

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SEABERY NORTH AMERICA, INC.,

Petitioner,

v.

LINCOLN GLOBAL, INC.,

Patent Owner

Case No. IPR2016-00840

U.S. Patent RE45,398

**PATENT OWNER'S NOTICE OF APPEAL
TO THE U.S. COURT OF APPEALS FOR THE FEDERAL CIRCUIT**

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Lincoln Global, Inc.,
Appellant,
v.
Seabery North America, Inc.,
Appellee

**NOTICE OF APPEAL TO THE
U.S. COURT OF APPEALS
FOR THE FEDERAL CIRCUIT
OF FINAL WRITTEN
DECISION OF THE PATENT
TRIAL AND APPEAL BOARD
IN INTER PARTES REVIEW
CASE NO. IPR2016-00840**

Office of the General Counsel
Director of the U.S. Patent & Trademark Office
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450

Pursuant to 35 U.S.C. §§ 141(c), 142, and 319, 37 C.F.R. §§ 90.2(a) and 90.3(a), Rule 4(a) of the Federal Rules of Appellate Procedure, and 28 U.S.C. § 1292(c), Patent Owner Lincoln Global, Inc. hereby appeals to the United States Court of Appeals for the Federal Circuit from the Final Written Decision (Paper 60, Attachment A) entered October 2, 2017 by the Patent Trial and Appeal Board. In particular, Patent Owner identifies the following issues on appeal:

- The Board’s judgment that claims 9–12, 13–31, 33–41, 45–50, 52–62, 66–69, 80–85, 88–92, 95–104, 112–120, 123–127, 130–141, 143–150,

152–162, 164–177, and 179–195 of U.S. Patent No. RE45,398 are unpatentable;

- The Board’s claim constructions; and
- Any Board finding, determination, judgment or order supporting or related to the Final Written Decision and decided adversely to Patent Owner.

Patent Owner is concurrently filing true and correct copies of this Notice of Appeal, along with the required fees, with the United States Court of Appeals for the Federal Circuit, and with the Patent Trial and Appeal Board.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: December 1, 2017

By: /Bridget A. Smith/

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ATTACHMENT A

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SEABERY NORTH AMERICA INC.,
Petitioner,

v.

LINCOLN GLOBAL, INC.
Patent Owner.

Case IPR2016-00840
Patent RE45,398

Before THOMAS L. GIANNETTI, JENNIFER S. BISK, and
JESSICA C. KAISER, *Administrative Patent Judges*.

GIANNETTI, *Administrative Patent Judge*.

FINAL WRITTEN DECISION
35 U.S.C. § 318(a) and 37 C.F.R. § 42.73

I. INTRODUCTION

Seabery North America Inc. (“Petitioner”) filed a Petition pursuant to 35 U.S.C. §§ 311–19 to institute an *inter partes* review of claims all 195 claims of U.S. Patent RE45,398 (Ex. 1001, “the ’398 patent”). Paper 5 (“Petition” or “Pet.”). Lincoln Global, Inc. (“Patent Owner”) filed a preliminary response. Paper 9 (“Prelim. Resp.”). Applying the standard set forth in 35 U.S.C. § 314(a), which requires demonstration of a reasonable likelihood that Petitioner would prevail with respect to at least one challenged claim, we granted Petitioner’s request and instituted an *inter partes* review on 151 of the 195 claims. Paper 11, 32.

Following institution, Patent Owner filed a Response to the Petition (Paper 33, “PO Resp.”) and Petitioner filed a Reply (Paper 42, “Pet. Reply”). In addition, and with our authorization, Patent Owner filed two separate sur-replies directed to specific issues that came up during the trial. Papers 52 and 53. These will be discussed in more detail *infra*.

The extensive record in this case also includes transcripts of several telephonic hearings requested by the Board or the parties. *See* Ex. 1037 (transcript of October 31, 2016 hearing); Ex. 1048 (transcript of November 15, 2016 hearing); Ex. 1049 (transcript of January 9, 2017 hearing); Ex. 1053 (transcript of February 22, 2017 hearing); Ex. 2023 (transcript of May 16, 2017 hearing). In addition, a final oral hearing was held on July 10, 2017. A transcript of that hearing has been entered in the record. Paper 59 (“Hr’g Tr.”)

For the reasons discussed below, Petitioner has shown by a preponderance of the evidence that all representative claims of the ’398 patent are unpatentable. *See infra*. In addition, we determine that by

consent of the parties, the remaining claims in this *inter partes* review stand or fall with those representative claims. Therefore, the remaining claims are also unpatentable.

