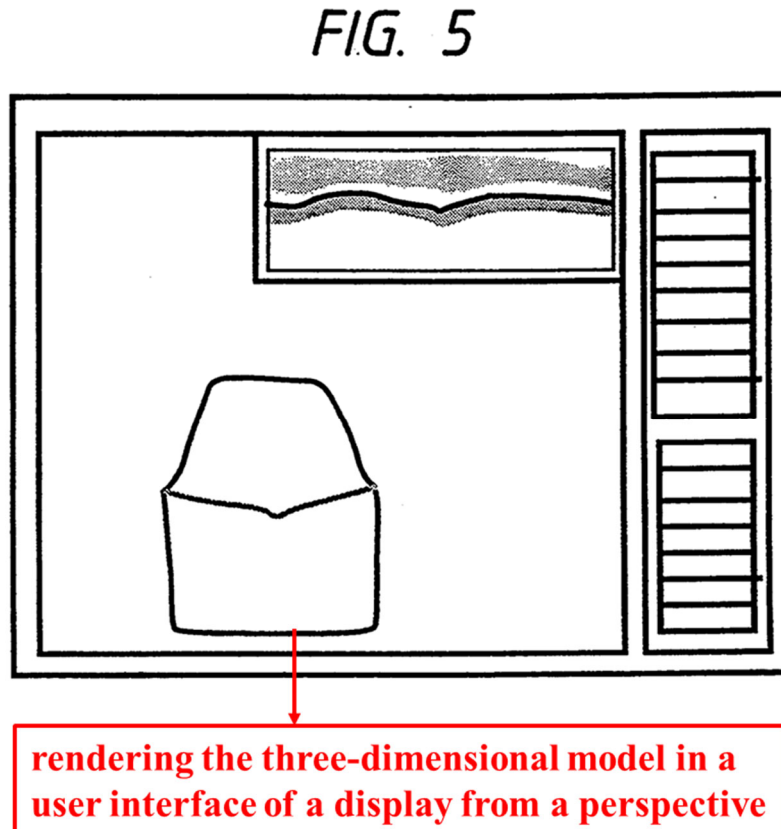
74. Element [1.2] is disclosed in Kawai (EX1010).

75. Kawai’s system renders its three-dimensional model in a user interface of a display from a perspective:

The developed view of the abutment tooth and **the three-dimensional shape** thereof can be simultaneously **displayed** as shown in FIG. 5, wherein in addition to the display of the three-dimensional shape of the abutment tooth, the developed view is displayed in the upper part.

EX1010, 3:61-65 (emphasis added).

76. Kawai's Figure 5 in annotated form is shown below:



77. In my opinion, Kawai in view of Quadling discloses all of the requirements of Element [1.2].

3. **[1.3]: automatically selecting a video image with the processor from the sequence of image sets that contains a view of the subject most closely corresponding to the perspective;**

78. Element [1.3] is disclosed in Kawai (EX1010).

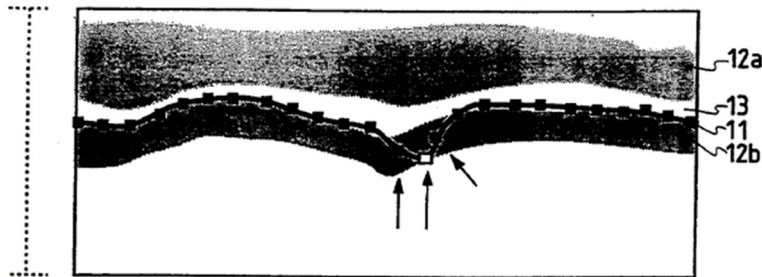
79. Kawai's system discloses display of a two-dimensional "developed view" image of its margin line preparation to assist a user in defining that margin line:

Amounts of variation of data representing the shape of an abutment tooth are determined, and a train of points is extracted from the amounts of variation. Then a developed view of the surface shape of the abutment tooth is displayed, and the obtained train of points is also displayed in the developed view. **The margin line for designing the artificial crown is determined, based on thus displayed train of points.** EX1010, Abstract (emphasis added).

The train of points representing the margin area is displayed on the corresponding position on said development view. FIG. 1A shows the display of said point train of the margin area on the developed view, wherein said points are connected by straight lines, and such connection can be made by hitting the points with a mouse. EX1010, 3:26-30 (emphasis added).

80. Kawai Figure 1A is shown below:

FIG. 1A



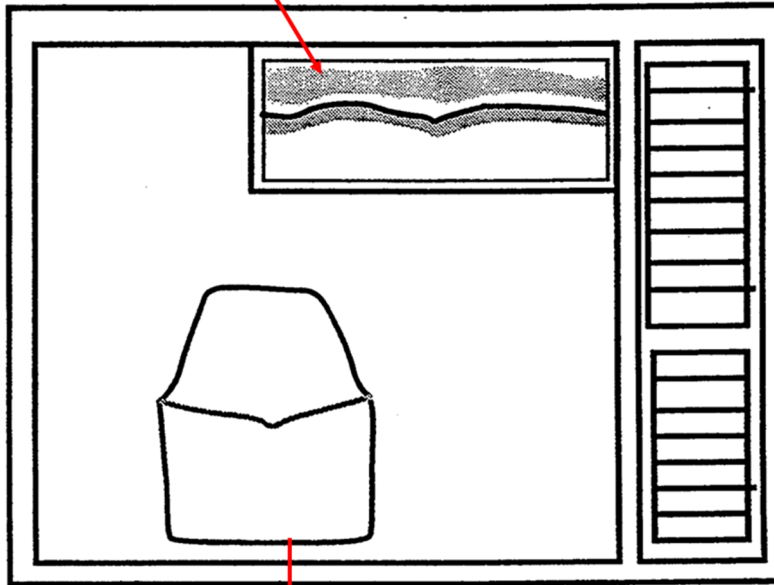
81. Kawai's "developed view" image is displayed from a view of the subject most closely corresponding to the perspective of its rendered three-dimensional model. As explained and illustrated by Kawai (annotations in **red**):

The developed view of the abutment tooth and **the three-dimensional shape** thereof can be **simultaneously displayed** as shown in FIG. 5, wherein in addition to the display of the three-dimensional shape of the abutment tooth, the developed view is displayed in the upper part. EX1010, 3:61-65 (emphasis added).

82. Kawai's Figure 5 in annotated form is shown below.

displaying the two-dimensional “developed view” from a view of the subject most closely corresponding to the perspective of the rendered three-dimensional model

FIG. 5



rendering the three-dimensional model in a user interface of a display from a perspective

83. Here, Kawai does not disclose that its two-dimensional “developed view” image is a “video image” as claimed. Instead, Kawai discloses a computationally expensive approach of deriving the two-dimensional “developed view” from the three-dimensional data of its three-dimensional model. *See* EX1010, 3:17-25 (“Said development view is obtained by developing the lateral surface of

the three-dimensional shape of the abutment tooth and displaying said lateral surface in planar form.

84. More specifically the developed data of the abutment tooth are prepared by developing the cylindrical surface from a broken line L shown in FIG. 2B, and the development view is displayed, based on said developed data.”).

85. As explained with reference to Element [1.1], Quadling discloses acquisition and storage of a plurality of video images used to create its three-dimensional model.

86. In the combination of Kawai with Quadling, a POSITA would use the computationally inexpensive approach of automatically selecting one of Quadling’s *existing* plurality of video images used to create its three-dimensional model as the “developed view” in place of Kawai’s derived approach.

