

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

XACTWARE SOLUTIONS, INC.
Petitioner

v.

EAGLE VIEW TECHNOLOGIES, INC.
Patent Owner

Case No. IPR2016-00592

Patent No. 9,135,737 B2

PATENT OWNER'S RESPONSE

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PATENT OWNER'S EXHIBIT LIST

Exhibit No.	Description	Previously Submitted
2001	A Dictionary of Computing, Fifth Edition, Oxford University Press (2004)	X
2002	McGraw-Hill Dictionary of Scientific and Technical Terms, Sixth Edition (2003)	X
2003	Kaplan, Steven M. "Wiley Electrical and Electronics Engineering Dictionary," Wiley Interscience (2004)	X
2004	Weisstein, Eric W., "Combinatorics," From MathWorld - A Wolfram Web Resource, http://mathworld.wolfram.com/Combinatorics.html	X
2005	Transcript of telephonic conference call before the Patent Trial and Appeal Board, June 27, 2016	X
2006	Declaration Of Adam R. Alper In Support Of Motion To Appear Pro Hac Vice On Behalf Of Patent Owner	X
2007	Reference Guide: Twister, 10/15/2008 (EV000144)	
2008	Declaration of Dr. Chandrajit L. Bajaj (Redacted)	
2009	Dr. Chandrajit L. Bajaj's CV	
2010	EVT Internal customer quality survey (EV045631)	
2011	Declaration of Chris Johnson	
2012	2009 through 2012 revenue data (EV01427936)	
2013	2013 revenue data (EV043428)	
2014	2014 revenue data (EV01427938)	
2015	2015 revenue data (EV01427937)	
2016	Declaration of Jared Barcnas	
2017	Deposition of Schuch from October 2016	

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2018	Deposition of Schuch from November 2016	
2019	Aerial Roof Measurements Technology Driving Changes to Professional Roofing Practices	
2020	Aerial Measurement Reports: Uncovering the Hidden Costs of DIY Tools, Eagleview Case Study: Insurance, http://www.eagleview.com/Portals/0/PortalContent/PDF/CS-117EagleViewvsDIYIns-Jan13-Web.pdf	
2021	EagleView and Xactware team up to revolutionize roof dimensioning, http://www.xactware.com/en-us/company/news/archives/2009/eagleview-and-xactware-team-up-to-revolutionize-roof-dimensioning/	
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2025	One small company reinvents a \$30 billion market, CNN Money, http://money.cnn.com/2011/12/09/smallbusiness/eagleview/	

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2026	Roof Consultants Utilize Aerial Measurement Technology to Provide Expert Service, Shear Bull, Apr 2011, Vol. 24-4, http://pbcroofers.com/newsletters/PBCR_news_11April.pdf	
2027	Eagle Eye, CalBiz Journal, http://www.calbizjournal.com/eagleviewmeasurements/	
2028	Counting on the Perfect Measurement Every Time, Eagleview Case Study: Contractors, http://www.eagleview.com/Portals/0/PortalContent/PDF/CS-116PhoenixRoofingCaseStudy-Jan13-web.pdf	
2029	Acquisition of EagleView Technology Corp., Verisk Analytics, Jan. 15, 2014, http://phx.corporate-ir.net/External.File?t=1&item=VHlwZT0yfFBhcmVudEIEPTUwODYxNjl8Q2hpbGRJRD01Mjk4MDA=	
2030	Reference Guide: For Measuring Technicians, 10/15/2008 (EV000236)	
2031	Declaration of Dr. Chandrajit L. Bajaj (Under Seal)	

I. INTRODUCTION

Petitioner has failed to establish by a preponderance of evidence that any of the instituted claims are unpatentable. First, Petitioner primarily relies on a reference by Avrahami that discloses an algorithm for extracting roof planes from a pair of aerial images. But Petitioner ignores that this reference is fundamentally different from the claimed invention of the '737 patent. The '737 patent is directed to providing tools allowing actual users in the field to display and modify lines in a line drawing to ensure a three-dimensional model of the roof is more accurate. Avrahami, by contrast, is an academic paper directed at testing an algorithm for creating a single, ***unmodifiable*** three-dimensional model. As a result, Avrahami fails to address the claimed abilities to change lines in a line drawing, modify a three-dimensional model, and display changes made to lines in one view of the roof to lines in another view of the roof, as is claimed in the '737 patent. The secondary references relied upon by Petitioner, which are directed to solving disparate problems, do not overcome the deficiencies with the Avrahami reference, and in any event would not be combined by a person of ordinary skill in the art in the manner suggested. In addition, with respect to Petitioner's obviousness challenges, significant objective indicia of non-obviousness exists due to the commercial success and industry praise garnered by products embodying the '737 patent—in fact, Petitioner itself has repeatedly acknowledged the novelty of Patent

Owner's patents, and only now changes its story, after its bid to acquire Patent Owner failed and it has been sued for wrongfully taking Patent Owner's technology without permission.

And while Patent Owner's positions are supported by the testimony of a highly experienced expert in this area, Petitioner's expert provides no opinions that the claims of the patents are disclosed in the prior art or are invalid. To the contrary, Petitioner's expert admitted key facts in his deposition confirming that numerous elements of the claims are missing in the prior art. At bottom, Petitioner cannot carry its "burden of proving a proposition of unpatentability by a preponderance of the evidence." 35 U.S.C. § 316(e); 37 C.F.R. § 42.1(d).

Accordingly, the Board should uphold the patentability of all of the instituted claims.

II. OVERVIEW OF U.S. PATENT NO. 9,135,737

U.S. Patent No. 9,135,737 ("the '737 patent") is directed to "systems and methods for estimating construction projects, and more particularly, to such systems and methods for determining roof measurement information based on one or more aerial images of a roof of a building." Ex. 1001 ('737 patent) at 1:7–11.

Specifically, the user interface displays a first and second aerial image of the roof, each image taken from a different angle. A line drawing representing features of the roof is overlaid onto the first image, with a corresponding line

drawing of those features also overlaid onto the second image. *Id.* at 14:43–50. That is, the user interface displays features of the roof “in conjunction with one or more images of the roof, so that an operator may review the model for accuracy and possibly make adjustments and/or corrections to the roof model.” *Id.* at 3:13–17; Ex. 2017 (Schuch Dep.) at 37:6–16. This is important, for example, if an error in the model is only apparent on one of the views of the roof or if one of the views contains obstructions such as a tree. Ex. 2008 (Bajaj Decl.) ¶ 27. If the user notices an inaccuracy with what is displayed, “the operator can switch between various images of the building roof 407, ***making refinements to the 3D model*** by adjusting the wire frame in whichever image is more convenient and/or provides a more suitable perspective/view of the model.” Ex. 1001 at 14:46–50; *see also* 15:45–50 (discussing adjusting line segments of a wire frame). The line drawing in the second image is then changed to make the corresponding adjustment that was made in the line drawing in the first image, so that the user can continue to modify or verify as necessary. *Id.* at 3:13–17.

With the benefit of an accurate 3D roof model, a reliable roof estimate report can be generated that “typically includes one or more plan (top-down) views of the model, annotated with numerical values for the slope, area, and/or lengths of the edges of at least some of the plurality of planar roof sections of the model of the

roof,” as well as “information about total area of the roof, identification and measurement of ridges and/or valleys of the roof, and/or different elevation views rendered from the 3D model.” Ex. 1001 at 6:31–38.

III. BOARD'S DECISION TO INSTITUTE REVIEW

As illustrated by the table below, the Board instituted *inter partes* review (“IPR”) with respect to the following grounds of unpatentability in the Petition that include Yair Avrahami, et al., “Extraction of 3D Spatial Polygons Based on the Overlapping Criterion for Roof Extraction from Aerial Images,” IAPRS, Vol. XXXVI, Part 3/W24, Vienna, Austria, Aug. 29–30, 2005 (“Avrahami”); AppliCad Product Bulletin, “Key features of our Roofing Software,” November 2002 (“AppliCad”); and Frederick Perlant, et al., “Scene Registration in Aerial Image Analysis,” Photogrammetric Engineering and Remote Sensing, Vol. 56, No. 4, April 1990 (“Perlant”):

Ground	Reference(s)	Basis (35 U.S.C.)	Claims Being Reviewed
3	Avrahami, AppliCad	§ 103(a)	1, 9, 16, 19, 22, 25–28, 31, 34–36
4	Avrahami, AppliCad, Perlant	§ 103(a)	10

Patent Owner, relying on the detail of the prior art ignored by Petitioner and the declaration of Dr. Chandrajit L. Bajaj, establishes not only that the prior art fails to disclose what the Petitioner claims it does, but that combining the art as

proposed by the Petitioner would be inappropriate and fail to yield the claimed inventions.

IV. CLAIM CONSTRUCTION

The Board interprets claim terms by applying the broadest reasonable construction in the context of the specification in which the claims reside. 37 C.F.R. § 42.100(b). However, “claims should always be read in light of the specification and teachings in the underlying patent,” *In re Suitco Surface, Inc.*, 603 F.3d 1255, 1260 (Fed. Cir. 2010), and the construction “must be consistent with the one that those skilled in the art would reach.” *Microsoft Corp. v. Proxyconn, Inc.*, 789 F.3d 1292, 1298 (Fed. Cir. 2015). “The PTO should also consult the patent’s prosecution history in proceedings in which the patent has been brought back to the agency for a second review.” *Id.* “While the Board must give the terms their broadest reasonable construction, the construction cannot be divorced from the specification and the record evidence.” *In re NTP, Inc.*, 654 F.3d 1279, 1288 (Fed. Cir. 2011); *Microsoft*, 789 F.3d at 1298.

A. “reference grid”

“Reference grid” has a plain and ordinary meaning to a person of ordinary skill. The Board did not construe this term in its institution decision (*see* Paper 14), and it does not affect any issues in this Patent Owner response. To the extent the Board determines to construe this term, Petitioner’s construction—“a data

structure to which one or more images are registered” (Paper 9 at 6–7)—is incorrect, as it reads the word “grid” out of the claim term and improperly attempts to allow for data structures that are in formats other than a grid. Ex. 2008 ¶ 27. Where, as here, Petitioner’s proposed construction fails to “give[] meaning to all the terms of the claim”—in this case, the term “grid”—it should be rejected. See *Merck & Co. v. Teva Pharm. USA, Inc.*, 395 F.3d 1364, 1372 (Fed. Cir. 2005); *Power Mosfet Techs., L.L.C. v. Siemens AG*, 378 F.3d 1396, 1410 (Fed. Cir. 2004) (“interpretations that render some portion of the claim language superfluous are disfavored”).

In any event, this issue has no impact on Patent Owner’s arguments, as claim 10 explicitly requires the grid to correspond to the three-dimensional model (a requirement which, as explained below, is missing from the asserted prior art). See Section V.B., below. As the specification confirms, a single reference grid is in a three-dimensional (3D) coordinate system and serves as a common reference for registering two-dimensional (2D) images. Ex. 1001 at 3:4–8. By associating 2D coordinates on the images with 3D coordinates on the reference grid, features on the images can be included in the 3D model produced by the system. *Id.* at 9:56–57 (“The **uniform 3D reference grid is used as a coordinate system** for a 3D model of the roof.”); see also 20:49–54, 9:63–10:2.

V. THE PETITION FAILS TO ESTABLISH THAT THE '737 PATENT IS UNPATENTABLE

A. Ground 3: The Combination of Avrahami and AppliCad Does Not Render Claims 1, 9, 16, 19, 22, 25–28, 31, 34–36 Obvious

Avrahami is an academic study of an algorithm for extracting 3D polygons of a roof structure based on two aerial images of the roof. See Ex. 1004 at Abstract. The reference also presents results of an effort to “examine the algorithm efficiency.” *Id.*

The Avrahami algorithm describes starting with “a pair of colored aerial images,” which Avrahami refers to as “left” and “right” images. See Avrahami at Abstract. From there, the algorithm disclosed by Avrahami is carried out in three stages, which are described in Figure 2 and the associated text: (1) manually pointing to “seed points”; (2) “an automatic process for extraction of the roof planes for each seed point”; and finally (3) a “roof extraction stage,” where individual roof planes are built into a 3D roof. Ex. 1004 at 44–46; see also 46 (“The proposed algorithm consists of three main stages . . .”).

In the first stage, “the operator needs to point at every distinct planar part of the roof *in the left image.*” *Id.* at 43; see also 44–46. These points are called “seed points.” See *id.* Critically, this is the only portion of the algorithm that accepts user input. *Id.* at 43 (“This stage defines the algorithm as semi-automatic and from here on the process is fully automatic.”); Ex. 2008 ¶¶ 30–31, 40.

The second stage is directed to extracting individual “roof planes for each seed point” that the user selected. Ex. 1004 at 46. That is, each process within the second stage is carried out only **once** for each seed point, and culminates in a single spatial polygon corresponding to a roof plane for each “seed point,” without modification to that spatial polygon. The second stage is composed of the sub-steps of: (i) “extraction of a bounding polygon in the left image space” (Section 3.1); (ii) “calculation of the estimated height and transformation to the right image space” (Section 3.2); (iii) extraction of a bounded polygon in the right image space” (Section 3.3); (iv) an iterative process of “left and right polygon matching” which overlaps the left and right polygons, so that later, homologous points in the left and right images can be determined (Section 3.4); and (v) extracting the individual spatial polygon that results from the prior steps (Section 3.5). Ex. 2008 ¶¶ 32–39. These steps are also fully automatic and involve no user-input. *Id.* Once the spatial polygon is extracted, there are no modifications, the left and right polygons are no longer referenced, and no modifications are made to them. Ex. 1004 at 46; Ex. 2008 ¶ 30, 38–41.