II. PRELIMINARY MATTERS

A. Representative Claims

Because the trial involved over 150 claims, we ordered the parties to meet and confer “to discuss ways to streamline this proceeding,” including choosing no more than 20 representative claims for trial. Paper 12, 3. If the parties could not agree on representative claims, we authorized the parties to each submit a proposed list of such claims. *Id.* The parties eventually agreed on the following claims of the ’398 patent as representative: claims 9, 12, 14, 23, 24, 33, 52, 81, 89–92, 95, 96, 137–141, and 168. Paper 25, 2. We then ordered the parties each to submit a memorandum “associating each of the . . . representative claims with one or more of the remaining claims of the ’398 patent for which trial was instituted.” *Id.* We clarified this directive by the following explanation:

The Board intends that by ‘associating’ a particular claim with a representative claim, the party agrees that a decision as to the patentability of the representative claim [will] be binding also as to the associated claim.

Id. at 3 n.1

Accordingly, the parties each submitted a memorandum on representative claims, as required by our order. Paper 27 (Patent Owner’s memorandum); Paper 28 (Petitioner’s memorandum). While there was a considerable amount of overlap in the parties’ submissions, for the purpose of this Decision, we adopt Patent Owner’s presentation of representative claims and associated remaining claims. *See infra.* Furthermore, we

acknowledge Patent Owner's representation that Patent Owner "currently believes each representative claim and its associated remaining claims stand or fall together." Paper 27, 1. Patent Owner did not alter this representation in its Patent Owner Response. *See generally* PO Resp.

B. Motion to Exclude

The principal reference relied on by Petitioner against all challenged claims is a thesis authored by Dorin Aiteanu, a Ph.D. candidate at the University of Bremen, Germany. Petitioner contends that the thesis was publicly accessible in March 2006, several years before the March 2010 filing date of the application for the '398 patent. Petitioner relies mainly on the testimony of Dr. Axel Graeser, who was on the faculty of the University of Bremen and supervised Aiteanu's thesis.

Patent Owner's motion does not seek to exclude the thesis itself. Instead, Patent Owner contests Petitioner's proofs that the Aiteanu thesis qualifies as a printed publication under 35 U.S.C. § 102(b). *See* discussion *infra*. Thus, Patent Owner's motion to exclude evidence (Paper 49) narrowly focuses on certain testimony about the thesis from Dr. Graeser, and on certain dates appearing on Exhibit 1003, one of the copies of the Aiteanu thesis submitted by Petitioner.¹

Although not entirely clear from Patent Owner's motion, it appears Patent Owner objects to Dr. Graeser's use in his testimony of the terms

¹ Petitioner has introduced three copies of the Aiteanu thesis: Exhibits 1003 and 1019 (submitted with the Petition) and Exhibit 1050 (introduced during the trial). The minor differences between the copies are discussed *infra*.

“publish” or “published” in reference to the thesis, on the ground that it constitutes “unqualified expert testimony.” Paper 49, 1; Paper 56, 1. Thus, Patent Owner seeks to exclude certain statements from Dr. Graeser’s declaration that Patent Owner contends contains “publication date assertions” or alleged “legal conclusions” as to when the thesis was published. Paper 49, 1–2; Paper 56, 1–2. Petitioner responds that Dr. Graeser’s testimony “is factual, not an expert opinion.” Paper 55, 2.

We deny Patent Owner’s motion to exclude this testimony. We do not understand Dr. Graeser’s testimony to be expressing an expert opinion on this issue. Thus, Rules 702 and 703 of the Federal Rules of Evidence, cited by Patent Owner, are inapplicable. Rather, we determine that Dr. Graeser has demonstrated personal knowledge of the matter and is therefore competent to present factual testimony on the public accessibility of the Aiteanu thesis under Rules 601 and 602 of the Federal Rules of Evidence.

Likewise, we deny Patent Owner’s motion to exclude certain dates appearing in Exhibit 1003. Patent Owner contends that the dates are “inadmissible hearsay.” Paper 49, 2. Petitioner responds that the dates are not hearsay, and, alternatively, that a hearsay exception (the business records exception of Rule 803(6) or, alternatively, the “residual” exception of Rule 803) applies. Paper 55, 21–22.