87. That selection would be of a video image containing a view of the subject most closely corresponding to the perspective (of the three-dimensional model) to achieve the same assistance value in defining a margin line of the “developed view” as disclosed in Kawai.

88. In my opinion, Kawai in view of Quadling discloses all of the requirements of Element [1.3].

4. [1.4]: displaying the video image in the user interface of the display concurrently with the three-dimensional model; and

89. Element [1.4] is disclosed in Kawai (EX1010).

90. As explained above with reference to Element [1.3], in the combination of Kawai and Quadling a POSITA would configure the system to select one of Quadling's *existing* plurality of video images used to create its three-dimensional model as the "developed view."

91. That "developed view" video image would be displayed concurrently with the three-dimensional model.

92. Kawai's "developed view" image is displayed from a view of the subject most closely corresponding to the perspective of its rendered three-dimensional model.

93. Kawai's "developed view" image and its three-dimensional model are displayed in the user interface concurrently.

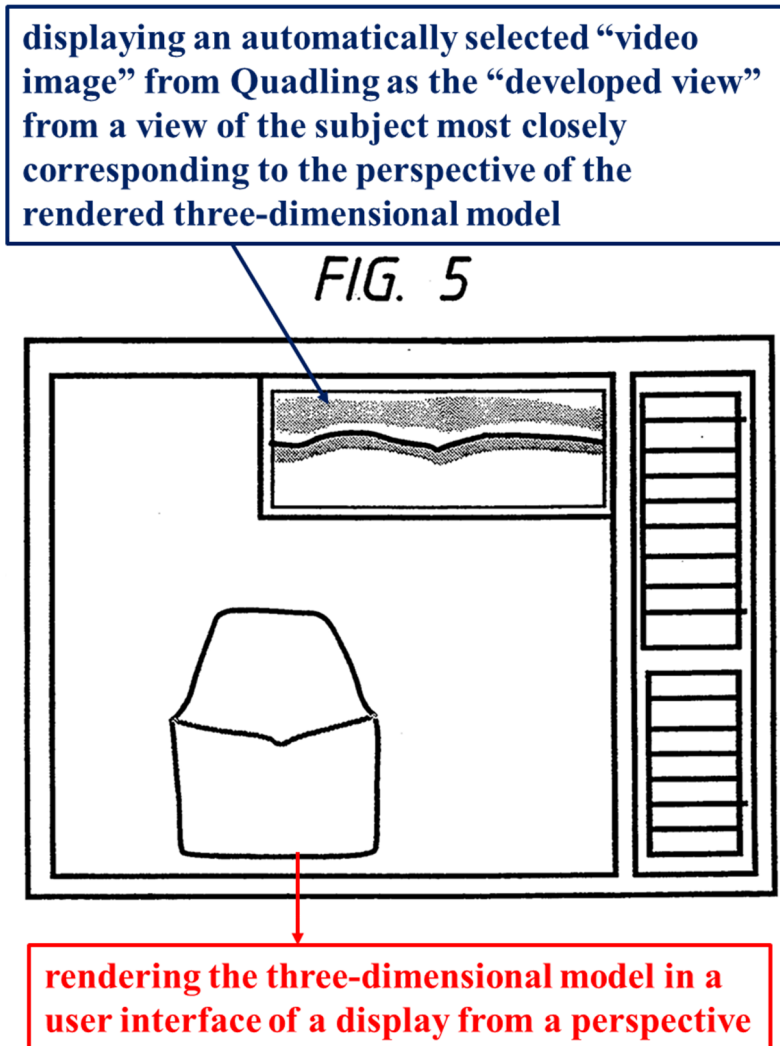
94. As noted in the annotations below (in **blue** and **red**) Quadling's existing video image would be substituted for Kawai's "developed view" image.

The developed view of the abutment tooth and **the three-dimensional shape** thereof can be **simultaneously displayed** as shown in FIG. 5, wherein in addition to the display of the three-dimensional shape of the abutment

tooth, the developed view is displayed in the upper part.

EX1010, 3:61-65 (emphasis added).

95. Kawai's Figure 5 in annotated form is shown below.



96. In my opinion, Kawai in view of Quadling discloses all of the requirements of Element [1.4].

5. [1.5]: providing a tool with the processor in the user interface for marking a margin of the dentition.

97. Element [1.5] is disclosed in Kawai (EX1010).
98. Kawai discloses a tool in the user interface for marking a margin of the dentition.
99. That tool is manipulatable using Kawai's computer mouse.
100. As explained by Kawai with reference to using the tool on the "developed view" image:

The train of points representing the margin area is displayed on the corresponding position on said development view. FIG. 1A shows the display of said point train of the margin area on the developed view, wherein said points are connected by straight lines, **and such connection can be made by hitting the points with a mouse**. EX1010, 3:26-30 (emphasis added).

Subsequently there is executed a correction operation for the point train of the margin area extracted by calculation and the lines connecting the points. Said correction is conducted by **hitting a displayed point and moving said point by giving an amount of variation by keys or a dial**. EX1010, 3:35-40 (emphasis added); *see also* 3:52-60, 3:66-4:11, Claim 4; Claim 7.

101. Kawai's tool also allows manipulation of the margin line directly on the three-dimensional model, and any movement of the margin line on either the "developed view" or the three-dimensional model is reflected on both:

The point train and the connecting lines, representing the margin area, can be displayed both in the three-dimensional shape and in the developed view. The above-mentioned correcting operation for the points may be conducted on the display of the three-dimensional shape, but is more easily conducted on the two-dimensional developed view.

The amount of movement of the point for correction is reflected both on the developed data and on the three-dimensional data. Consequently, when the point is moved on the developed view, the corresponding point in the display of the three-dimensional shape may also be moved in corresponding manner. EX1010, 3:66-4:10.

102. In my opinion, Kawai in view of Quadling discloses all of the requirements of Element [1.5].

B. Claim 2 (Preamble): A system comprising:

103. In my opinion, Kawai in view of Quadling discloses a system with each of the claimed features of Claim 2, as detailed below. *See also* Claim 1 (detailing the

method of 2D and 3D display, and margin line definition of Kawai's system, as modified by Quadling's scanner disclosure).

1. **[2.1]: a memory storing a three-dimensional model of a subject and a sequence of image sets used to create the three dimensional model, each image set including a plurality of images of a subject including dentition, each one of the plurality of images captured from a different optical axis, the plurality of images including at least one video image;**

104. Kawai discloses Element [2.1].

105. Kawai alone discloses a memory storing a three-dimensional model of a subject, and the rendering of that model in a user interface, as discussed above in reference to Element [1.1].

106. A POSITA would have appreciated that the three-dimensional model is stored in a memory in order to be rendered and displayed.

107. As discussed above with reference to Element [1.1], Quadling provides a known a three-dimensional measuring instrument, specifically designed to scan dentition.

108. Quadling stores a plurality of video images captured from different optical axes – when further understood in combination with Durbin – where those images are acquired using a video camera as its image sensor meeting this Element [2.1].

109. In my opinion, Kawai in view of Quadling discloses all of the requirements of Element [2.1].

**2. [2.2]: a display configured to provide a user interface
presenting the sequence of image sets; and**

110. Kawai discloses Element [2.2].

111. Kawai's display provides a user interface that presents its "developed view" image and allows a user to define and make corrections to a margin line, as explained above with reference to Elements [1.3] - [1.5].