In the final third stage, Avrahami describes creating, for the first time, a 3D model of a roof by “building the topology between the roof planes.” *Id.* at 46 (Section 4, Fig. 2). During this final stage, no user-input occurs. Ex. 2008 ¶ 41.

After this stage, the process is complete; Avrahami describes no further steps or modifications to the 3D model.

1. **Neither Avrahami Nor AppliCad Discloses “displaying . . . a plurality of aerial images of a roof at the same time, each of the aerial images providing a different view, taken from a different angle of the same roof; displaying . . . respective line drawings representing features of a roof” (claim 1) Or “displaying corresponding changes to the line drawing overlaid on the second aerial image” (claim 16) Or “displaying the second line drawing after the first line drawing has been displayed (claim 28)**

Petitioner relies solely on Avrahami for these limitations and not on any other reference. However, Avrahami does not disclose or suggest that two aerial images of a roof or two line drawings overlying two aerial images should ever be displayed to the user.

As noted above, Avrahami is an academic paper directed at an algorithm for creating a model of a roof—not a user-oriented product with software or any other apparatus for displaying a roof model so that modifications can be made. Ex. 1004 at Abstract; Ex. 2008 ¶ 28. Although Avrahami includes illustrative Figures 1, 3, and 5 that show side-by-side images of a roof, those are included in the paper to graphically illustrate the *internal* operation of the Avrahami algorithm. Ex. 1004 at 46–48. The mere presence of those figures does not teach or disclose that the images in the figures should be displayed during performance of the algorithm. Ex. 2008 ¶ 57. Indeed, the Avrahami algorithm only displays a single image (the

“left” image) to the user for selecting a roof plane by placing a seed point on that plane. Ex. 1004 at 43 (“manual pointing to the center of a well-defined area in the **left image** space by an operator”). The remainder of the steps in the algorithm for creating a spatial polygon are “fully automatic” and do not include a step of displaying any image. *Id.* (“From here on the process is fully automatic.”); Ex. 2017 at 56:11–16 (Mr. Schuch agreeing that the initial seed point is only given in the left image). Indeed, there is no need in Avrahami to display both images, as there is no opportunity for interaction with the modeling process after the placement of the initial “seed point.” Ex. 2008 ¶¶ 31, 57.

Though Petitioner relies on language from Avrahami stating that two images are required to perform the algorithm (Paper 5 at 30), nowhere does Avrahami state that **both** these images are ever actually displayed. To the contrary, Avrahami explicitly states that the only interaction is the placement of the initial “seed point” in the “left” aerial image at the very beginning of the process. Ex. 1004 at 43, 44, 46. Because no other input is performed as part of the algorithm of Avrahami, displaying **both** a first and second aerial image is not required, nor disclosed by Avrahami. Ex. 2008 ¶¶ 31, 57. At best, displaying only a first aerial image is disclosed. This argument is uncontested by Petitioner’s expert, who admits that

there is no discussion of software for graphically displaying a first and second image, or any sort of visualization of the model:

Q. So, is it fair to say that in Avrahami there's no discussion of whether the authors created display software, basically, the code that would display the -- graphically display the various stages of the algorithms and processes that they were developing?

A. ***That's correct. Everything that is written in this document suggests that it can be done without visualization.***

Ex. 2017 at 73:20–74:3; *see also* 32:3–12.

Notably, Petitioner relies exclusively on the disclosure of Avrahami to satisfy this element and has provided no evidence or argument that one of ordinary skill in the art would find it obvious to modify Avrahami to perform this functionality. To the contrary, Avrahami concerns an academic study of an algorithm for generating a roof model, and such “displaying” was unnecessary for that purpose. Ex. 2008 ¶¶ 28, 57. Because Avrahami fails to disclose this element, Petitioner has failed to show that this claim is obvious. *In re Zurko*, 258 F.3d 1379, 1385–86 (Fed. Cir. 2001) (reversing the Board’s obviousness finding because cited references did not disclose limitation and there was no “concrete evidence” to remedy deficiencies in the art).

2. Neither Avrahami Nor AppliCad discloses “in response to user input, changing, by the at least one processor of the roof estimate report system, the line drawing representing a feature of the roof that overlies the first aerial image of the roof” (claim 1)

Petitioner relies solely on Avrahami for this limitation and not any other reference. Petitioner is not correct that Avrahami discloses this limitation.

Avrahami is fundamentally different than the inventions of the '737 patent because Avrahami does not disclose that the user can **change** a line drawing. The only user interaction disclosed in Avrahami is the manual placement of a seed point on an aerial image at the outset of the algorithm, which occurs **before** any line drawings even exist, and thus cannot constitute a “change” in the line drawing. As discussed above and as expressly stated in the paper, Avrahami accepts user input at only a single time, when initial “seed points” for individual roof planes are selected in the “left image,” after which the process is fully automatic. Ex. 1004 at 43 (“The algorithm consists of several consecutive stages: 1) manual pointing to the center of a well-defined area in the left image space by an operator. This stage defines the algorithm as semi-automatic and **from here on the process is fully automatic.**”), 44; Ex. 2008 ¶¶ 30–31. At the time the “seed point” is placed, no line drawing exists in the Avrahami algorithm whatsoever, and thus the placement of the “seed point” cannot constitute a **change** in a line drawing. Ex. 1004 at 44 (“the input is a, initial 2D seed point . . . [f]ollowing th[at] stage, the automatic

process consists of extraction in the left image space . . .”); Ex. 2008 ¶ 60; Ex. 1006 ¶ 61 (Mr. Schuch confirming that after “seed point” selected, the algorithm “segments the area and extracts a bounded polygon in that first image”).

And, once the seed point is placed, both experts confirm there is no further user interaction—for the remainder of the process, the computer automatically performs additional steps to generate individual spatial polygons, and, ultimately, a three-dimensional roof model. Ex. 1004 at 44–46; Ex. 2008 ¶¶ 30, 60. Indeed, Mr. Schuch admitted that there is no disclosure in Avrahami of a user moving a seed point or otherwise interacting with the algorithm after the seed point is placed:

Q. Okay. But Avrahami -- whenever Avrahami was creating this system and then as reported in the Avrahami reference, there was no -
- ***there's no indication of moving or repositioning a seed point on any of the images, correct?***

A. That is not spelled out. ***That's correct.***

Ex. 2018 at 26:24–27:5. Although Mr. Schuch attempted to testify at his deposition that certain functionality described in Avrahami ***could*** be accomplished by repositioning a “seed point” (see, e.g., Ex. 2018 at 23:6–16), he repeatedly admitted during his deposition that Avrahami does ***not*** disclose any such repositioning:

Q. Does the Avrahami reference state that a user manually repositions the seed point?

A. *It does not say that.*

Ex. 2018 at 13:8–10.

Indeed, Mr. Schuch's discussion of repositioning seed points at his deposition was pure speculation on his part, as he admitted "that's how [he] would do it" if he were to try to correct for failures in the automatic phase of the process, but "Avrahami does not state that":

Q. So you just said a moment ago, "additional information has to be introduced into the process by the operator for that to happen."

Alright. ***By saying that are you referring to movement of a seed point?***

A. *That is how I would do it.*

Q. Okay. That's how you would do it.

A. Yes.

Q. But how about Avrahami, isn't it correct that in Avrahami there is no subsequent movement of seed points after the initial introduction of a seed point at the beginning of the process?

A. *Avrahami does not state that.*

Ex. 2018 at 25:22–26:10; *see also id.* at 23:6–16. Although Mr. Schuch identified a portion of Avrahami regarding the dividing of a single spatial polygon into several planar surfaces as support for repositioning a seed point, in actuality that part of Avrahami says nothing about repositioning a seed point. Ex. 1004 at 46.

And, when Mr. Schuch was asked whether such dividing of a spatial polygon could be accomplished by the placement of a seed point by the user, Mr. Schuch responded that “I don’t know how that is done.” Ex. 2018 at 23:6–16.

Accordingly, his speculative, conclusory statements deserve no weight. *Harmonic, Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363-64 (Fed. Cir. 2016) (affirming Board determination that claims are patentable where asserted prior art reference in obviousness combination contained “no express teaching of [the claim] limitation” and Petitioner’s expert testimony “add[ed] nothing beyond the conclusory statements in [Petitioner’s] petition”); *August Tech. Corp. v. Camtek, Ltd.*, 655 F.3d 1278, 1290 (Fed. Cir. 2011) (concluding that a prior art combination does not render the asserted claims obvious as a matter of law where the combined prior art reference “does not supply the missing element for purposes of the obviousness analysis”). At bottom, it is not proper to use an expert to embellish the prior art with functionality that is admittedly not present under the guise of what “one of ordinary skill” would see. *Arendi S.A.R.L. v. Apple Inc.*, 832 F.3d 1355, 1362–64 (Fed. Cir. 2016). In any event, Petitioner failed to raise this argument in its Petition or in Mr. Schuch’s expert declaration, and therefore it should not be considered. 37 C.F.R. § 42.22(a)(2); *Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1369 (Fed. Cir. 2016).

Moreover, the selection by the user of an initial “seed **point**” in Avrahami is not a change to a **line** drawing. Rather than indicating a change in a line, the initial “seed point” instead merely reflects “manual pointing to the center” of an area on the left image. Ex. 1004 at 43. This “point” is not a line, let alone a roof feature, as both Dr. Bajaj and Mr. Schuch confirm. Ex. 2008 ¶ 60; Ex. 2018 at 31:2–8 (Mr. Schuch admitting that a “seed point” is not a line). Instead, the “seed point” tells the algorithm where to start its “flood fill” operation. Ex. 2008 ¶¶ 33, 34, 60; Ex. 2018 at 17:24–18:6; Ex. 1004 at 44. Because the subsequent steps of Avrahami are automatic, the user has no input regarding where the algorithm draws the bounds of any roof section (i.e., the lines of any polygons). Ex. 2008 ¶ 60; Ex. 2018 at 31:9–15 (Mr. Schuch agreeing that the Avrahami algorithm automatically decides where to place lines). Thus, Avrahami does not disclose allowing the user to change a line drawing.

Unlike Avrahami, the “changing” a line functionality of the '737 patent is an important part of the '737 patent's invention—i.e., the ability of an operator to change a three-dimensional model in order to improve the accuracy of the resulting measurements for a roof estimate report through the aid of user input:

In this manner, the operator can switch between various images of the building roof 407, ***making refinements to the 3D model by adjusting***

the wire frame in whichever image is more convenient and/or provides a more suitable perspective/view of the model.

Ex. 1001 at 14:46–50; *see also* 15:45–50 (discussing the operator changing lines); Ex. 2008 ¶¶ 23–24. Because the user is able to correct for errors in the three-dimensional model, a more accurate model can be produced. *Id.*; Ex. 1001 at 3:13–16. This functionality is entirely absent in Avrahami.

Once again, Petitioner relies exclusively on Avrahami to satisfy this element and has provided no evidence or argument that one of ordinary skill in the art would find it obvious to modify Avrahami to perform this functionality.

3. **Neither Avrahami Nor AppliCad Discloses “in response to the changing, making corresponding changes, by the at least one processor of the roof estimate report system, to the line drawing overlying the second aerial image” (claim 1) Or “in response to changes in the line drawing overlaid on the first aerial image, displaying corresponding changes to the line drawing overlaid on the second aerial image” (claim 16) Or “changing . . . a line in a second line drawing that corresponds to the same feature in the first line drawing that was changed, the change in the second line drawing being made by the computer in response to the change that was made to the first line drawing” (claim 26)**

Petitioner relies solely on Avrahami for these limitations and not any other reference. Petitioner is not correct that Avrahami discloses these limitations of claims 1, 16, and 26.

In instituting review on this ground, the Board stated that the algorithm disclosed by Avrahami and illustrated in Figure 2 includes a process whereby “[p]oint by point the polygon created on the left image is recreated on the right image by ‘matching’ points via a process that iteratively ‘slides’ the polygon over to the right image,” and that in such a process, “new points are added to the left [image] thereby changing (i.e., reconstructing) the polygon on the left and that change is propagated to the right [image].” Paper 14 at 17.

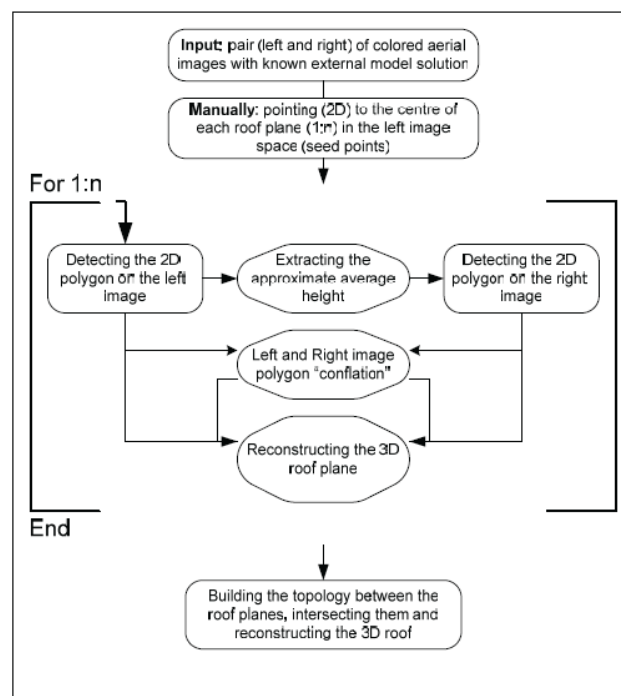


Figure 2. Flowchart of the roof extraction

Ex. 1004 at 46 (Figure 2). Patent Owner respectfully submits that this characterization is incorrect for at least two reasons: (1) as discussed in Section V.A.2, Avrahami does not disclose the ability to change a line at all; and (2) the

iterative “sliding” process referenced Figure 2—which the Board relied on in finding this element met—does not make changes to the left polygon which are then propagated to the right polygon. To the contrary, Patent Owner respectfully submits that nowhere in Avrahami are changes made in the right image that ***correspond*** to a change that was made in the left image, either during the sliding process or at any other point in the algorithm.