As Petitioner points out, other panels of the Board have admitted such dates over hearsay objections. *See* Paper 55, 19–20. We agree with the view that the dates are not hearsay because they are not assertions. We, therefore, deny Patent Owner’s motion to exclude these dates. We are supported in this by cases such as *United States v. Snow*, 517 F.2d 441, 445 (9th Cir. 1975), where a red tape bearing the defendant’s name affixed to a

briefcase where a gun was found was admitted as circumstantial evidence that the defendant possessed the weapon. To the same effect are *United States v. Koch*, 625 F.3d 470, 480 (8th Cir. 2010) (computer flash drive with manufacturer’s label “China” not inadmissible hearsay to prove place of manufacture); and *United States v. Bowling*, 32 F.3d 326, 328 (8th Cir. 1994) (manufacturer’s name stamped on firearm not hearsay). We are persuaded by these cases that dates appearing in Exhibit 1003, like the examples in those cases, are circumstantial evidence of publication and not assertions that publication occurred on a date certain. We, therefore, overrule the objection and admit the dates for this purpose.²

C. Status of the Aiteanu Thesis As Prior Art

i. Background

A substantial portion of the record in this case is occupied by Patent Owner’s challenge to the public accessibility of the Aiteanu thesis. This challenge has been the subject of numerous filings, conferences, and other communications with the Board. *E.g.*, Paper 16; Paper 20; Paper 23; Paper 26; Paper 31; Paper 34, Paper 35, Paper 37; Paper 40; Paper 53; Ex. 1037; Ex. 1051; Ex. 1047; Ex. 1049; Ex. 1052; Ex. 1034; Ex. 1038; Ex. 1039; Ex. 1040; Ex. 1047; Ex. 2016.

To establish the thesis as prior art, Petitioner initially proffered, with the Petition, the declaration testimony of Dr. Axel Graeser, Aiteanu’s thesis

² We would, in any case, determine that the “residual exception” of Federal Rule of Evidence 807 applies, for the reasons advanced by Petitioner. *See* Paper 55, 21–23.

advisor at the University of Bremen. Pet. 5–6; Ex. 1002. Dr. Graeser testifies to the public availability of the thesis at the University’s library. Ex. 1002 ¶ 65. Dr. Graeser supports his testimony with documentary exhibits. Exs. 1004, 1018. In our Institution Decision (Paper 11), we concluded that the Petition had made a sufficient showing on this issue and, on October 6, 2016, instituted *inter partes* review based on the Aiteanu thesis:

We have considered this argument in light of Dr. Graeser’s testimony and are persuaded that, at this stage, Petitioner has made a sufficient showing that Aiteanu qualifies as a printed publication that is prior art to the ’398 patent. . . . We, therefore, cannot agree with Patent Owner that there is “no evidence” that Aiteanu is a prior art printed publication or that it was publicly accessible as of March 2006. To the contrary, on this record and at this stage, we conclude Petitioner has demonstrated sufficiently that Aiteanu qualifies as a printed publication that is prior art to the ’398 patent.

Paper 11, 7–8.

After institution, on October 21, 2016, Patent Owner filed objections to the thesis itself, as well as the exhibits relied on by Dr. Graeser to establish public availability of the thesis. Paper 14. Shortly thereafter, Petitioner contacted the Board seeking an extension of the deadline for serving supplemental evidence in response to Patent Owner’s objections. *See* 37 C.F.R. § 42.64(b)(2).

A conference with the Board and the parties to discuss the matter took place on October 31, 2016. The Board expressed concern with the nature of the evidentiary objections filed by Patent Owner as well as those filed by Petitioner, and ordered them to meet and confer and refile their objections in ten days. Paper 16; Ex. 1037, 5:5–22. In accordance with that Order, Patent

Owner filed revised evidentiary objections on November 10, 2016. Paper 20. Patent Owner continued to object to the Aiteanu thesis, but now limited its objections to certain “annotations” (i.e., yellow highlighting added by Petitioner) to the document under Rules 1002 and 1003 of the Federal Rules of Evidence, and as hearsay under Rule 802, but only “as to the alleged publication dates of the exhibits.” *Id.* at 1–3.

Patent Owner also objected to Dr. Graeser’s testimony under Federal Rule of Evidence 702, but “only to those portions of the declarant’s testimony related to the prior art status of the references on which [Petitioner] relies, including, for example, the declarant’s assertions that certain references were ‘published’ or ‘available’ under U.S. patent law on or before a certain date.” *Id.* at 2.