112. In my opinion, Kawai in view of Quadling discloses all of the requirements of Element [2.2].

**3. [2.3]: a processor configured to render the three-
dimensional model in the user interface from a perspective,
select a video image from the sequence of image sets that
contains a view of the subject most closely corresponding to
the perspective, display the video image in the user interface
concurrently with the three-dimensional model, and provide
a tool for marking a margin of the dentition.**

113. Kawai discloses Element [2.3].

114. As discussed above with reference to Element [1.2], Kawai renders its three- dimensional model from a perspective in its user interface.

115. As explained above with reference to Element [1.3], Kawai's system discloses display of a two-dimensional "developed view" image of its margin line preparation to assist a user in defining that margin line, and that "developed view"

image is displayed from a view of the subject most closely corresponding to the perspective of its rendered three-dimensional model.

116. The discussion of Elements [1.3] and [1.4] is also equally applicable here regarding selection of Quadling's existing video image and display of the same concurrently with the three-dimensional model from a view of the subject (dentition).

117. Lastly, as explained with reference to Element [1.5], Kawai discloses a tool in the user interface for marking a margin of the dentition.

118. In my opinion, Kawai in view of Quadling discloses all of the requirements of Element [2.3].

C. Claim 15 (Preamble): A system comprising:

119. In my opinion, Kawai in view of Quadling discloses a system with each of the claimed features of claim 15, as detailed below. *See also* Claim 1 (detailing the method of 2D and 3D display, and margin line definition of Kawai's system, as modified by Quadling's scanner disclosure).

1. [15.1]: displaying a three-dimensional model of dentition from a perspective in a display;

120. Kawai discloses Element [15.1].

121. Kawai discloses display of a three-dimensional model of dentition from a perspective in a display, as detailed above with reference to Element [1.2].

122. In my opinion, Kawai in view of Quadling discloses all of the requirements of Element [15.1].

2. [15.2]: providing a plurality of video images of the dentition in a memory;

123. Kawai discloses Element [15.2].

124. Quadling discloses providing a plurality of video images of the dentition in a memory, as detailed above with reference to Element [1.1].

125. In my opinion, Kawai in view of Quadling discloses all of the requirements of Element [15.2].

3. [15.3]: automatically selecting one of the plurality of video images with the processor that shows the dentition from the perspective; and

126. Kawai discloses Element [15.3].

127. As explained above with reference to Element [1.3], the combination of Kawai and Quadling discloses automatically selecting one of Quadling's *existing* plurality of video images used to create its three-dimensional model as the "developed view" in place of Kawai's derived approach.

128. That selection would be of a video image containing a view of the subject most closely corresponding to the perspective (of the three-dimensional model) to achieve the same assistance value in defining a margin line of the "developed view" as disclosed in Kawai.

129. In my opinion, Kawai in view of Quadling discloses all of the requirements of Element [15.3].

4. **[15.4]: displaying the one of the plurality of video images in a user interface of the display concurrently with the three-dimensional model as an aid to visually determining a margin of the dentition.**

130. Kawai discloses Element [15.4].

131. As explained above with reference to Element [1.4], the combination of Kawai and Quadling would involve selection of one of Quadling's *existing* plurality of video images used to create its three-dimensional model as Kawai's "developed view."

132. That "developed view" video image would be displayed concurrently with the three-dimensional model, and Kawai's "developed view" is specifically disclosed as an aid to visually determine a margin of the dentition.

133. In my opinion, Kawai in view of Quadling discloses all of the requirements of Element [15.4].

D. Claim 16: The method of claim 15 further comprising displaying a margin on one or more of the three-dimensional model or the one of the plurality of video images.

134. Kawai discloses the additional limitations of Claim 16.

135. Kawai discloses display of the margin line on both its three-dimensional image and its “developed view” (which would include Quadling’s substituted video image as the “developed view”).

The point train and the connecting lines, representing the margin area, can be displayed both in the three-dimensional shape and in the developed view. The above-mentioned correcting operation for the points may be conducted on the display of the three-dimensional shape, but is more easily conducted on the two-dimensional developed view.

The amount of movement of the point for correction is reflected both on the developed data and on the three-dimensional data. Consequently, when the point is moved on the developed view, the corresponding point in the display of the three-dimensional shape may also be moved in corresponding manner. EX1010, 3:66-4:10 (emphasis added).

136. In my opinion, Kawai in view of Quadling discloses the requirements of Claim 16.

E. Claim 17: The method of claim 16 further comprising receiving a user modification of the margin and updating the display with a modified margin.

137. Kawai discloses the additional limitations of Claim 17.

138. Kawai discloses user modification of the margin line on either of the three-dimensional model or the “developed view” (which would include Quadling’s substituted video image as the “developed view”), and updating of the same on the display of both, as discussed above with reference to Element [1.5].

139. In my opinion, Kawai in view of Quadling discloses all of the requirements of Claim 17.

F. Claim 18 (Preamble): A system comprising:

140. In my opinion, Kawai in view of Quadling discloses a system with each of the claimed features of Claim 18, as detailed below. *See also* Claim 1 (detailing the method of 2D and 3D display, and margin line definition of Kawai’s system, as modified by Quadling’s scanner disclosure).

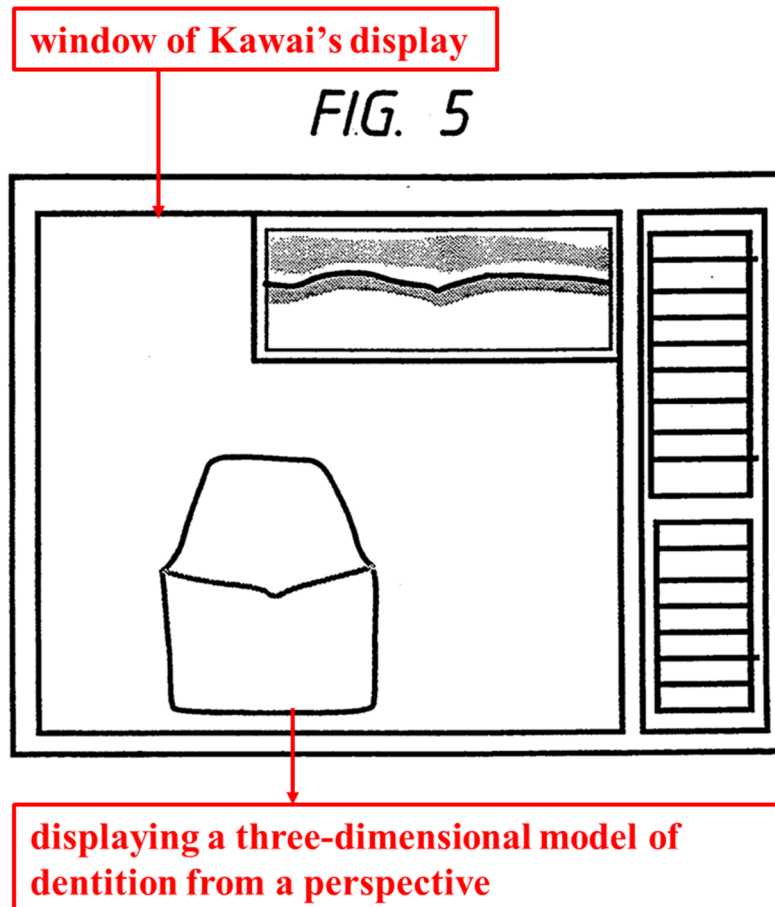
1. [18.1]: a display having a window for displaying a three-dimensional model of dentition from a perspective;

141. Kawai discloses Element [18.1].

142. Kawai discloses a display having a window for displaying a three-dimensional model of dentition from a perspective:

The developed view of the abutment tooth and **the three-dimensional shape** thereof can be simultaneously **displayed** as shown in FIG. 5, wherein in addition to the display of the three-dimensional shape of the abutment tooth, the developed view is displayed in the upper part. EX1010, 3:61-65 (emphasis added).