The sliding process relied on by Petitioner and the Board does not make changes to the left or right polygons, or propagate points from one polygon to the other. Before the sliding process begins, the left and right polygons (on the left and right images, respectively) are created independently using a flood fill technique that is performed separately for each of the two images. Ex. 1004 at 44, 45; Ex. 2008 ¶¶ 33, 34, 62; Ex. 2018 at 17:24–18:14. Specifically, after a user inputs a “seed point” corresponding to a roof plane on a “left” image, Avrahami uses a flood-fill operator to detect the bounds of a 2D polygon that outlines the individual roof plane on that image. Ex. 1004 at 44 (Section 3.1). Avrahami then estimates the approximate average height of the points of that 2D polygon on that same image. Ex. 1004 at 44–45 (Section 3.2). Once the left polygon is completed, the algorithm separately turns to the right image. The seed point from the left image is transferred to a corresponding point on the second image. Ex. 1004 at 45

(Section 3.3). Then, the algorithm independently applies the flood-fill operator to detect the bounds of a 2D polygon that outlines the individual roof plane in the right image. *Id.* As such, the lines relating to the second image are created independently from the lines in the first image—indeed, Avrahami states that as a result of this independence, the line drawings in the left and right images can be different, with one having a different number or set of points than the other. Ex. 1004 at 46 (“In the example of Figure 1, the polygon extracted from the left image is composed of 6 points whereas the polygon extracted from the right image is composed of 10 points.”); Ex. 2008 ¶ 62; Ex. 2017 at 59:22–24 (stating that the left and right polygons are “unlikely” to match).

As both experts confirm, at no point in the sliding process are “new points” added to either of the polygons, let alone propagated from the left polygon to the right. Ex. 2008 ¶ 40–41, 63. Mr. Schuch expressly admitted that no new points are added to the polygons in Avrahami:

Q. Okay. And, in the iterative sliding process, new points are not added to the polygons at that stage, correct?

A. No.

Q. No, they are not?

A. No, they're not.

Ex. 2018 at 34:19–24. Although Avrahami states that the sliding process involves left and right polygon matching so that “for each point in the left polygon we can find the corresponding homologous point in the right polygon” (Ex. 1004 at 45 (Section 3.4); Ex. 2017 at 63:18–23), the point of that part of the process is to overlap the two polygons, so that the **differences** in the number of points for each polygon can be ascertained. Ex. 2008 ¶¶ 36–37, 63.

Specifically, to overlay the polygons, an “iterative method for maximal matching” is used such that the “left polygon ‘slides’ in the direction of the epipolar line in the right image space” until “the polygons achieve maximum overlap in the right image space.” Ex. 1004 at 45; *see also* Figure 1 (illustrating the initial and final position of the left polygon during the sliding process). During this “sliding” process, no points are added or subtracted from either polygon, and neither polygon is changed, let alone changed in response to user input. Ex. 2008 ¶¶ 37, 63; Ex. 2018 at 34:19–24. As shown in Figure, 1, the polygons created in the left image (upper-left of Figure 1) and right image (upper-right of Figure 1) having a mismatched number of points, even after “the matching process result” is obtained (lower-right of Figure 1):

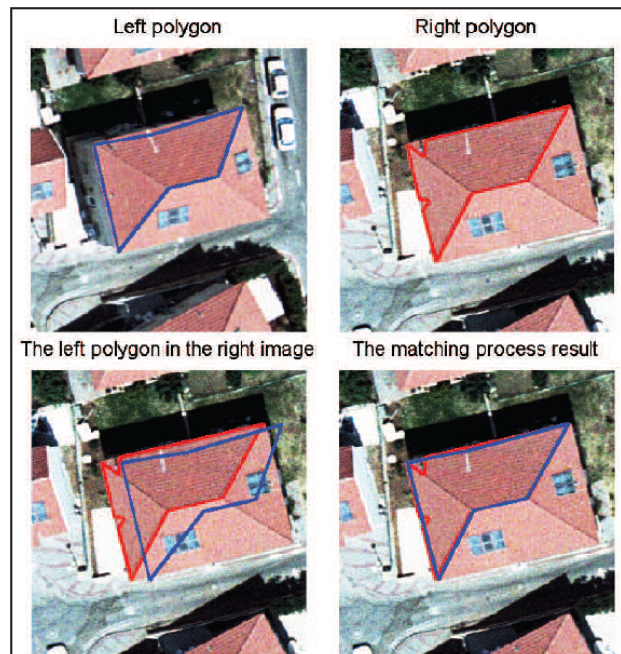


Figure 1. Result of the iterative matching process between the polygons in the right image space

Ex. 1004 at 46 (Figure 1).

After the matching (sliding) process is complete, the Avrahami algorithm generates a single spatial polygon from the left and right polygons, with the extraneous points from the previous step removed. Ex. 1004 at 46 (Section 3.5) (describing the left polygon composed of 6 points, the right polygon composed of 10 points, and extracting a polygon with 5 points). This step does not reflect the claimed “changing” either. First, the removal of extraneous points is completely unrelated to any user input or changing as is required by the claims. Ex. 2008 ¶ 64. As discussed above, the user has no control over where the lines are drawn, and no ability to change the lines once they have been drawn. *Id.* ¶ 38; Ex. 2018 at 31:9–15 (agreeing that the Avrahami algorithm automatically decides where to place

lines). Second, this step concerns reconciling the two line drawings by removing points that do not appear in both drawings, not making a change to a line in one drawing, then making the same ***corresponding*** change in the other, and is completely unrelated to the claim elements at issue. Ex. 2008 ¶¶ 38–40, 64.

And, although Avrahami refers to these steps as “[r]econstructing the 3D roof plane” (Ex. 1004 at 46 (Figure 2)), that simply refers to reconstruction of the real-life roof plane from the physical world as a virtual 3D spatial polygon. Ex. 2008 ¶ 38; Ex. 1004 at 44 (“Due to the complexity of ***automatic reconstruction of 3D reality from aerial images*** (occlusions, image quality, etc.), each method attempts in its own way to minimize the dependency on radiometric parameters of the image.”) No other reconstruction takes place—as there is no disclosure stating that the left and right polygons are altered after they are created. Ex. 2008 ¶ 38. Although extraneous points reflected in the left and right polygons are removed, that is explicitly described as being part of the process for “extract[ing] the ***spatial polygon***,” not modifying the constituent left and right polygons. Ex. 1004 at 46 (Section 3.5); Ex. 2008 ¶ 38, 64.¹

¹ As discussed in Section V.A.1 above, there is no disclosure in Avrahami of the “displaying” elements.

Not only does Avrahami not disclose this limitation, but it expressly teaches away from the methodology of the '737 patent. As stated above, once the algorithm is complete, there is no ability to provide any change to any lines or to otherwise modify the model. Ex. 2017 at 47:8–15. Avrahami also lacks any mention of displaying the changes in line drawings to the user for modification. See Section V.A.1, above. Thus, Avrahami teaches away from the functionality claimed by the '737 patent and fails to provide one of the key benefits of the invention discussed in the specification.

Once again, Petitioner relies exclusively on Avrahami to satisfy this element and has provided no evidence or argument that one of ordinary skill in the art would find it obvious to modify Avrahami to perform this functionality.

4. **Neither Avrahami Nor AppliCad Discloses “generat[ing] and output[ting] a roof estimate report using a report generation engine, wherein the roof estimate report includes numerical values for corresponding slope, area, or lengths of edges of at least some of a plurality of planar roof sections of the roof” (claims 1, 16, and 26)**

a) This limitation is entitled to patentable weight:

The Board's institution decision states that because the detailed and specific requirements of the claimed roof report are printed matter, they are not entitled to weight in the patentability analysis. Paper 14 at 14–16. Respectfully, because this argument was not raised by Petitioner in its Petition, it should not be considered.

In re Magnum Oil Tools Int'l, Ltd., 829 F.3d 1364, 1381 (Fed. Cir. 2016) (“[W]e find no support for the PTO’s position that the Board is free to adopt arguments on behalf of petitioners that could have been, but were not, raised by the petitioner during an IPR.”).

If this issue is nevertheless considered, the limitation of “generating and outputting a roof estimate report,” which includes detailed and specific requirements of the contents of the report, should be given patentable weight under the governing authorities. *In re Gulack*, 703 F.2d 1381, 1385 (Fed. Cir. 1983) (holding that the differences between an invention and the prior art cited against it “cannot be ignored merely because those differences reside in the content of the printed matter”).

“Printed matter is given such weight if the claimed informational content has a functional or structural relation to the substrate.” *In re DiStefano*, 808 F.3d 845, 850 (Fed. Cir. 2015). Here, the test is satisfied. A functional relationship between the claimed report and the underlying method exists because the roof report and its contents are intertwined with, and directly improve the functionality of, the underlying method of roof estimation. As the specification of the ’737 patent confirms, prior to the invention, homeowners would “typically ask several roofing contractors to provide written estimates to repair or replace a roof on a house” by

visiting a home and taking measurements. Ex. 1001 at 1:17–26. However, a variety of factors prevented contractors from timely visiting a home—such as distance, weather, or lack of qualified personnel. *Id.* at 1:28–51. The '737 patent provides the benefit of obviating the need for a visit all-together by improving the accuracy of generating a three-dimensional model of the roof. A three-dimensional model of a roof alone, however, may not be usable by a contractor to generate a roof repair estimate. To fully obtain the benefits of the utility of the three-dimensional model, a roof report is generated to provide the specific values (set forth in the claims) which are needed by the contractor to estimate the roof repair without visiting the site. Ex. 2018 at 49:4–13 (admitting that, without information such as dimensions, area, and slope, a roof report could not be used to estimate repair cost). Likewise, the usefulness of the roof report is improved by a three-dimensional modeling method that provides accurate results. Ex. 2008 ¶¶ 23, 68; Ex. 2018 at 50:14–21 (agreeing that a three-dimensional model is needed to generate a roof report with numerical values for slope, area, and lengths). Indeed, the claimed values in the roof report—which are generated from the three-dimensional model—allow for accurate estimation of the roof repair.

The informational content of the report and types of annotations contained in the report are inexorably linked to the method, as the method allows for those

values to be accurately derived from aerial images. Furthermore, the report improves the method by allowing the user to have an easy to read annotated representation of the three-dimensional model created by the underlying method. These features are critical to the invention of the '737 patent, and far from independent of the system and method used to produce them. *See In re Gulack*, 703 F.2d at 1385 (“[T]he board cannot dissect a claim, excise the printed matter from it, and declare the remaining portion of the mutilated claim to be unpatentable. The claim must be read as a whole.”).

Claims 1, 16, and 26 of the '737 patent are fundamentally different from claims cited by the Board where printed matter was not given patentable weight. *See Manual of Patent Examining Procedure (MPEP) § 2111.05 (Rev. 07.2015)* (“Additionally, where the printed matter and product do not depend upon each other, no functional relationship exists.”). For example, in *In re Ngai*, user instructions included in a chemical kit were not found to have patentable weight because they “in no way depend[] on the kit” and did not “interrelate with the kit.” 367 F.3d 1336, 1339 (Fed. Cir. 2004). In *Ex parte Nehls*, the claim limitation was directed to specific kinds of “SEQ ID NOs” that could be retrieved from a database, but the particular sequence retrieved did not improve the utility or alter

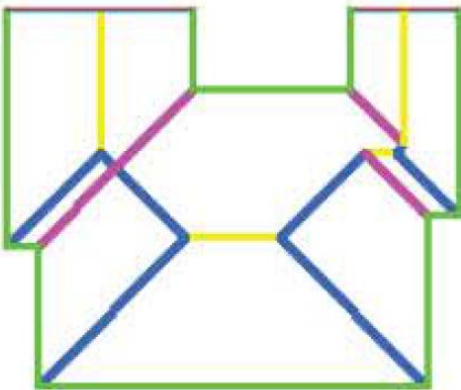
the performance of the underlying method. 88 USPQ2d 1883, 1887–90 (BPAI 2008).