On November 24, 2016, Petitioner contacted the Board to request additional time to provide supplemental evidence in response to Patent Owner’s revised objections. Ex. 1051. Petitioner stated that, in response to Patent Owner’s objections to certain exhibits, Dr. Graeser was preparing a declaration and would be available for cross-examination by Patent Owner on December 15, 2016. Paper 26. Patent Owner opposed the extension. The Board granted the request and extended the due date to December 23, 2016. *Id.*

On December 22, 2016, as requested by the Board, the parties filed a joint status report after meeting and conferring on the objections. Paper 31. The report indicated that in response to Patent Owner’s objections to the Aiteanu thesis, Petitioner had served supplemental evidence relating to the public accessibility of the thesis. *Id.* at 2. The report indicated also that

notwithstanding the supplemental evidence, Patent Owner was maintaining its evidentiary objection. *Id.* at 3–5.

In January 2017, Petitioner requested leave to move “to file its previously served evidence regarding the Aiteanu dissertation^[3], however that evidence is characterized (e.g., as supplemental evidence or supplemental information).” Ex. 1052. Petitioner represented that it had conferred with Patent Owner, and that Patent Owner opposed the request. *Id.* The Board authorized Petitioner to file a motion under 37 C.F.R. § 42.123 for leave to file supplemental information relating to the issue of whether the Aiteanu dissertation qualifies as a printed publication. Paper 34.

The evidence included a supplemental declaration of Dr. Graeser (Ex. 1047), a copy of the Aiteanu dissertation made available at Dr. Graeser’s deposition (Ex. 1050), a shelving record from the Bremen University Library (Ex. 1035), a “screen grab” of that library’s on-line search page (Ex. 1036), Dr. Graeser’s photographs of the shelved Aiteanu dissertation (Ex. 1039), and the library’s circulation record for the dissertation (Ex. 1040).

ii. Patent Owner’s “Prima Facie Case” Argument

On March 15, 2017, the Board granted Petitioner’s motion and authorized Petitioner to file the exhibits. Paper 40. In granting the motion, we determined that Petitioner met all the requirements of 37 C.F.R. § 42.123(b). In reaching this conclusion, we considered Patent Owner’s

³ In describing the Aiteanu reference, the parties use “thesis” and “dissertation” interchangeably. As Dr. Graeser explains, the difference is that “thesis” applies during the work, while “dissertation” refers to the finished work. Ex. 2015, 17:13–15.

arguments in opposition and found them unconvincing. Specifically, we were not persuaded by Patent Owner’s argument that establishing Aiteanu as a reference is part of Petitioner’s “prima facie case.” *Id.* at 4. According to Patent Owner, Petitioner cannot submit new evidence in response to Patent Owner’s challenge to Aiteanu as prior art because Petitioner’s “case-in-chief is now closed.” *Id.* at 3. Further, Patent Owner asserted that whether a document is a printed publication relates to its sufficiency as evidence, not its admissibility under the Federal Rules of Evidence. *Id.* at 5.

We disagreed with this “prima facie case” argument. Under the AIA statute, as a threshold showing for whether to institute *inter partes* review, the Board must determine that the petition shows “there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” 35 U.S.C. § 314(a). Our rules implementing the statute contain similar language. *See* 37 C.F.R. § 42.108(c) (requiring “a reasonable likelihood that at least one of the claims challenged in the petition is unpatentable.”). In instituting this proceeding, we considered the proofs proffered by Petitioner, including its showing that the Aiteanu thesis qualifies as prior art, and determined that this standard was met. Paper 11, 7–8.

Moreover, the Federal Circuit has said that once trial is instituted, a petitioner is permitted to supplement the record. As the Court observed in *Genzyme Therapeutic Prods. Ltd. P’ship v. Biomarin Pharm. Inc.*, 825 F.3d 1360, 1367 (Fed. Cir. 2016): “The purpose of the trial in an *inter partes* review proceeding is to give the parties an opportunity to build a record by introducing evidence—not simply to weigh evidence of which the Board is already aware.” If the situation were otherwise, 37 C.F.R. § 42.123 would

be useless to petitioners. As noted above, after the supplemental evidence was submitted, we granted Patent Owner leave to file a sur-reply directed to the printed publication issue. *See infra*.

iii. Patent Owner's Sur-Reply

We authorized Patent Owner to file a sur-reply directed to the public accessibility of the Aiteanu reference. Paper 53. Patent Owner's sur-reply focuses its argument on Exhibit 1003, a copy of the Aiteanu thesis submitted with the Petition, and presents a variation of its rejected "prima facie case" argument. Patent Owner now contends that Petitioner "tries to pull a switcheroo." *Id.* at 1. According to Patent Owner:

Exhibit 1003 anchors all instituted grounds. For purposes of instituting trial, the Board credited Dr. Graeser's testimony that Exhibit 1003 was available as prior art. After Dr. Graeser's deposition, however, it became apparent Exhibit 1003 was never published.