143. Kawai's Figure 5 in annotated form is shown below.



144. In my opinion, Kawai in view of Quadling discloses all of the requirements of Element [18.1].

2. [18.2]: a camera providing a plurality of video images of the dentition; and

145. Kawai discloses Element [18.2].

146. In the combination of Kawai with Quadling, Quadling's scanner includes a video camera that provides a plurality of video images of the dentition:

The image sensor 111 captures an image of the scanned surface of the object 108. The image sensor 111 may be a photo-sensitive or light sensitive device or electronic circuit capable of generating signal representative of intensity of a light detected. The image sensor 111 may include an array of photodetectors. The array of photodetectors may be a charge coupled device ("CCD") or a CMOS imaging device, or other array of light sensitive sensors capable of generating an electronic signal representative of a detected intensity of the light. The image sensor 111 **may comprise a commercially available CCD or CMOS high resolution video camera** having imaging optics, with exposure, gain and shutter control, such as the Silicon Imaging USB Camera SI-1280F-U. EX1011, ¶[0059] (emphasis added).

147. In my opinion, Kawai in view of Quadling discloses all of the requirements of Element [18.2].

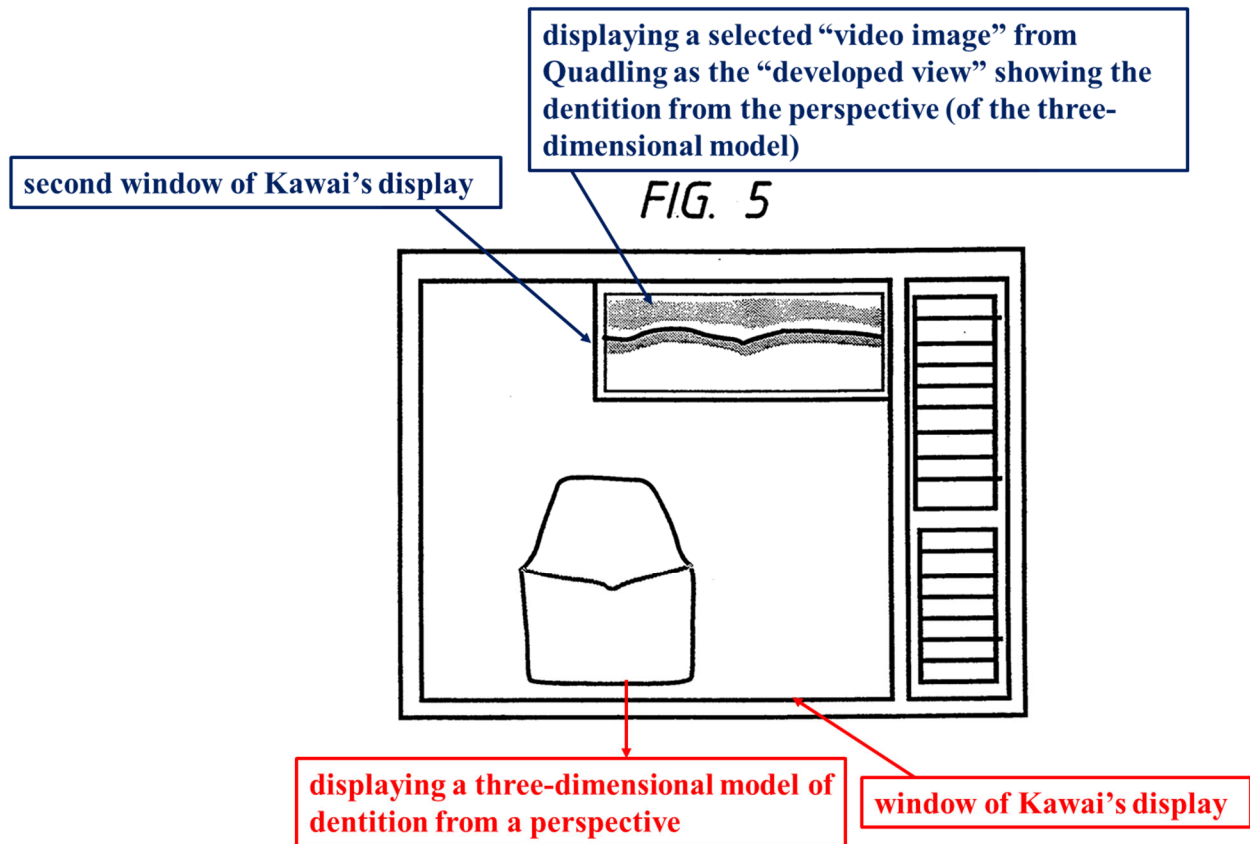
3. **[18.3]: a processor configured to select of one of the plurality of video images that shows the dentition from the perspective and display in a second window in the display the one of the plurality of video images concurrently with the three-dimensional model as an aid to visually determining a margin of the dentition.**

148. Kawai discloses Element [18.3].

149. As explained above with reference to Element [1.3], the combination of Kawai and Quadling discloses selecting one of Quadling's *existing* plurality of video images used to create its three-dimensional model as the “developed view” in place of Kawai's derived approach.

150. That selection would be of a video image that shows the dentition from the perspective (of the three-dimensional model) to achieve the same assistance value in defining a margin line of the “developed view” as disclosed in Kawai.

151. As noted in the annotations below (in **blue** and **red**) Quadling's existing video image would be substituted for Kawai's “developed view” image and would be displayed in a second window concurrently with the three-dimensional model.



152. In my opinion, Kawai in view of Quadling discloses all of the requirements of Element [18.3].

G. Claim 19: The system of claim 18 wherein the processor is configured to display a margin on one or more of the three-dimensional model or the one of the plurality of video images.

153. Kawai discloses the additional limitations of Claim 19.

154. Kawai discloses display of the margin line on both its three-dimensional image and its “developed view” (which would include Quadling’s substituted video image as the “developed view”). *See* EX1010, 3:66-4:10.

155. In my opinion, Kawai in view of Quadling discloses all of the requirements of Claim 19.

H. Claim 20: The system of claim 19 wherein the processor is configured to receive a user modification of the margin and update the display with a modified margin.

156. Kawai discloses the additional limitations of Claim 20.

157. Kawai discloses user modification of the margin line on either of the three-dimensional model or the “developed view” (which would include Quadling’s substituted video image as the “developed view”), and updating of the same on the display of both, as discussed above with reference to Element [1.5].

158. In my opinion, Kawai in view of Quadling discloses all of the requirements of Claim 20.

I. Explanation of Why Claims 1, 2 and 15-20 Would Have Been Obvious (Ground 1).

159. Claims 1, 2 and 15-20 would have been obvious over Kawai in view of Quadling, and in further view of Durbin.

1. Kawai combined with Quadling

160. This section explains the obviousness analysis with respect to the combination of Kawai and Quadling. Following this section is an explanation of the obviousness analysis of the combination of Kawai and Quadling with Durbin.

**a) Difference between the claimed invention and the
prior art.**

161. As discussed above in paragraphs 78-88, Kawai discloses all the features of the method and systems of Claims 1, 2 and 15-20 with the exception of its two-dimensional “developed view” image being a “video image” as claimed.

162. Quadling discloses video images used to construct three-dimensional models of dentition and the associated limitations of Claims 1, 2 and 15-20.