By contrast, for the '737 patent, there is a strong functional, novel relationship between the system that generates the report and the specific contents of the report. Without the roof metrics provided in the claimed roof reports, users of the claimed methods could not estimate the cost of repairs to a roof. This is similar to *Application of Miller*, in which volumetric measurements printed on a measuring cup allowed the functionality of the cup itself to be fully realized. 418 F.2d 1392, 1394 (C.C.P.A. 1969). Similarly, in *In re Gulack*, digits generated by an algorithm and impressed on a band for educational purposes were given patentable weight because they improved the functionality of the underlying band. 703 F.2d at 1385. Here, the point of the underlying method is to produce roof estimation information. There is a strong functional relationship between that method and the contents of the roof report because those contents—i.e., slope, area, and lengths of edges of the roof—are the product of the method, thus improving it by allowing it to be useful for purposes of roof estimation. Because the roof report and underlying method are not independent, the roof report contents should be given patentable weight. See MPEP § 2111.05 (Rev. 07.2015) (“[W]here the claim as a whole is directed [to] conveying a message or meaning to

a human reader **independent of the intended computer system**, and/or the computer-readable medium merely serves as a support for information or data, no functional relationship exists.”).

b) AppliCad does not disclose or suggest this limitation:

Petitioner relies solely on AppliCad for this limitation. See Paper 9 at 18–21. Petitioner points to only one report illustrated in AppliCad for allegedly meeting this claim limitation, but it is missing multiple required elements:

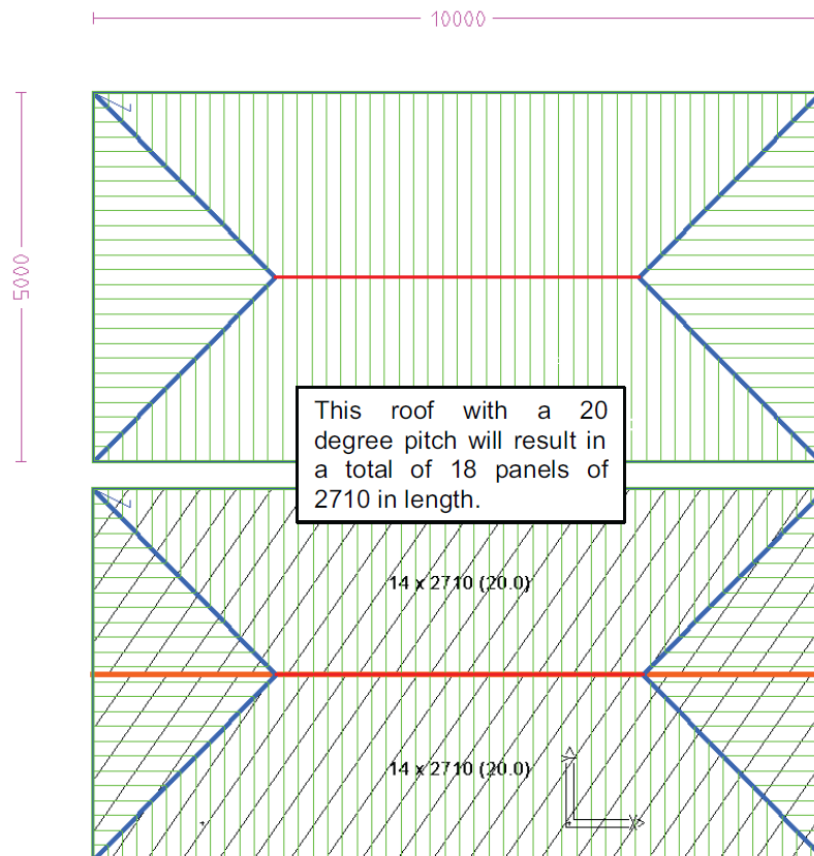
AppliCad Roofing 123 Church St. Hawthorn 03 9810 3100 03 9810 3200 Home 2 A/C/V: Home 1		Date: November 2002 Job no										
Customer: Phone: Mobile: Fax:	Address:	Site address: Builder name: Phone:										
		<table> <tr> <td>Roof Pitch</td> <td>20.0</td> </tr> <tr> <td>Height</td> <td>5.300</td> </tr> <tr> <td>Rafter CTS</td> <td>600</td> </tr> <tr> <td>Eaves</td> <td>0</td> </tr> <tr> <td>Gable Finish</td> <td></td> </tr> </table> For the supply and installation of: Roof K/S 1000 LP-Steel, Galvanised - Paint Ridge BHP Ridge capping, Mountain Blue Fascia Metal fascia, Torres Blue Gutter O Gee Gutter, Ebony Valley Not Included Barge Rake flashing, Offwhite Batten Not Included Insulation Not Included Downpipes Not Included Curved Roof Not Included	Roof Pitch	20.0	Height	5.300	Rafter CTS	600	Eaves	0	Gable Finish	
Roof Pitch	20.0											
Height	5.300											
Rafter CTS	600											
Eaves	0											
Gable Finish												

Ex. 1005 at 40 (hereinafter “AppliCad Report Figure”). First, there are no “numerical values for corresponding slope, area, or lengths of edges of at least some of a plurality of planar roof sections.” Indeed, there is no indication of “area” or “lengths of the edges” at all in this report, or any information from which “area” or “lengths of the edges” could be derived. While “Roof Pitch 20.0” appears in a separate section of the report on the right side (highlighted in yellow above), there is nothing to suggest that this pitch “correspond[s]” to any of the “plurality of planar roof sections,” and, given its location in a separate section, the requirement that the “one or more top plan views” be “annotated” with slope information is not met either. See Ex. 1001 at claims 1, 16, and 26.

Petitioner resorts to relying on two other figures in AppliCad that it contends depict “a top plan view of a roof annotated.” See Paper 9 at 20–21. But both figures include captions in boxes over the diagrams, confirming that these figures are intended to illustrate general roofing principles, and expressly indicated to **not** be included in AppliCad’s alleged roof estimate report. See *id.* Thus, AppliCad teaches away from the claimed invention. See *Tec Air v. Denso Mfg. Michigan Inc.*, 192 F.3d 1353, 1360 (Fed. Cir. 1999).

Moreover, even if they were incorporated into a report, the two figures are missing numerous additional requirements of the claims. The first figure Petitioner

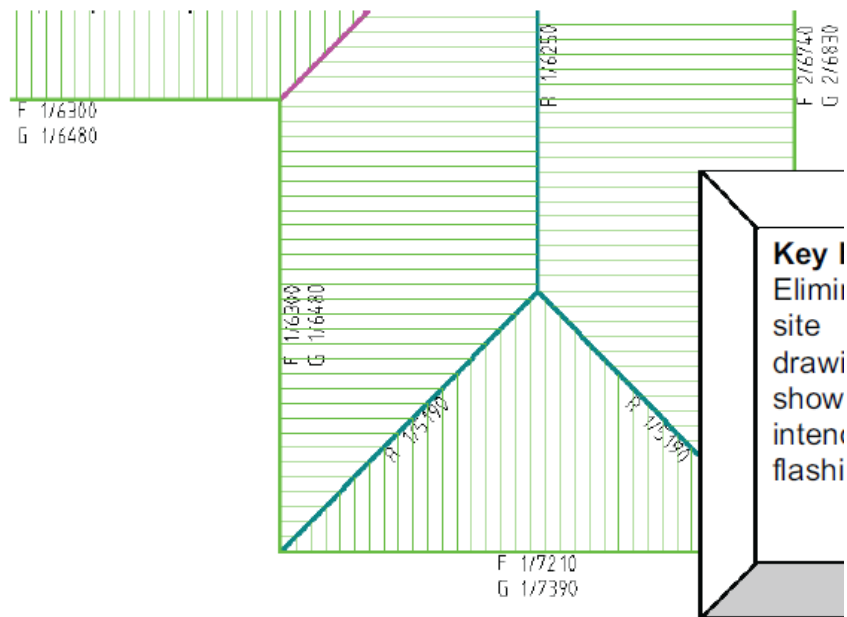
relies on is described as illustrating functionality for “[b]locking the roof to minimize wastage,” but this figure is missing the required “numerical values for corresponding . . . area[] or lengths of the edges of at least some of the plurality of planar roof sections”:



Ex. 1005 at 28 (hereinafter “Roof Blocking Figure”). Although Petitioner relies on the numbers “10000” and “5000” appearing to the top and left sides of the upper rectangle in the Roof Blocking Figure, there is no disclosure in AppliCad that those numbers refer to length. See, e.g., Ex. 1005 at 28–29 (describing the Roof Blocking Figure in terms of the number of roof panels used). And even if those

two numbers did refer to length, at best those values reflect the length of one edge on ***two separate planar roof sections***: one edge of the top and one edge of the side planar roof sections, respectively. *See id.* But the claims require numerical values for more than just one edge of any given planar roof section. *See, e.g.,* Ex. 1001 at claim 26 (requiring “numerical values for corresponding slope, area or lengths of the ***edges*** of at least ***some of the plurality of planar roof sections***”). AppliCad's Roof Blocking Figure does not meet this requirement, by only providing the length of ***a single edge***. Further, there is no indication of “area” of the roof panels in the Roof Blocking Figure, or any information sufficient to derive area. The 5000 and 10000 numbers would at best provide a total roof area, but not the areas of the planar roof sections themselves as required.

The second figure Petitioner relies on similarly illustrates measurements of roofing materials and does not disclose “numerical values for corresponding slope, area, or lengths of the edges of at least some of the plurality of planar roof sections”:



Ex. 1005 at 25 (hereinafter “Flashings Figure”). The roofing materials here are flashings and fall into one of several categories, including ridge caps (designated by an “R”), gutters (designated by a “G”), and fascia (designated by an “F”). See *id.* at 26. The number and length of these flashings are indicated next to the letter designations, e.g., “R 1/5190” is indicative of a single ridge cap with a length of 5190.

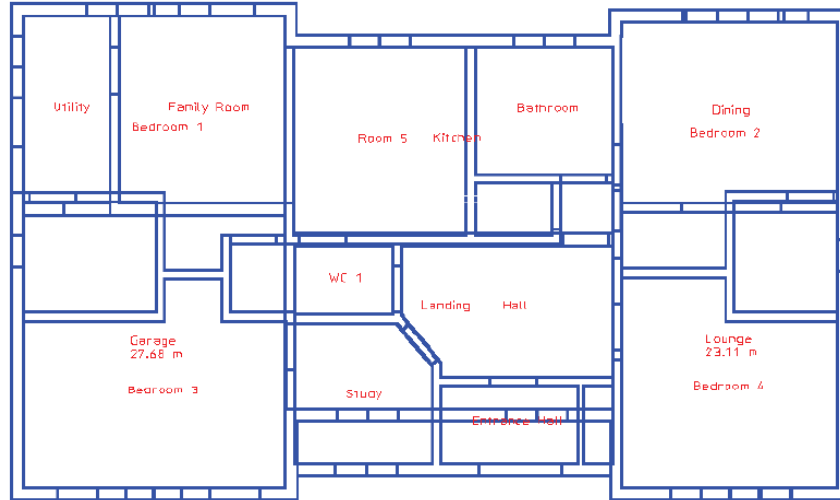
The flashing information here is different from measurements of the actual roof and thus is not any of the “slope, area, or lengths of the edges” of any “planar roof sections.” As an initial matter, the numbers and letters appearing on the Flashings Figure have nothing to do with slope or area. They also are not “lengths of the edges” of any “planar roof sections.” To the contrary, those values reflect

user-specified “Allowances” for the flashings based on availability of flashing material in inventory. *See id.* at 24. Although these flashing lengths are placed on top of or next to the roof figure, they do not describe the lengths of the planar roof sections. *See id.* at 25 (“On the screen, the lengths and sizes *of the flashings* needed will be displayed . . .”).

c) A POSITA Would Not Combine Avrahami and AppliCad:

Finally, a person of ordinary skill in the art would not be motivated to combine Avrahami and AppliCad. Petitioner primarily argues that a person of ordinary skill would combine these references because a three-dimensional model from Avrahami could be imported into AppliCad. Paper 9 at 31–32, 53. But Avrahami and AppliCad are fundamentally incompatible because AppliCad cannot import three-dimensional models. As such, Petitioner has not articulated a reasonable rationale for combining the references with “a reasonable expectation of success.” *Purdue Pharma L.P. v. Depomed*, 643 F. App’x 960, 963 (Fed. Cir. 2016).

Instead, AppliCad only provides for the importation of two-dimensional outlines. Ex. 1005 at 4 (Section 3); Ex. 2008 ¶¶ 46–48, 66. As the AppliCad reference states, “[t]he plan below is an imported CAD drawing”:



Ex. 1005 at 4. Though AppliCad references importing a “.dxf format” file, this does not indicate that it can import three-dimensional models. Ex. 2008 ¶ 66. Instead, after the outline is imported, AppliCad teaches that the user must provide certain information. Ex. 1005 at 4 (“***[A]fter entering the pitch or slope of the roof*** and the eave offset from the wall, the roof is generated . . .”). If AppliCad was capable of importing three-dimensional models, then it would be unnecessary for the user to enter this information. Similarly, the other methods of importing information into the program also confirm that only two-dimensional models can be imported. Ex. 2008 ¶¶ 46–48; Ex. 1005 at 4 (importing an outline from a scanned image or bitmap), 7–8 (the “Track-Outline” requires the user to “enter[] the pitch (or slope), the eave offset and the eave height”).

Petitioner’s argument to combine is at best impermissible hindsight, including because Avrahami and AppliCad are directed to different problems:

Avrahami discloses an algorithm for extracting roof plane polygons from a pair of **aerial images** of a roof of **unknown** measurements, whereas AppliCad discusses generating a roof model using CAD software starting with an existing floor plan and at least some **known** measurements. Ex. 2008 ¶ 67; Ex. 1005 at 3. Neither suggests generating a roof report after a three-dimensional model is created based on a pair of aerial images and then modified to ensure accuracy. *Id.* Petitioner cannot simply recreate that aspect of the invention when neither reference includes any suggestion that such an inventive combination would be advisable. *InTouch Techs. Inc. v. VGO Commc'ns, Inc.*, 751 F.3d 1327, 1351 (Fed. Cir. 2014) (rejecting expert's testimony that relied on the challenged "patent itself as her roadmap for putting what she referred to as pieces of a 'jigsaw puzzle' together."); *Abbott Labs. v. Syntron Bioresearch, Inc.*, 334 F.3d 1343, 1357 (Fed. Cir. 2003) ("To prevent hindsight invalidation of patent claims, **the law requires some teaching, suggestion, or reason** to combine cited references.")

5. **Neither Avrahami Nor AppliCad Discloses "transmitting roof measurement information based at least in part on the change of the line drawing representing a feature of the roof that overlies the first aerial image of the roof" (claim 9)**

Petitioner relies solely on Avrahami for the added limitations of dependent claim 9 and not any other reference. Avrahami does not disclose this limitation.

First, as discussed above in Section V.A.2, Avrahami does not disclose the possibility of changing lines at all, and thus it cannot disclose “transmitting” of roof measurement information based on such a change as required by claim 9.

Second, Avrahami does not generate any “roof measurement information” because it only creates a model in a local coordinate system rather than generating any actual measurements. Ex. 2008 ¶ 72; Ex. 1001 at 2:55–58 (“The roof measurement information may include measurements such as lengths of the edges of sections of the roof, pitches of the sections of the roof, areas of sections of the roof, etc.”). Petitioner conceded that no actual measurements are generated in Avrahami. Paper 9 at 40 (arguing that the local coordinate system in Avrahami “can easily be converted to actual measurements given the parameters of the camera in which the aerial images were taken”).

Third, Avrahami does not disclose the “transmitting” of any measurement information of any kind. According to the '737 patent, the patented system transmits roof measurement information to “third-party systems that generate roof estimate reports based on the provided information.” See Ex. 1001 at 17:12–21, 7:5–8 (“Reports may be transmitted electronically, such as via a network (e.g., as an email, Web page, etc.) or by some shipping mechanism, such as the postal service, a courier service, etc.”). By contrast, Avrahami provides **no** disclosure

that the algorithm or system described therein is capable of transmitting any information to another system or computer. Ex. 2008 ¶¶ 70–71. Even assuming Avrahami creates a 3D roof model within the system, that is the final step in the process. Ex. 1004 at 46; Ex. 2008 ¶ 30; Ex. 2017 at 47:8–15 (Mr. Schuch conceding that creating a three-dimensional model is the last step of the algorithm).

Tellingly, Petitioner cites no portion of the Avrahami that actually discloses the transmission of roof measurement information. Petitioner primarily relies on Avrahami's introductory paragraph, which states that generating 3D city models “requires combination of CAD and GIS systems where the spatial data must be stored in such a way that it can be queried and presented.” Ex. 1004 at 43; Paper 9 at 47. But this paragraph does not describe the system that is the subject of Avrahami, but rather general background on the field, and is thus irrelevant to whether the system described in Avrahami discloses this limitation. Ex. 2008 ¶ 71; *see TRW Auto. US v. Magna Elec., Inc.*, IPR2014-00294, Paper 21 at 4 (PTAB Aug. 27, 2014); *In Re John R. Fritch*, 972 F.2d 1260, 1266 (Fed. Cir. 1992); *Belden Inc. v. Berk-Tek LLC*, 805 F.3d 1064, 1073 (Fed. Cir. 2015). Avrahami is focused on the study of “algorithms for semi-automatic 3D spatial polygon extraction.” Ex. 1004 at 43. The only system that is described in connection with the algorithm disclosed therein is the “MATLAB® environment” used to run the

experiment. *Id.* at 46. However, MATLAB is simply a tool for computational mathematics and is not inherently capable of transmitting roof measurement information. Ex. 2008 ¶ 70.

Petitioner and the Board rely on the discussion in Avrahami of “automatic extraction of the 3D roof in a local coordinate system” (Paper 9 at 47; Ex. 1004 at 46; *see also* Paper 14 at 18), but extracting a 3D roof in a local coordinate system does not constitute “transmission” of roof measurement information. *See* Ex. 1001 at 17:12–21, 7:5–8. Indeed, Petitioner’s expert Mr. Schuch provided no opinion regarding where Avrahami discloses any kind of transmission, much less that extraction is the same as transmitting information. Ex. 1007 ¶¶ 60–65. “Extraction” in Avrahami simply refers to the overall process of generating a 3D model of the roof, not transmitting roof measurement information. Ex. 2008 ¶ 70.

To the contrary, such an expansive definition or application of “transmitting” would conflict with the specification, which discusses that ***after*** a model has been generated, roof measurement information can be transmitted to a third-party. *Id.* at 17:15–21 (“For example, the roof generation engine 813 may transmit roof measurement information based on, or derived from, models stored in the RES data repository 816. Such roof measurement information may be

provided to, for example, third-party systems that generate roof estimate reports based on the provided information.”), *see also* 6:60–7:8.

Petitioner's argument that Figures 4 and 6 of Avrahami show “transmitting roof measurement information on a coordinate graph or plane” (Paper 9 at 47) is also inaccurate. As discussed above, these figures do not show roof measurement information as required by claims 9, and are not even the result of the Avrahami algorithm. Ex. 1004 at 47 (stating that the information necessary to generate the walls and floors is “not included in the input data”). Moreover, there is no indication that any information associated with Figures 4 and 6 are “transmitted” as required by the claims. Ex. 2008 ¶ 70. A person of ordinary skill would not understand output to a display screen to be the same as transmission. *Id.*

6. Neither Avrahami Nor AppliCad Discloses “modifying a three dimensional model of the roof based at least on the modification of the line drawing overlaid on the first aerial image” (claim 25)

Petitioner relies solely on Avrahami for the added limitations of dependent claim 25 and not on any other reference. As set forth in the '737 patent and specification, after changing a line drawing overlaid over aerial images, a three-dimensional model of the roof is **modified**. Ex. 1001 at 3:13–17 (“an operator may review the model for accuracy and possibly make adjustments and/or corrections to the roof model”); 14:46–50 (“[T]he operator can switch between various images of

the building roof 407, ***making refinements to the 3D model by adjusting the wire frame*** in whichever image is more convenient and/or provides a more suitable perspective/view of the model.”).

Avrahami does not teach or suggest this limitation because (1) the Avrahami algorithm builds a three-dimensional model of the ***roof*** only ***once***, at the very end of the process, which is never subsequently modifiable; (2) the steps of Figure 2 within the bracketed “For 1:n” loop do not teach modifying a three dimensional model of a roof, but instead merely address the creation of ***individual roof planes*** that are later assembled to create the roof model, and, which are created only once and are never modified as part of the “1:n” process.

First, Avrahami is fundamentally different from the inventions of the '737 patent because Avrahami teaches generating a three-dimensional model of the roof only ***once, at the very end*** of the process, and includes no disclosure or teaching of subsequently ***modifying*** that model based on a “received indication.” Ex. 2017 at 47:8–15 (Mr. Schuch conceding that creating a three-dimensional model is the last step of the algorithm and no steps occur thereafter). As explicitly set forth in Avrahami, the algorithm of Avrahami has three distinct stages which end with the generation of a three-dimensional model of a roof: (1) initial pointing by the operator to a “seed point”; (2) extraction of individual roof planes; and (3) building

the topology between the individual roof planes in which “the planes are intersected **and the outcome is a 3D roof.**” Ex. 1004 at 46 (further stating the “Figure 2 illustrates a flowchart of the proposed algorithm”); Ex. 2017 at 50:20–25; Ex. 2008 ¶¶ 30, 40. That 3D roof is the first and only three-dimensional roof model disclosed in Avrahami, and the Avrahami algorithm stops at that point. Ex. 2017 at 48:18–23 (Mr. Schuch conceding that the last step of the algorithm is creating a three-dimensional model from individual roof planes). The parties’ experts agree: as both Dr. Bajaj and Petitioner’s own Mr. Schuch confirm, Avrahami makes a single three-dimensional roof model and then **stops**, neither allowing nor disclosing any subsequent modification of that model:

Q: And then once you have that 3D roof model, that is the end of the process, right?

A: In this paper, yes.

Ex. 2017 at 47:13–15; *see also* Ex. 2008 ¶¶ 30, 40, 75.

Indeed, the entirety of the disclosure of Avrahami is directed towards creating this singular roof model, and once that happens, that is the end of the process. The creation of individual spatial polygons are merely intermediary steps on the path to initial creation of the model: as both experts confirm, before this final stage, Avrahami only creates individual spatial polygons **that are not yet part of any model of a roof**. *Id.*; Ex. 2017 at 38:13–19 (Mr. Schuch confirming that a

three-dimensional model is made up of individual roof planes). Indeed, Mr. Schuch critically concedes that these spatial polygons are **not** the claimed three-dimensional model:

Q. Okay. And the spatial polygons, those are inputs along the way to ultimately creating the 3D roof model, correct?

A. Yes.

Q. That's not the 3D roof model, correct?

A. Correct.

Ex. 2017 at 68:23–69:3.

As a result, Avrahami does not disclose “modify[ing] a three-dimensional model of the roof” as required by claim 25 of the '737 patent—indeed, no such three-dimensional model even exists to be modified during the prior steps relied on by Petitioner (and the Board), and there simply is no disclosure in Avrahami of modifying the model once it is generated. See Ex. 1001 at 14:58–62 (“manipulating the wire frame 613 . . . results in corresponding **changes in the underlying 3D model**”).

As discussed in Section V.A.3, above, although Avrahami refers to “[r]econstructing the 3D roof plane” within the “1:n” process (Ex. 1004 at 46), that process does not satisfy this claim element. The “1:n” process begins and ends **before a three-dimensional model is ever created**. This fact is undisputed: the

“1:n” steps incrementally generate individual roof planes that will only later be combined into a three-dimensional roof model. Ex. 1004 at 45–46; Ex. 2008 ¶ 73; Ex. 2017 at 47:8–12 (“Q: And that last box, that last step of the Avrahami algorithm that’s reflected in that final box in Figure 2, that’s when the 3D roof model is created? A: Correct.”). Accordingly, “reconstruction” merely refers to reconstruction of the real-life roof plane from the physical world as a virtual 3D spatial polygon. Ex. 2008 ¶ 38; Ex. 1004 at 44.

Second, although the individual spatial polygons representing roof planes in Avrahami are not, by themselves, a three-dimensional model of a roof, the “1:n” process never modifies the individual spatial polygons either; to the contrary, it merely performs the steps necessary *to create* each constituent spatial polygon, and then stops—no modifications are made. Ex. 2008 ¶¶ 76–78. Indeed, each step in the bracketed loop is carried out only once for each “seed point” selected by the operator to generate a spatial polygon associated with a roof plane, and does not modify any three-dimensional model or modify any individual roof planes. Ex. 2017 at 48:11–18 (Mr. Schuch agreeing that the bracketed steps are performed only once for each “seed point”). Although the process is repeated for different other “seed points,” those “iterations” concern the creation of spatial polygons for other roof planes, and do not constitute “modifications” of the spatial polygons that

were previously generated. Ex. 1004 at 46 (Figure 2); Ex. 2008 ¶¶ 76–78; Ex. 2017 at 48:11–17. Accordingly, Avrahami fails to teach or suggest this limitation.

Once again, Petitioner relies exclusively on Avrahami to satisfy this element and has provided no evidence or argument that one of ordinary skill in the art would find it obvious to modify Avrahami to perform this functionality.

B. Ground 4: The Combination of Avrahami, AppliCad, and Perlant Does Not Render Claim 10 Obvious

The combination of Avrahami and AppliCad does not render obvious claim 1 from which claim 10 depends, and accordingly, the combination of Avrahami, AppliCad, and Perlant cannot render obvious claim 10. Petitioner does not contend that Perlant meets any limitations of claim 1.

Perlant does not teach or suggest “registering, based on the received indication of the point, the aerial image to a reference grid **corresponding** to a **three-dimensional model**” of a roof. Not only is the reference grid utilized by Perlant a two-dimensional reference grid, but there is no corresponding three-dimensional model. The claimed reference grid in '737 patent is a three-dimensional coordinate system (3D) that serves as a common reference for registering two-dimensional (2D) images:

The uniform 3D reference grid is used as a coordinate system for a 3D model of the roof. By registering multiple images to the reference grid, an operator may indicate a roof feature on an image (such as a

roof edge), which may then be translated from the coordinate system of the image to the coordinate system of the reference grid, for purposes of including of the indicated feature in the 3D model.

Ex. 1001 at 9:53–62; *see also* 3:4–8; 9:57–62.