**b) A POSITA would have had motivation to combine the
disclosures of Kawai and Quadling.**

163. A POSITA would have had express motivation to combine the system of Kawai with Quadling’s known three-dimensional measuring instrument, specifically designed to scan dentition. *See* EX1011, Abstract (“A intra-oral laser digitizer system provides a three-dimensional visual image of a real-world object such as a dental item through a laser digitization.”).

164. Kawai expressly states that its three-dimensional model of an abutment tooth (*i.e.*, a tooth for a crown preparation) may be obtained using known three-dimensional measuring instruments:

At first, the shape of a plaster cast of the abutment tooth, prepared in the same manner as in the conventional art, is measured to obtain shape data of said abutment tooth. Said measurement can be achieved by a **known technology**,

such as by CT scanning or by **a three-dimensional measuring instrument**. Thus the data indicating the three-dimensional shape of the abutment tooth are obtained from the measurement data. EX1010, 2:31-35 (emphasis added).

165. Quadling discloses such a known three-dimensional measuring instrument. A POSITA would need to reference scanning disclosure, such as that provided by Quadling, to implement Kawai's system.

166. Quadling's scanner also provides intra-oral scanning as opposed to the Kawai's suggested need to first create a plaster model of an abutment tooth.

167. This advancement in scanning technology represents a significant improvement in the form of speed and accuracy, as was recognized by the prior art. *See e.g.*, EX1012, ¶¶[0010]-[0012] (discussing advantages of direct intra-oral scanning over traditional model preparation including that "Dental patients typically experience discomfort when the dentist takes an impression of the patient's teeth...Automated scanning techniques have been developed as alternatives to the mold casting procedure. Because these techniques can create a digital representation of the teeth, they provide the advantage of creating an 'impression' that is immediately transmittable from the patient to a dental laboratory...[such methods] can provide details of orally situated dental formations thus enabling diagnosis and

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 9,262,864

the preparation of precision moldings and fabrications that will provide greater comfort and longer wear to the dental patient.”); EX1018, 1:6-15 (“A great variety of methods and systems have been developed for direct optical measurement of teeth and the subsequent automatic manufacture of dentures. The term "direct optical measurement" signifies surveying of teeth in the oral cavity of a patient. This facilitates the obtainment of digital constructional data necessary for the computer-assisted design (CAD) or computer-assisted manufacture (CAM) of tooth replacements without having to make any cast impressions of the teeth. Such systems typically includes [sic] an optical probe coupled to an optical pick-up or receiver such as charge coupled device (CCD) and a processor implementing a suitable image processing technique to design and fabricate virtually the desired product.”).

168. Quadling also provides readily substitutable elements into Kawai’s disclosure in the form of its three-dimensional model of dentition, and its video images (used to create the three-dimensional model) to be substituted for Kawai’s “developed view.”

169. The details of that substitution are provided above with reference to Element [1.3] in Ground 1.

170. Here, Kawai discloses a relatively complex approach involving deriving the two-dimensional “developed view” from the three-dimensional data of its three-dimensional model. *See* EX1010, 3:17-25.

171. By contrast, Quadling provides the ability to select *existing* video images for concurrent display with a three-dimensional model, reducing the overall complexity and computational expense of displaying a two-dimensional “developed view” image along with a three-dimensional model as an aid to visually determine a margin of the dentition—the focus of Kawai’s disclosure.

c) A POSITA would have had a reasonable expectation of success based on the disclosures of Kawai and Quadling and knowledge generally available in the art.

172. A POSITA would have had a reasonable expectation of success in making the combination of Kawai with Quadling’s scanner disclosure because Kawai is agnostic regarding its three-dimensional measurement technique, and expressly motivates a POSITA to look to known methods:

At first, the shape of a plaster cast of the abutment tooth, prepared in the same manner as in the conventional art, is measured to obtain shape data of said abutment tooth. Said measurement can be achieved by a **known technology**, such as by CT scanning or by **a three-dimensional measuring instrument**. Thus the data indicating the

three-dimensional shape of the abutment tooth are
obtained from the measurement data. EX1010, 2:31-35
(emphasis added).

173. Combining the disclosures of Kawai with Quadling would only require the use of “known methods”—using each in the same way they were used as disclosed.

174. Specifically, Kawai discloses display on a user interface of a three-dimensional model of dentition and a two-dimensional “developed view” image in the same perspective view, and Quadling provides the three-dimensional instrument used to capture the underlying images of the dentition and create the three-dimensional model of the dentition.

175. None of the components or methods would need to be used in an unexpected or unintended way. Each would be fulfilling its original purpose and used in an expected way.

176. The combination of Kawai and Quadling renders obvious all the recited features of Claims 1, 2 and 15-20, when also combined with Durbin as discussed directly below.

2. Kawai and Quadling, when combined with Durbin

177. As discussed above in Paragraphs 60-73, Quadling generally discloses capture of two-dimensional images from different optical axes for three-dimensional scanning, but it does not expressly state precisely how its two-dimensional images are captured from different optical axes and then stored to implement its system.

178. Durbin provides that express disclosure in the form of a multi-aperture scanner/camera arrangement that obtains a plurality of two-dimensional image sets such that “each one of the plurality of images in each image set [is] captured from a different optical axis.”

a) Difference between the claimed invention and the prior art.

179. A POSITA would have been motivated to apply Durbin’s disclosure concerning multi-aperture scanner/camera arrangements that obtain a plurality of two-dimensional images from different optical axes to confirm how a POSITA would have implemented Quadling’s existing two-dimensional image capture from different optical axes for three-dimensional scanning.

180. Given the existing details of Quadling’s system that expressly states that “multiple images can be captured from multiple positions and orientations with

respect to the object”², a POSITA would have already been aware that multi-aperture scanner/camera arrangements, such as the one disclosed in Durbin, provided the ability to capture two-dimensional images in a form that readily met the requirements of Quadling’s system.

181. In addition, Durbin itself provides motivation to a POSITA to use its multi-aperture scanner/camera arrangement disclosure because it efficiently facilitates “automated intra-oral scanning of all the dental structures in the jaw through an optical aperture and combines the information available in the entire set of images to create and present an accurate 3D model of the scanned structures. The system allows intra oral images of dental structures *to be taken rapidly and with high resolution such that the acquired images can be processed into accurate 3D models of the imaged dental structures.*” ¶[0024] (emphasis added). Even further, the understanding that multi-aperture scanner/camera arrangements such as that disclosed in Durbin were known in the prior art is confirmed by the ’864 Patent itself. EX1001, 9:9-13.

² EX1011, ¶[0012].

b) A POSITA would have had motivation to combine the disclosures of Kawai and Quadling.

182. A POSITA would have had a reasonable expectation of success in making the combination of Quadling’s video-based scanning system that obtains images from different optical axes with the multi-aperture scanner/camera disclosure of Durbin relating to capture of two-dimensional images from different optical axes. This is so because both references are directed to generation of three-dimensional models from underlying two-dimensional images. *See* Discussion above regarding element [1.1] (concerning Quadling’s model generation), and EX1012, ¶¶[0052]-[0053] (concerning Durbin’s model generation).

183. Durbin simply provides a POSITA’s existing understanding of capture of two-dimensional images from different optical axes using a multi-aperture scanner/camera arrangement.

184. Combining the disclosures of Quadling with Durbin would only require the use of “known methods”—using each in the same way they were used as disclosed.

185. Specifically, Quadling already discloses capture of two-dimensional images from different optical axes – And, Durbin provides the POSITA’s existing understanding of capture of two-dimensional images using a multi-aperture

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 9,262,864

scanner/camera technique demonstrating how a POSITA would have understood two-dimensional images would have been captured to support Quadling's scanner.