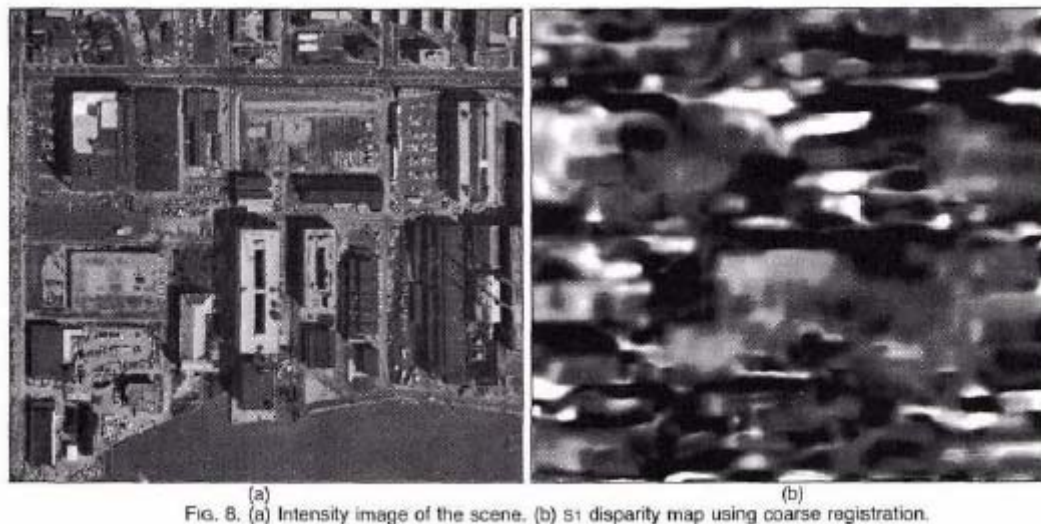
Perlant has no such reference grid because the registration being performed is to simply correlate a point in one 2D image to a point in another 2D image, **not** to any corresponding three-dimensional model of a roof, as explicitly required by claim 10. As confirmed by both side's experts, the portions of Perlant relied upon by Petitioner regard the identification of homologous points in a pair of **2D images**. Ex. 1006 at 481, Figures 4–7; Ex. 2008 ¶ 53; Ex. 2017 at 78:6–10 (“Q. When you're -- when you are talking about a reference grid in connection with Perlant, ***you're talking about the correspondence that's created between points on [sic] first and second image?*** A. ***Correct.***”), 78:16–19 (Mr. Schuch admitting that the registration is done in 2D). However, such “registration” does not involve a grid corresponding to a **three-dimensional** roof model, and is therefore not the type required by claim 10. Ex. 2008 ¶¶ 55, 80; Ex. 1001 at 3:4–8.

Petitioner's reliance on Perlant's “disparity map” to show a “three dimensional model of a roof” is incorrect. Ex. 2008 ¶¶ 55, 80. Indeed, Mr. Schuch confirmed this point:

Q. Is it fair to say that, generally speaking, the disparity maps discussed in Perlant ***do not provide you with a three-dimensional model*** of the buildings?

A. ***That's correct.***

Ex. 2017 at 84:16–20. Although Petitioner points to language regarding a “three-dimensional description” of the scene (Ex. 1006 at 488), that is not a three-dimensional model of a roof of a single building, but rather a description of the ***differences in height*** between different buildings in an image. Ex. 2008 ¶¶ 54, 80; Ex. 2017 at 79:10–15, 82:1–83:1. These differences are depicted as differences in color—brighter spots being closer to the camera than dark ones—in Perlant's “disparity map” figures. Ex. 2008 ¶¶ 55, 80; Ex. 1006 at 489, 490, Figs. 8, 9. For example, Figure 8(b) of Perlant is meant to provide a “disparity map” of relative height of buildings in an aerial image of Figure 8(a):



Ex. 1006, Figure 8; *see also* Figures 9, 10, 11. But these maps do not constitute ***a three-dimensional model of a roof***. Ex. 2008 ¶ 80.

Petitioner also relies on discussion in Perlant of generating a 3D “segmentation” of a roof after the registration process has completed. Ex. 1006 at 490. But that “segmentation” process does not produce a three-dimensional model of a roof, but rather two 2D disparity maps. Ex. 2008 ¶¶ 55, 80; *see* Ex. 1006, Figure 11; Ex. 2017 at 88:4–89:12, 88:18–89:11 (admitting the information in Figure 11 comes from the information used to create Figure 10). Although Mr. Schuch contends that those 2D images could look 3D if viewed by a user through a stereoscope (Ex. 2017 at 88:4–89:11), that is not a three-dimensional model of a roof as required by the claims. Ex. 2008 ¶¶ 55, 80.

Finally, a person of ordinary skill in the art would lack the motivation to combine Avrahami and Perlant because registering the image to a reference grid corresponding to a three-dimensional model would be unnecessary in Avrahami. One advantage of the '737 patent is that it is capable of generating roof reports that are more accurate, in part because the generation of three-dimensional roof models is done through the aid of user-input to ensure better accuracy. Ex. 2008 ¶ 24; Ex. 1001 at 3:13–16, 22:44–49. As discussed above in Section V.A.2., Avrahami does not suggest or teach that a line drawing or model can be changed based on user

input. Accordingly, there would be no reason to register points on the images used in Avrahami to a reference grid with x, y, and z coordinates corresponding to the three-dimensional model. Ex. 2008 ¶ 81. Petitioner and its declarant offer no cognizable justification for combining these references and thus their argument must be rejected. *Purdue*, 643 F. App'x at 963.

VI. EVIDENCE OF OBJECTIVE INDICIA ESTABLISHES NON-OBVIOUSNESS OF INVENTION

Obviousness is a question of law which requires four underlying factual findings: (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 art; and (4) objective indicia of non-obviousness. *See Graham v. John Deer Co. of Kansas City*, 383 U.S. 1, 17-18 (1966). The first three factors have been discussed above. The fourth is now discussed below.

Even where the prior art appears to render an invention obvious, objective indicia of non-obviousness including evidence that inventive aspects of the claimed invention are commercially successful and praised by the industry, can establish that the invention is non-obvious. *Transocean Offshore Deepwater Drilling, Inc. v. Maersk Drilling USA, Inc.*, 699 F.3d 1340, 1349 (Fed. Cir. 2012); *see, e.g., Ecolochem, Inc. v. S. Cal. Edison Co.*, 227 F.3d 1361, 1376-1380 (Fed. Cir. 2000). It is improper to defer consideration of these objective indicia until

after the Board has already made a finding of obviousness, and indeed, when evidence of such indicia are present, it *must* be considered prior to the obviousness determination. *Nike Inc. v. Adidas AG*, 812 F.3d 1326, 1339-40 (Fed. Cir. 2016) (remanding to the Board to consider objective indicia of non-obviousness); *Intri-Plex Techs. Inc. v. Saint-Gobain Performance Plastics Rencol Ltd.*, IPR2014-00309, Paper 83 (PTAB, Mar. 23, 2014) (“Evidence of secondary considerations of non-obviousness, when present, must always be considered en route to a determination of obviousness.” (quotation omitted)). Evidence relating to the objective indicia of non-obviousness may be the most probative evidence in the record. *Id.* (“Evidence of secondary considerations ‘may often be the most probative and cogent evidence of non-obviousness in the record.’”) (quoting *Leo Pharm. Prods., v. Rea*, 726 F.3d 1346, 1358 (Fed. Cir. 2013)).

As Petitioner is aware from the ongoing district court proceedings and Patent Owner's discovery responses in those proceedings, several important objective indicia of non-obviousness apply to the '737 patent claims, including commercial success, long-felt but unsolved needs, industry praise and unexpected results, industry skepticism, and copying. Due to the limited nature of these IPR proceedings, Patent Owner elaborates on only two here: the commercial success of

Patent Owner's Twister and Render House products and the evidence of praise for Patent Owner's invention described in the '737 patent.

While Patent Owner must show sufficient nexus that the indicia of non-obviousness are tied to the novel elements of the claim at issue, the "[o]bjective indicia 'need only be reasonably commensurate with the scope of the claims.'" *Institut Pasteur & Universite Pierre Et Marie Curie v. Focarino*, 738 F. 3d 1337, 1347 (Fed. Cir. 2013) (quoting *Rambus*, 731 F.3d at 1257). Patent Owner is not required to "produce objective evidence of nonobviousness for every potential embodiment of the claim." *Rambus Inc. v. Rea*, 731 F.3d 1248, 1257 (Fed. Cir. 2013). A prima facie nexus is established when the patent owner shows significant sales in a relevant market and that the product sold is the invention claimed in the patent. *In re GPAC Inc.*, 57 F.3d 1573, 1580 (Fed. Cir. 1995); *J.T. Eaton & Co. v. Atlantic Paste & Glue Co.*, 106 F.3d 1571 (Fed. Cir. 1997) ("When a patentee can demonstrate commercial success, usually shown by significant sales in a relevant market, and that the successful product is the invention disclosed and claimed in the patent, it is presumed that the commercial success is due to the patented invention."). As shown below, Patent Owner's Render House and Twister software are the invention disclosed and claimed in the '737 Patent, and has achieved commercial success and praise in the roof estimation market.

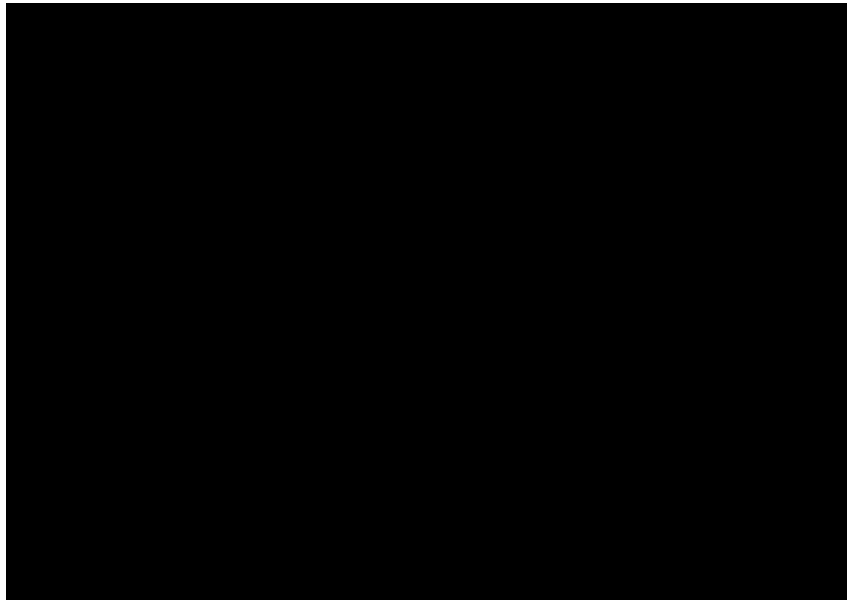
A. Patent Owner's Render House and Twister Products Embody The Claimed Invention Of The '737 Patent

Patent Owner's Render House and Twister products practice at least claims 1, 9, 10, 16, 19, 22, 25-28, 31, and 34-36 of '737 Patent.

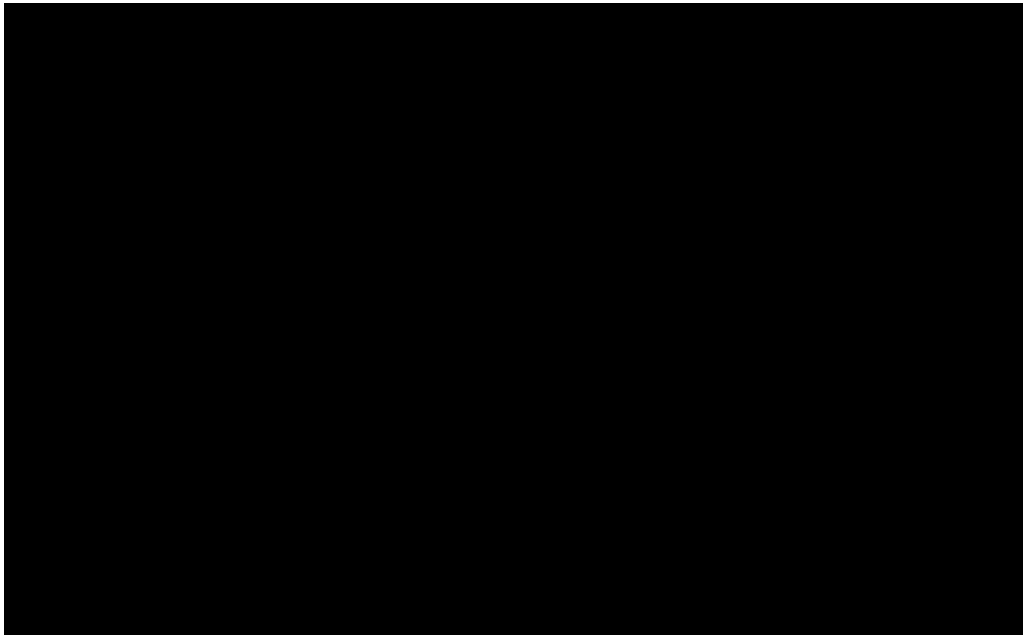
1. Render House And Twister Embody Claim 1 Of The '737 Patent

Render House and Twister embody the computer-implemented method in a roof estimate report system as disclosed and claimed in independent claim 1 of the '737 Patent. Ex. 2030 at 4 [REDACTED]
[REDACTED]
[REDACTED]); Ex. 2007 at 4 [REDACTED]
[REDACTED]
[REDACTED]); Ex. 1001 at claim 1.

As the screenshots below show, Render House and Twister display a plurality of aerial images of a roof at the same time where each image provides a different view of the same roof. Render House and Twister also display line drawings overlying a first and a second aerial image, in which the line drawings have features in common. For example, [REDACTED]
[REDACTED]
[REDACTED]



Ex. 2031 (Bajaj Decl.) ¶ 84 at claim 1.c.



Id.

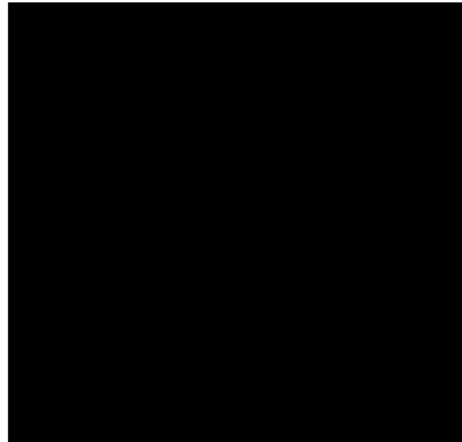
Render House and Twister will change the line drawing overlying the first aerial image in response to a user input. For example, both Render House and

Twister allow [REDACTED]

[REDACTED] *Id.* at claim 1.d. In the screenshots below from Render House, [REDACTED] have been changed in response to user input.”