186. None of the methods would need to be used in an unexpected or unintended way. Each would be fulfilling its original purpose and used in an expected way.

187. The combination of Kawai, Quadling, and Durbin renders obvious all the recited features of Claims 1, 2 and 15-20.

**XI. ANY PURPORTED SECONDARY CONSIDERATIONS EVIDENCE
DOES NOT OVERCOME THE STRONG EVIDENCE OF THE
OBVIOUSNESS OF THE CLAIMS**

188. I am currently unaware of any secondary considerations evidence that may be commensurate with the challenged claims of the '864 Patent such as commercial products produced by the Patent Owner.

XII. CONCLUSION

189. For the reasons set forth above, it is my opinion that all elements of Claims 1, 2 and 15-20 of the '864 Patent are disclosed or suggested by the prior art. In my opinion, Claims 1, 2 and 15-20 of the '864 Patent would have been anticipated or rendered obvious by the prior art.

190. In signing this Declaration, I understand that the Declaration will be filed as evidence in a contested case before the Patent Trial and Appeal Board of the United States Patent and Trademark Office. I acknowledge that I may be subject to cross-examination in the case and that cross-examination will take place within the United States. If cross-examination is required of me, I will appear for cross-examination within the United States during the time allotted for cross-examination.

191. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Date: August 12, 2024



Eli Saber

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 9,262,864

APPENDIX A

I have previously testified and/or been consulted as an expert in the
following matters:

Maxell, LTD. v. TCL Electronics Holdings Ltd. Et. al.

June 2024 – Present

Case 5:23-CV-00108-RSW-JBB (EDTX) and related proceedings including
against LG Electronics and Samsung

- Legal Firm: Mayer-Brown
- Retained as an expert on behalf of Maxell
- Provide expert opinions in support of legal proceedings.

3Shape A/S (Petitioner) v. Medit Corporation

Jan. 2024 – Present

US Patent and Trademark Office, Patent Trial and Appeal Board

- Legal Firm: Buchanan, Ingersoll and Rooney PC
- Retained as an expert on behalf of 3Shape A/S to provide expert opinions for multiple inter partes proceedings involving U.S. Patent US 10,076,391 (IPR2024-00548), US 11,234,798 (IPR2024-00549), US 9,191,648, US 9,262,864, US 7,912,257 and US 9,245,374.

3Shape A/S (Petitioner) v. Dental Imaging Technologies & Carestream Dental

Jan. 2024 – Present

US Patent and Trademark Office, Patent Trial and Appeal Board

- Legal Firm: Buchanan, Ingersoll and Rooney PC
- Retained as an expert on behalf of 3Shape A/S to provide expert opinions on inter partes proceedings involving U.S. Patent US 10,076,391 (IPR2024-00548), US 11,234,798 (IPR2024-00549) and US 9,191,648

Amazon v. Nokia

Jan. 2024 – Present

- Legal Firm: Perkins-Coie
- Retained as an expert on behalf of Amazon (Petitioner)

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 9,262,864

- Provided expert opinions and a declaration in support of US 7,724,818 (IPR2024-00572)
- Provide expert opinions and a declaration for an IPR proceeding re. US 6,856,701
- Provide expert opinions and a declaration for an IPR proceeding re. US 8,175,148
- Provide expert reports with regards to invalidity, non infringement and domestic industry with regards to ITC case No. 337-TA-1380
- Provided a Deposition on June 28st, 2024 for ITC case No. 337-TA-1380.

Autonomous Devices LLC v. Tesla, Inc

October 2022 - Present

US District Court, District of Delaware, case No.

- Legal Firm: McKool-Smith
- Retained as an expert by the Barr Group on behalf of Autonomous Devices.
- Provided declarations in support of legal proceedings.
- Working on multiple IPRs (5X): IPR2023-01054, IPR2023-01055, IPR2023-01169, IPR2023-01172, IPR2023-01173.
- Provided or in process of providing multiple declarations in support of Patent Owner Response and Motion to Amend with regards to the above IPRs
- Provided a Deposition on May 16th, 2024 with regards to IPR 2023-01054.
- Provided a Deposition on May 21th, 2024 with regards to IPR 2023-01055.
- Provided a Deposition on June 14th, 2024 with regards to IPR 2023-01169.
- Provided a Deposition on June 21st, 2024 with regards to IPR2023-01172 and IPR 2023-01173.

Medit USA, Crown Jade Co. Ltd. (Petitioner) v. 3Shape A/S (Patent Owner)

Oct. 2023 – Present

US Patent and Trademark Office, Patent Trial and Appeal Board

- Legal Firm: Buchanan, Ingersoll and Rooney PC
- Retained as an expert on behalf of 3Shape A/S to provide expert opinions on IPR proceedings involving U.S. Patent Nos. 10,695,151; 11,076,146; 11,368,667.

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 9,262,864

- Provide expert opinions in support of Patent Owner Response.
- Institution was denied for 11,076,146; 11,368,667.
- Institution granted for U.S. 10,695,151 (IPR2023-01315)
- Provided a declaration in support of Patent Owner regarding US 10,695,151 (IPR2023-01315)
- Provided a Deposition on August 8th, 2024 for IPR2023-01315.

Meta Platforms, Inc.; Instagram, Inc.; WhattsAPP LLC; Meta Platforms Technologies, LLC; and Giphy, Inc. (Petitioners) v. VL Collective IP LLC (Patent Owner)

Jan. 2024 – Present

- Legal Firm: Reichman Jorgensen Lehman & Feldberg LLP
- Retained as an expert on behalf of VL Collective IP LLC
- Provided expert opinions and a declaration in support of Patent Owner Response with regards to IPR2023-00924.
- Provided a Deposition on May 30th, 2024 with regards to IPR 2023-00924.

Facetec, Inc. v. iProov Ltd., Case No. 2:21-cv-02252-ART-BNW

October 2022 - Present

US District Court, District of Nevada

- Legal Firm: OneLLP
- Retained as an expert by Teklicon on behalf of FaceTec, Inc.
- Provided expert opinions as needed in support of legal proceedings

TVISION INSIGHTS v. The NIELSEN Company (US), LLC

August 2023 - Present

US Patent and Trademark Office, Patent Trial and Appeal Board

- Legal Firm: Erise Intellectual Property Law
- Retained as an expert on behalf of the Nielsen Company (US), LLC
- Provided expert opinions and a declaration in support of patent owner in IPR2023-01014. Documents were filed on 10/11/2023.
- PTAB decision to institute was reached January 2024.
- Provided a Deposition on July 2nd, 2024.

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 9,262,864

In Re Lyft Rideshare Litigation

Dec. 2021 – Present

Superior Court of the State of California, Case No. CJC-20-005061

- Legal Firm: Williams & Connolly, LLP
- Retained as an expert by WIT Legal, LLC on behalf of Lyft (Defendant)
- Provide reports and consulting services on the challenges of the use of Dashcam solutions in Vehicles
- Provided a Deposition on March 24th, 2023.
- The first portion of the Case that requires my expertise has been settled.

RealD, LLC v. Microsoft Corp., NO. 2:22-cv-00942-TL

Feb. 2023 – June 2024

- Legal Firm: Michelman & Robinson
- Retained as an expert on behalf of RealD, LLC
- Provided expert opinions and a declaration in support of IPR2023-01046. Patent Owner Preliminary Response filed on 10/13/2023.
- Provide expert opinions and additional reports in support of Federal case.
- Provide algorithm support for software review.
- Provided expert opinions and a declaration in support of Patent Owner Response with regards to IPR2023-01046. POR filed on March 15th, 2024
- Provided a Deposition on June 5th and 7th, 2024 with regards to IPR 2023-01046.