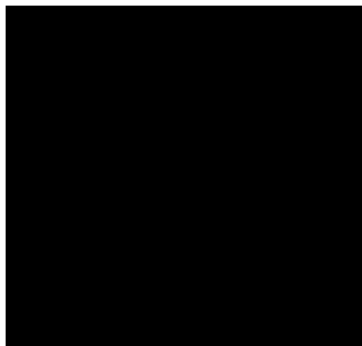
Id. at claim 1.c



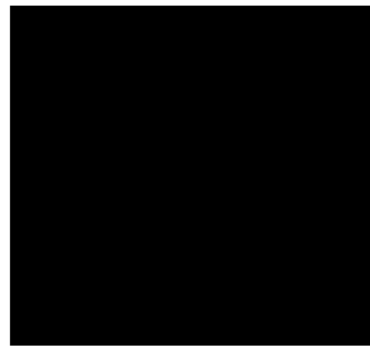
Id. at claim 1.d

Similarly, in the screenshots below from Twister, “[REDACTED]

[REDACTED] has been straightened in response to user input.”



Id. at claim 1.c



Id. at claim 1.d

Render House and Twister make corresponding changes to the line drawings overlying the second aerial images:

Screenshots from Render House

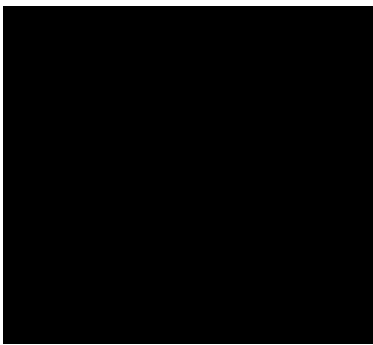


Change to First Aerial Image

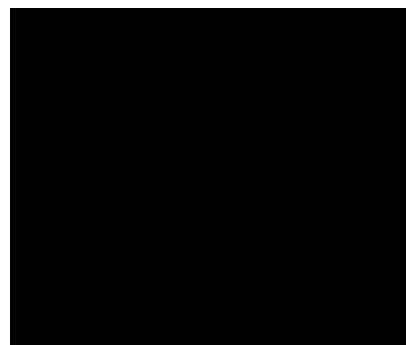


Corresponding Change to Second
Aerial Image

Screenshots from Twister



Change to First Aerial Image



Corresponding Change to Second
Aerial Image

Id. at claim 1.d.

The Render House and Twister products each generate and output roof estimate reports using the House Report tool:



Id. at claim 1.f (example cover page of an Eagle View roof estimate report). The roof estimate reports can include numerical values corresponding to the slope, area, or lengths of edges of at least some of the roof sections:



Id. (example page of roof estimate report showing the area of the roof facets).

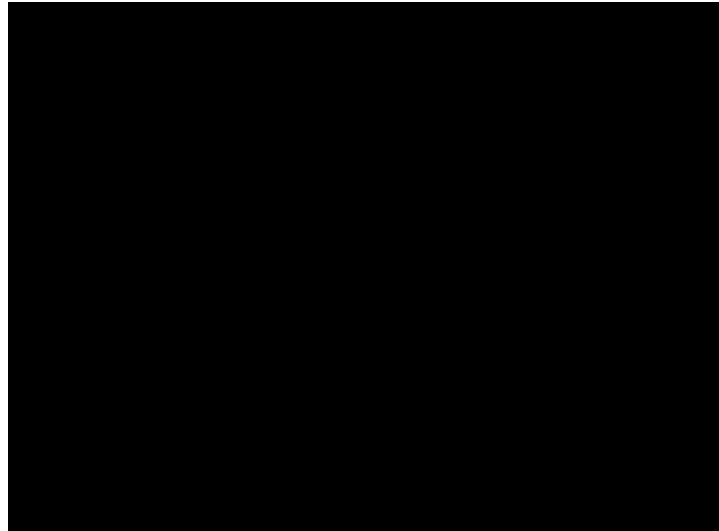
2. Render House And Twister Embody Claim 9 Of The '737 Patent

In addition to embodying the invention of independent claim 1 of the '737 Patent, Render House and Twister also meet the limitations of dependent claim 8 by [REDACTED] when a change is made" as claimed in dependent claim 9 of the '737 Patent. *Id.* at claim 9.

3. Render House And Twister Embody Claim 10 Of The '737 Patent

In addition to embodying the invention of independent claim 1 of the '737 Patent, Render House and Twister also embody the invention claimed in dependent

claim 10 of the '737 Patent. For example, Render House displays a marker indicated 



Id. at claim 10.a (red arrow in the screenshot “shows a visual marker that is moveable by a user”). And Twister similarly displays an operable marker indicated :



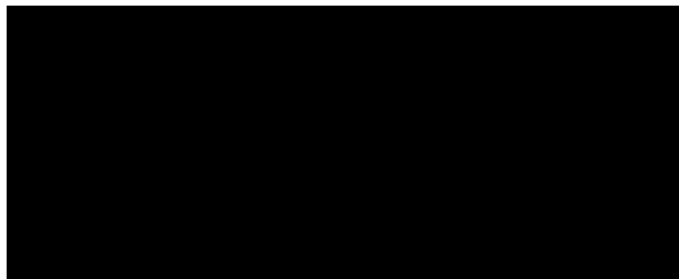
Id. (red arrow in the screenshot “shows a visual marker that is moveable by a user”).

In the screenshots above, the Render House and Twister software receive an indication of the point indicated by the red arrows. *Id.* at claim 10.b (“The red arrows . . . show a point where the Twister and Render House products have received an indication via the marker on the first aerial image.”).

Then, based on the received indication, Render House and Twister register the aerial image to a reference grid corresponding to the three-dimensional model of the roof. The Render House software registers the received indications to a three dimensional roof model.



Ex. 2030 at 23. The Twister software similarly registers the received indications to a three dimensional roof model:



Ex. 2007 at 24 (showing an example of [REDACTED] in the Twister program).

4. Render House And Twister Embody Claim 16 Of The '737 Patent

As explained above with respect to claims 1 and 10 of the '737 Patent, both the Render House and Twister software embody the invention disclosed and claimed in independent claim 16 of the '737 Patent. *See* Section VI.A.1, 3.

5. Render House And Twister Embody Claims 19, 28 And 31 Of The '737 Patent

The Render House and Twister software meet the limitations of dependent claims 19, 28 and 31. As explained above with respect to claim 1, Render House and Twister display roof features in multiple aerial images. See Section VI.A.1.

[REDACTED]

[REDACTED]

[REDACTED] Ex. 2031 ¶ 84 at claim 19.b; *id.* at claim 31 [REDACTED]

[REDACTED]

[REDACTED].

6. Render House And Twister Embody Claim 22 Of The '737 Patent

In addition to embodying the invention of independent claim 16 of the '737 Patent, Render House and Twister also embody the invention of dependent claim 22 of the '737 Patent. *Id.* at claim 22.b ([REDACTED])

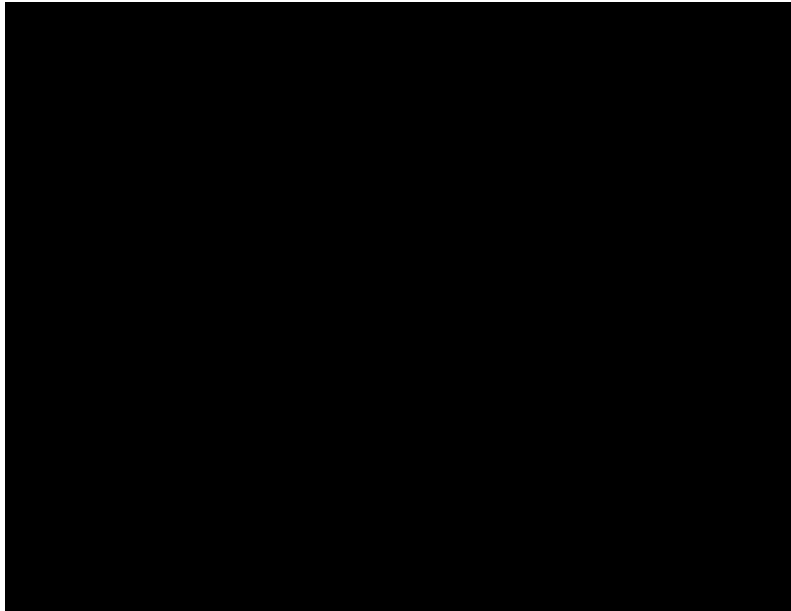
[REDACTED]).

7. Render House And Twister Embody Claim 25 Of The '737 Patent

In addition to embodying the invention of independent claim 16 of the '737 Patent, Render House and Twister also embody the invention claimed in dependent

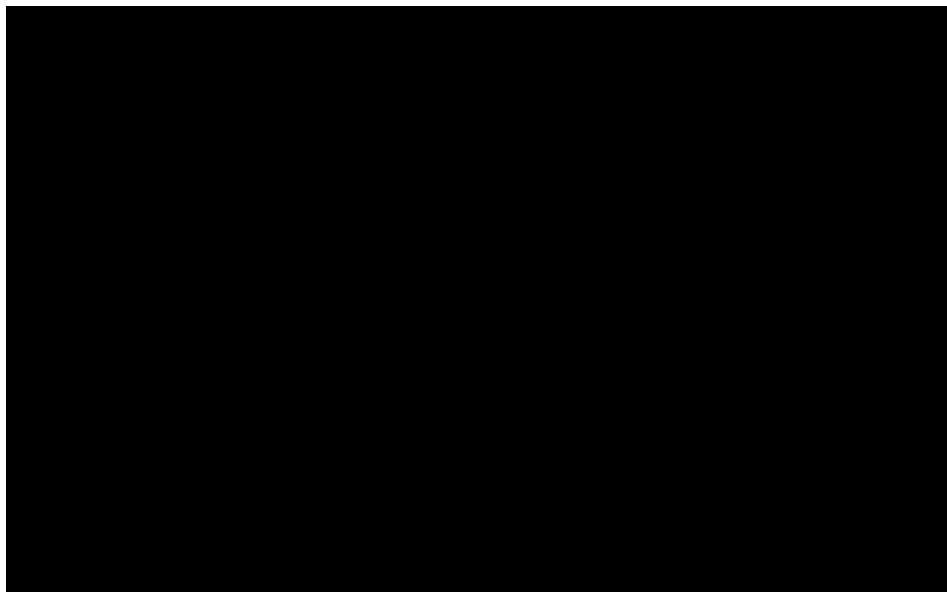
claim 25 of the '737 Patent. For example, Render House modifies [REDACTED]

[REDACTED] of a roof in the below screenshot:



Id. at claim 25 [REDACTED]

[REDACTED]). Twister similarly modifies a three-dimensional model of a roof based on modifications to the line drawing overlaying a first aerial image:



Id. [REDACTED]
[REDACTED].

8. Render House And Twister Embody Claim 26 Of The '737 Patent

As explained above with respect to claims 1 and 10 of the '737 Patent, both the Render House and Twister software embody the invention disclosed and claimed in independent claim 26 of the '737 Patent. See Sections VI.A.1, 3.

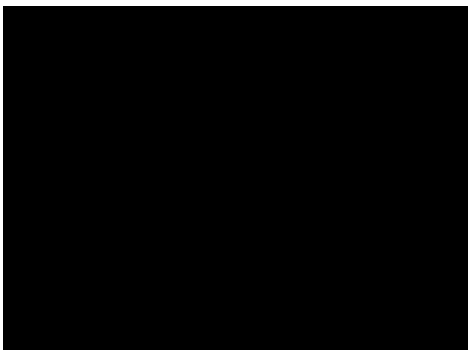
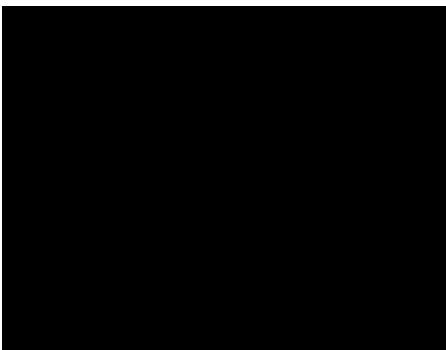
9. Render House And Twister Embody Claim 27 Of The '737 Patent

In addition to embodying the invention of independent claim 26 of the '737 Patent, Render House and Twister also embody the invention disclosed and claimed in dependent claim 27 of the '737 Patent. As shown in the screenshots above, Render House and Twister change lines representing roof features including [REDACTED]. Ex. 2031 ¶ 84 at claim 27 (indicating the screenshots of the Twister and Render House products [REDACTED] [REDACTED]).

10. Render House And Twister Embody Claims 34 and 35 Of The '737 Patent

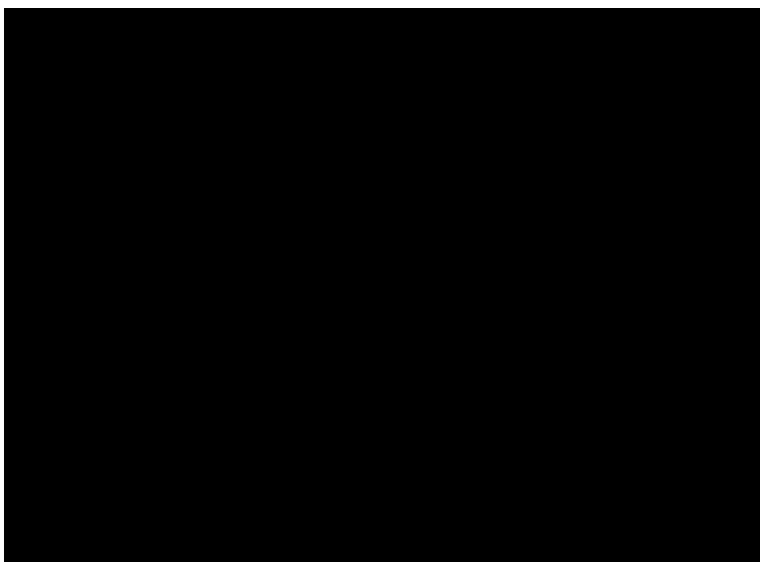
In addition to embodying the invention of independent claim 26 of the '737 Patent, Render House and Twister also embody the invention disclosed and claimed in dependent claims 34 and 35 of the '737 Patent. For example, the

excerpted screenshots below of the Render House and Twister products demonstrate both products display [REDACTED] indicated by the red arrows overlaying and concurrent with a first aerial image with blue line drawings:

	
<i>Id.</i> at claim 35 (Render House)	<i>Id.</i> (Twister)

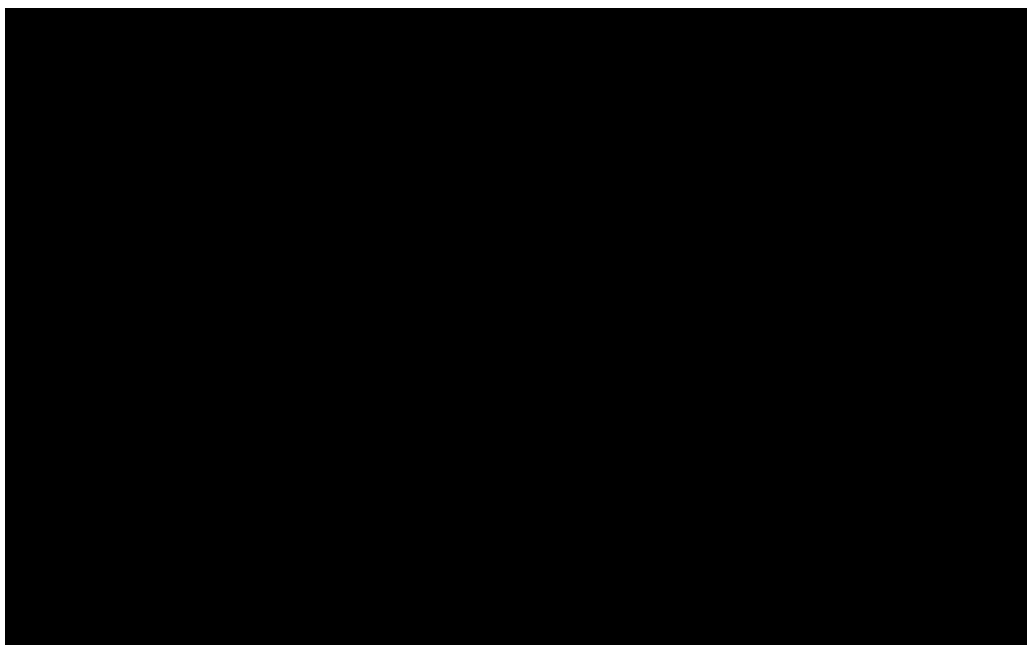
11. Render House And Twister Embody Claim 36 Of The '737 Patent

In addition to embodying the invention of independent claim 26 of the '737 Patent, Render House and Twister also display a wireframe model of the roof in isolation from any images of the roof on the same display as claimed in dependent claim 36 of the '737 Patent. For example Render House and Twister build and display roof models in isolation from the aerial images of the roofs:



Id. at claim 36 (screenshot from Render House displaying 

 isolated from any images).



Id. (screenshot from Twister displaying  isolated from any image).

B. The Render House And Twister Products Have Achieved Significant Commercial Success As A Result Of The Patented Features

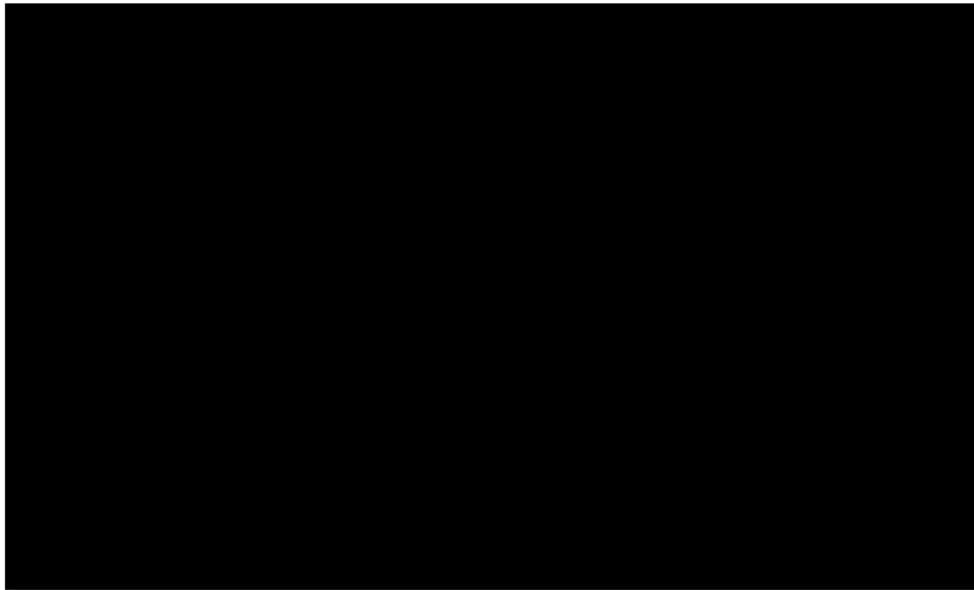
Patent Owner's roof report service used the patented invention to achieve tremendous commercial success by creating accurate roof estimate reports faster and at less expense than previous solutions. Patent Owner pioneered a novel process whereby a user can generate roof estimate reports from complex three-dimensional models based on analysis of particular types of high-resolution aerial photographs and new photogrammetry techniques. The inventiveness of Patent Owner's process generates more consistently accurate roof measurements than could be achieved using older methods. *See, e.g.*, Ex. 2019 at 3 ("We also know the total bottom line number is more accurate so we stand behind that. We don't have to worry that we may have made a mistake on the measurement."); Ex. 2020. Patent Owner's process also saves time and money, and reduces liability and risk to contractors. *See* Ex. 2019; Ex. 2020 (showing a \$617,500 "cost savings" by using EagleView).

Patent Owner's success is directly tied to the patented invention. The Render House and Twister products embody the claimed invention of the '737 Patent to create roof reports that are then transmitted to customers. *See* Section VI.A. Patent Owner first began producing roof reports using its patented invention in 2008. Recognizing the benefits of Patent Owner's technology, Petitioner

Xactware entered a contract with Patent Owner for its roof reports soon after the release of Patent Owner's first product. Ex. 2021 (announcing "a new technology integration" between EagleView and Xactware). Over the next several years, Patent Owner's services achieved rapid growth in sales due to its invention. See, e.g., Ex. 2022 ("EagleView was ranked No. 13 in the software category and No. 133 overall in *Inc. Magazine's* recently released 31st annual Inc. 500. The ranking was determined by the company's three-year revenue growth of 2,406 percent.").

Patent Owner's sales information further demonstrates the commercial success of its invention:²

² Revenue data comes from the gross revenue from roof reports found in Patent Owner's financial records. Exs. 2012 at 3; 2013 at 7; 2014 at 6; 2015 at 12. This revenue reflects sales of roof reports created using Patent Owner's Twister and Render House products. Ex. 2011 (Declaration of C. Johnson).



In 2009 Patent Owner Eagle View sold [REDACTED] roof reports using the patented invention for a total revenue of approximately [REDACTED]. *See* Ex. 2012 at 3. The number of roof reports [REDACTED] in 2015. *See* Ex. 2015 at 12 [REDACTED]. Patent Owner's commercial success from the patented invention has resulted in an increase in revenue over the past seven years of [REDACTED]. *Compare* Ex. 2012 at 3 *with* Ex. 2015 at 12 (calculated growth in revenue from [REDACTED] in 2009 to approximately [REDACTED] in 2015).

Petitioner recognized the commercial success of Patent Owner's invention two years ago when it announced a plan to acquire Patent Owner. *See* Ex. 2023. Petitioner Verisk valued Patent Owner's business at \$650 million. *Id.* The CEO of Petitioner Verisk explained to its investors that this valuation was due to the value

of the Patent Owner's patent portfolio: "Additionally, [Patent Owner] has significant intellectual property, including over 20 issued patents." Ex. 2023 at 3.

Patent Owner's commercial success using its patented invention is strong evidence that Petitioner's obviousness arguments rely on impermissible hindsight analysis. *See e.g., Intri-Plex Tech.*, IPR2014-00309, Paper 83 at 38 ("[T]he commercial success . . . weighs heavily in favor of non-obviousness of the invention."). The core of Patent Owner's business is the novelty and innovativeness of its technology embodying the patented invention. It would not have achieved commercial success or disrupted the roofing and insurance industry had its patented invention been obvious at the time as Petitioner now argues. The patentability of Claims 10, 15, and 25 should be upheld.

C. The Invention Has Been Recognized and Praised By the Roofing and Insurance Industry

Patent Owner created a fundamentally new way of measuring roofs and creating roof reports. Prior to Patent Owner's invention, "[r]oofers once had to spend hours with ladders and tape measures to figure out the size of a job." Ex.2024 at 1. Patent Owner's invention created a new avenue for "determining roof measurement information based on one or more aerial images of a roof of a building." Ex. 1001 at 1:6-11. The roofing measurement industry has taken notice of Patent Owner's invention and uniformly praised its innovativeness.

While the industry was initially skeptical of Patent Owner's new process, it soon became an accepted industry standard. Ex. 2025 at 2 ("When [the inventor] began telling contractors and insurance claims adjusters about his technology, they were skeptical."); *id.* at 1 ("Having an Eagle View report has become an industry accepted standard" (quotation omitted)); Ex. 2026 ("EagleView invented the concept of 3D aerial roof measurements and has quickly become the industry standard in both the roofing and insurance industries."). Experts in the industry now "consider Eagle View's invention the 'greatest technological breakthrough' in the industry." Ex. 2027 at 2; *see also id.* at 1 ("Eagle View made one of the biggest breakthroughs in the history of the industry by creating a state-of-the-art software program that remotely snaps sophisticated aerial pictures of roofs and accurately measures lengths, pitches, valleys and other hard-to-see areas on roofs.").

As explained above, a feature of the patented invention is the increased accuracy of roof measurements by modifying and displaying line drawings overlaid over aerial images of the roof. *See, e.g.*, Ex. 1001 at Claim 1; Ex. 2008 ¶ 23. Not surprisingly, the industry praises the accuracy of Patent Owner's roof reports, which is a direct result of the innovative features. *See* Ex. 2028 (describing Patent Owner Eagle View's reports as "consistent, accurate

measurements every time”); *id.* (explaining that “similar services . . . just don’t compare to EagleView in terms of accuracy . . .”); Ex. 2025 at 2 (“The software also produced **more precise** estimates than workers with tape measurers.”) (emphasis added). Indeed, a survey of Patent Owner’s customers in 2009 found that [REDACTED] praised the [REDACTED] by giving them an [REDACTED] rating. *See* Ex. 2010.

Petitioner’s executives have also touted the benefits of Patent Owner’s technology to its investors by noting that “[a]erial imagery [was] emerging as a disruptive innovation for insurance,” and stating that Patent Owner’s use of imagery for roof estimating was a “killer app.” Ex. 2029 at 12; Ex. 2023 at 16. Petitioner Verisk’s CEO acknowledge Patent Owner’s pioneering work in rooftop aerial measurement technology, describing Patent Owner’s “unique” ability to span two technologies: the “very complex” worlds of 3D imaging, on the one hand, and analytics based on aerial photographs, on the other. *Id.* at 14. He further specifically noted that one of the “special things” about Patent Owner was the “over 20 patents that [Patent Owner] has.” *Id.* at 17. Patent Owner’s uniform praise from the roofing industry, experts, and even Petitioner is strong evidence that Petitioner’s obviousness arguments are without merit.

VII. CONCLUSION

For the reasons discussed herein, Eagle View respectfully requests that the Board deny Petitioner's Petition and upholds the patentability of the challenged claims.

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Respectfully submitted,

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CERTIFICATE OF COMPLIANCE

This Patent Owner's Response complies with the type-volume limitations as mandated by 37 C.F.R. § 42.24, totaling 13,992 words. Counsel has relied upon the word count feature provided by Microsoft Word.

/Gianni Cutri
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CERTIFICATE OF SERVICE

The undersigned hereby certifies that a copy of the foregoing Patent Owner's Responses was served on November 16, 2016, by filing this document through the Patent Review Processing System as well as via email directed to counsel of record for the Petitioner at the following:

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