Meta Platforms, Inc. f/k/a Facebook, Inc. v. Angel Technologies Group LLC

May 2023 – October 2023

US District Court, District of Nevada

- Legal Firm: McKool-Smith
- Retained as an expert by Alliance Technical Staffing on behalf of Angel Technologies Group LLC.
- Provide expert opinions and declarations in support of four IPR proceedings (IPR2023-00057, IPR2023-00058, IPR2023-00059, IPR2023-00060).
- Provided a Deposition on October 20th, 2023 for IPR2023-00057, IPR2023-00058 and IPR2023-00059

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 9,262,864

- Provided a Deposition on October 23rd, 2023 for IPR2023-00060.

Alarm.com Incorporated v. Vivint, Inc NO. 2:23-CV-00004-JRG-RSP

March 2023 – Dec. 2023

- Legal Firm: Cravath, Swaine and Moore, LLP
- Retained as an expert on behalf of Alarm.com, Inc.
- Case has been settled

HL Holdings, Inc. v. LNHL, LLC, et al.

July 2023 – Dec. 2023

- Legal Firm: Nelson, Mullins, Riley and Scarborough LLP
- Retained as an expert by IMS Consulting and Expert Services on behalf of LNHL, LLC and Seek Now Inc. f/k/a Ladder Now LLC.
- Provided expert opinions and a report in support of legal proceedings.
- Provided a Deposition on November 29th, 2023
- Case has been settled.

Angel Group Co. Ltd. V. Sensen Networks Group Pty Ltd

July 2023 – Oct. 2023

- Legal Firm: Norton Rose Fulbright
- Retained as an expert on behalf of Angel Group Co. Ltd.
- Provide expert opinions in support of a potential IPR proceeding.
- Case has been settled.

United Services Automobile Association v. Truist Bank

March 2023 – Oct. 2023

- Case No. 2-22-CV-00291
- Legal Firm: Cravath, Swaine and Moore, LLP
- Retained as an expert on behalf of Truist Bank.
- Performed review of six patents.
- Case was settled.

Dental Imaging Technologies Corp. (Petitioner) v. 3Shape A/S (Patent Owner)

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 9,262,864

Feb. 2023 – July 2023

US Patent and Trademark Office, Patent Trial and Appeal Board

- Legal Firm: Buchanan, Ingersoll and Rooney PC
- Retained as an expert on behalf of 3Shape A/S.
- Provided consulting services in support of POPR for IPR2023-00387 (US 11,076,146).
- Provided consulting services in support of POPR for IPR2023-00400 (US 10,695,151).
- Provided consulting services in support of POPR for IPR2023-00411 (US 11,368,667).
- PTAB decision to NOT Institute on all three IPRs.

Nike v. Valmarc

January 2023 – Present

- Legal Firm: Hilgers Graben
- Retained as an expert on behalf of Valmarc Corporation
- Provided expert opinions in support of Patent Owner Preliminary Response on petitions IPR2022-01403 & IPR2022-01404
- PTAB granted institution but client opted not to pursue defending the patents.

Sensormatic Electronics, LLC v. Genetec, Inc. et al.

Oct. 2021 – Feb. 2023

US District Court, District of Delaware, Case 1:20-cv-00760-MN

- Legal Firm: Fish & Richardson, P.C.
- Retained as an expert by IMS Expert Services on behalf of Genetec, Inc. et al. (Defendant)
- Representing Genetec (USA) Inc. and Genetec Inc. (C. A. No. 20-760)
- Provided Opening, Rebuttal and Reply reports regarding invalidity & Non-infringement with regards to US 7,307,652.
- Sat in on a deposition of Plaintiff expert (April 29th, 2022) per counsel request.
- Provided a deposition on May 3rd, 2022
- Case is completed.

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 9,262,864

Roku, Inc. v. Flexiworld Technologies, Inc.

June 2022 – October 2022

US Patent and Trademark Office, Patent Trial and Appeal Board, Case No.
IPR2022-01112

US Patent and Trademark Office, Patent Trial and Appeal Board, Case No.
IPR2022-001269

- Legal Firm: Perkins-Coie, LLP
- Retained as an expert by WIT Legal, LLC on behalf of Roku (Petitioner).
- Provided a declaration in June 2022 in support of the IPR petition for US 10,140,073.
- Provided a declaration in July 2022 in support of the IPR petition for US 7,944,577.
- Case was settled in October 2022.

CareView Communications, Inc. v. Interactive Digital Solutions, Inc.

Jan. 2022 – April 2022

- Legal Firm: Mintz, Levin, Cohn, Ferris, Glovsky & Popeo, P. C.
- Retained as an expert by IMS Expert Services on behalf of Interactive Digital Solutions, LLC (Defendant) to provide declarations in support of 3 IPR proceedings
- Case was settled in April 2022.

Sovereign Peak Ventures, LLC v. Hisense Co., LTD

Nov. 2021 – Dec. 2021

US District Court, Eastern District of Texas, Case No. 21-cv-00209

- Legal Firm: Perkins-Coie, LLP
- Retained as an expert by WIT Legal, LLC on behalf of Hisense Co. (Defendant).
- Working to provide a declaration in support of the IPR petition for US 8,019,169.
- Case was settled in Early 2022.

Perfect Corporation v. Lennon Image Technologies, LLC

Sept. 2021 – June 2022

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 9,262,864

US Patent and Trademark Office, Patent Trial and Appeal Board, IPR2021-00124

- Legal Firm: Perkins-Coie, LLP
- Retained as an expert by WIT Legal, LLC on behalf of Perfect Corporation (Petitioner).
- Provided a declaration in support of the IPR petition for US 6,624,843.
- Petitioner filed a motion to dismiss its petition on April 5th, 2022.

Apple Inc. v. Corephotonics, LTD

Jan. 2021 – May 2021

- Legal Firm: Russ, August & Kabat,
- Retained as an expert by WIT Legal, LLC on behalf of Corephotonics in two IPR cases.
- Provided two declarations in support of IPR Petitions IPR2020-00487 & IPR2020-00860.
- Provided a deposition on 04/14/2021.

Davis Polk

Aug. 2020 – Nov. 2021

- Legal Firm: Davis Polk
- Retained as an expert by WIT Legal, LLC
- Provided expert and consulting services for video and point cloud type imagery.

Cravath, Swaine & Moore, LLP

Feb. 2020 – Mar. 2020 and Jan. 2021

- Legal Firm: Cravath, Swaine & Moore, LLP
- Retained as an expert by WIT Legal, LLC
- Evaluated computer vision technology for various clients.
- No reports, depositions or expert testimonies were provided.

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 9,262,864

Wells Fargo & Co. v. Lighthouse Consulting Group

Feb. 2020 – Sept. 2020

US Patent and Trademark Office, Patent Trial and Appeal Board, IPR2020-00758 and IPR2020-00759

- Legal Firm: Winston & Strawn LLP
- Retained as an expert by DOAR on behalf of Petitioner Wells Fargo.
- Submitted two declarations in support of IPR Petitions IPR2020-00758 & IPR2020-00759 for US 8,590,940 and US RE44,274.

3Shape A/S v. Align Technology, Inc.

Jan. 2020 – April 2020

US District Court, District of Delaware, Case No. 18-cv-00886 (consolidated with 18-cv-00697)

- Legal Firm: Buchanan, Ingersoll and Rooney, PC
- Retained as an expert by DOAR on behalf of plaintiff for US Patents-in-Suit Nos. 9,962,244 and 9,629,551 with regards to invalidity.
- Case was transferred to Troutman Pepper LLP very shortly after my engagement.

3Shape A/S et al v. Align Technology, Inc.

Oct. 2019 – Oct. 2020

US Patent and Trademark Office, Patent Trial and Appeal Board, IPR2020-00222 and IPR2020-00223

- Legal Firm: Buchanan, Ingersoll and Rooney, PC
- Retained as an expert by DOAR on behalf of Petitioner 3Shape A/S with respect to US 7,156,661
- Provided two declarations in support of IPR petitions (IPR2020-00223 and IPR2020-0222) for US 7,156,661. Both petitions were filed in December 2019.
- Provided a deposition on July 30th, 2020 in support of IPR2020-00223 that was instituted by PTAB and supporting materials for follow on responses.

Uniloc 2017 LLC v. Netflix, Inc. (Petitioner) (18-cv-2055)

July 2019 – July 2020

US Patent and Trademark Office, Patent Trial and Appeal Board, IPR2020-00044

- Legal Firm: Perkins-Coie, LLP

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 9,262,864

- Retained as an expert by DOAR on behalf of Petitioner Netflix, Inc.
- Provided an expert declaration in support of IPR2020-00044 for US 6,584,229.
- Case was settled in July 2020.

Align Technology, Inc. v. 3Shape A/S et al

Feb. 2019 – Feb. 2022

US District Court, District of Delaware, Case No. 17-cv-01646 (LPS) (CJB)

- Legal Firm: Troutman Pepper LLP
- Retained as an expert by WIT Legal, LLC on behalf of Defendant 3Shape for US Patent-in-Suit No. 9,510,757 ('757 Patent).
- Served as expert for invalidity and non-Infringement for US 9,510,757
- Provided expert reports regarding Invalidity and non-infringement of '757
- Provided a deposition on 10 January 2020
- Case was settled in February 2022.

Certain Dental and Orthodontic Scanners and Software

Feb. 2019 – Oct. 2019

US International Trade Commission, Investigation No. 337-TA-1144 (3Shape v. Align)

- Legal Firm: Pepper Hamilton, PC
- Retained as an expert by DOAR on behalf of respondent 3Shape A/S with respect to US Patent-in-Suit No. 9,299,192 ('192 Patent).
- Served as expert on invalidity, non-infringement and domestic industry.
- Provided expert opinions and rebuttal reports in support of the above proceedings.
- Provided a deposition (8/13/2019).
- Provided trial testimony on October 30th, 2019 (Trial was held Oct. 24-30, 2019) with regards to Invalidity, Non-infringement and Domestic Industry.

3Shape A/S et al v. Align Technology, Inc.

Oct. 2018 – Sept. 2019

US Patent and Trademark Office, Patent Trial and Appeal Board, IPR2019-00132 and IPR2019-00134 and IPR2019-00148

- Legal Firm: Buchanan, Ingersoll and Rooney, PC

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 9,262,864

- Retained as an expert by DOAR on behalf of respondent 3Shape A/S with respect to US 7,112,065, US 9,451,873 and US 9,299,192
- Represented 3Shape (Petitioner) in three IPR Petitions v. Align (Patent Owner).
- Provided three declarations in support of the IPR petitions for US 7,112,065, US 9,299,192 and US 9,451,873. All three petitions were filed in November 2018 and all three were instituted.
- Provided three depositions with regards to US 7,112,065 (8/16/2019), US 9,451,873 (09/18/2019) and US 9,299,192 (09/30/2019).

Blackberry Corp. et al v. Maxell, Ltd

Sept. 2018 – Oct. 2018

US Patent and Trademark Office, Patent Trial and Appeal Board, IPR2019-00087 and IPR2019-00095 and IPR2019-00097

- Legal Firm: Oblon, McClelland, Maier and Neustadt, LLP
- Retained as an expert on behalf of petitioner Blackberry Corp.
- Provided three declarations in support of the IPR petitions for US 9,100, 604 (Joinder), US 6,765, 616 and US 7,995,897.
- Case settled in May 2019.

Exocad GmbH et al v. 3Shape A/S

March 2018 – Sept. 2019

US Patent and Trademark Office, Patent Trial and Appeal Board, IPR2018-00788

- Legal Firm: Buchanan, Ingersoll and Rooney, PC
- Retained as an expert by DOAR on behalf of 3Shape A/S in defending an IPR filings of EXOCAD (Petitioner) v. 3Shape (Patent Owner). Case No. IPR 2018-00788
- Provided a declaration in support of the Patent Owner response for US 9,336,336.
- Provided a deposition on April 1st, 2019.

Certain Intraoral Scanners and Related Hardware and Software

February 2018 – Sept. 2018

US International Trade Commission, Investigation No. 337-TA-1090 & No. 337-TA-1091 (Align v. 3Shape)

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 9,262,864

- Legal Firm: Pepper Hamilton, LLP
- Retained as an expert by DOAR on behalf of respondent 3Shape A/S.
- Provided expert opinions regarding claim construction, noninfringement, and the domestic industry analysis.
- Attended a *Markman* hearing and provided a tutorial for the technology in suit.
- Provided a Deposition on July 16, 2018.
- Provided trial testimony as an expert on Sept. 20th, 2018 with regards to Non-infringement and Domestic Industry.

Nikon Corporation et al v. ASML Netherlands BV et al

July 2017 – Nov. 2017

US Patent and Trademark Office, Patent Trial and Appeal Board, IPR2018-00227

- Legal Firm: Morrison & Foerster
- Retained as an expert on behalf of petitioner Nikon Corporation.
- Provided an expert declaration in support of IPR petition for US 7,209,167.

Raster Printing Innovations, LLC v. Hewlett-Packard Company et al

April 2016 – May 2016

US District Court, Northern District of Illinois, Case No. 15-cv-03967

- Legal Firm: Morgan, Lewis & Bockius, LLP
- Retained as an expert by IMS Expert Services on behalf of defendant Hewlett Packard.
- Contributed to the development of initial invalidity contentions charts.
- Case settled very quickly after my engagement in June 2016.

Qomo Hitevision LLC v. Pathway Innovations and Technologies, Inc.

Nov. 2015 – Jan. 2016

US Patent and Trademark Office, Patent Trial and Appeal Board, IPR2016-00661

- Legal Firm: Mei & Mark, LLP
- Retained as an expert on behalf of petitioner Qomo Hitevision.
- Provided an expert declaration in support of petition for inter partes review.

Sony Corp of America. v. Image Processing Technologies, LLC

Aug. 2014 – Nov. 2014

US Patent and Trademark Office, Patent Trial and Appeal Board

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 9,262,864

- Legal Firm: Lerner, David, Littenberg, Krumholz & Mentlik LLP
- Retained as an expert on behalf of Sony.
- Provided an expert declaration in support of petition to institute inter partes review of US Patent No. 6,959,293.

Image Processing Technologies, LLC v. Canon Inc. et al

June 2011 – Dec. 2012

Case: US District Court, Eastern District of New York, Case No. 10-cv-03867

- Legal Firm: Fitzpatrick, Cella, Harper & Scinto
- Retained as an expert on behalf of defendant Canon Inc.
- Traveled to Japan twice to meet with Canon Technical & Engineering Teams
- Provided reports related to Invalidity, Non-Infringement, Rebuttals, and summary judgement.
- Provided a Deposition in April 2012.