Id. Patent Owner further asserts:

[Petitioner's Reply] conflates Exhibits 1003, 1018, and 1050, referring to them collectively as "Aiteanu," to muddy the distinction between them. To be clear: they embody different documents. The Federal Rules of Evidence do not allow Petitioner to swap one reference for another in the instituted grounds.

Id. We are not persuaded by this argument.

As noted above, three copies of the Aiteanu thesis have been entered in the record. The first and second, Exhibits 1003 and 1018, were submitted with the Petition. Dr. Graeser's testimony established that the version that is Exhibit 1003 is his personal copy of the thesis given to Dr. Aiteanu's Ph.D. examination committee. Ex. 2015 ("Graeser Dep.") 28:21–24. His testimony further explains that the bound book version produced at his

deposition (Ex. 1050) was the copy of the thesis provided to the Bremen University library.

Q All right. So let me -- let me just state this concisely. So the book [Ex. 1050] that is -- has the red band on the front --

A Yeah.

Q -- the physical exhibit, was a document that was given to the library?

A Yeah.

Q All right. And Exhibit 1003, without the highlighting, was given to the author's examination committee and Ph.D. committee, correct?

A Yeah.

Id. at 28:13–24. Also, according to Dr. Graeser, Exhibit 1018 represents an electronic version of the thesis available for sale. Ex. 1047 (“Graeser Supp. Decl.”) ¶ 10.

According to Patent Owner’s theory, these three copies “embody different documents.” Paper 53, 1. We do not agree. While there are minor formatting differences, there is no dispute that the text of the thesis does not change. Thus, the only differences Patent Owner identifies relate to the introductory pages and not to the thesis itself. Patent Owner states: “For example, pages 4 and 5 of Exhibit 1050 are not in Exhibit 1003.” *Id.* The so-called “missing” pages are not part of the thesis. They are introductory pages added by the book’s publisher, Shaker Verlag. Likewise the differences between Exhibits 1018 and 1003 and Exhibits 1050 and 1018 identified by Patent Owner are minor and do not involve the thesis itself: “For example, page 4 of Exhibit 1050 refers to ‘Band 6.1’ and includes a sub-title; Page 3 of Exhibit 1018 refers to ‘Series 6-Nr.1’ and does not

include a sub-title.” Paper 53, 2. Dr. Graeser testifies that the subtitle was added by the publisher. Graeser Dep. 97:23–98:25.

iv. Patent Owner’s Rule 1003 Argument

Patent Owner’s argument based on Rule 1003 of the Federal Rules of Evidence is misplaced. That rule permits the admissibility of duplicates “unless a genuine question is raised about the original’s authenticity.” We do not understand Petitioner or Patent Owner to be asserting that the three documents are exact duplicates. Nor is there any question about their authenticity. Therefore, we do not find Rule 1003 to be applicable.

We note, however, that there is no dispute that the text of the thesis is the same in each of the documents.

v. Public Accessibility of Aiteanu

Finally, having reviewed the procedural history of this dispute, we consider the merits of Petitioner’s argument that the Aiteanu thesis was publicly accessible. In the leading case of *In re Hall*, 781 F.2d 897 (Fed. Cir. 1986), the Federal Circuit considered what evidence is necessary to support the conclusion that a doctoral thesis qualifies as a printed publication. The Federal Circuit set the following standard:

The proponent of the publication bar must show that prior to the critical date the reference was sufficiently accessible, at least to the public interested in the art, so that such a one by examining the reference could make the claimed invention without further research or experimentation.

781 F.2d at 899.

The record before the Federal Circuit in *Hall* indicated that the author of the thesis (Foldi) submitted his dissertation to the chemistry department at Freiburg University, in Germany, and was awarded a doctorate degree more

than one year before the critical date. *Id.* at 897. The University provided evidence that the Foldi dissertation was received by the library before the critical date, and that such dissertations are indexed in a special catalogue and set apart in the stacks. *Id.* at 897–98. In addition, the University provided evidence as to the date the dissertation was “most probably available for general use” based on general library practice. *Id.* at 898.

The appellant in *Hall* challenged this evidence as insufficient to show that the dissertation was properly catalogued prior to the critical date. *Id.* Distinguishing the CCPA’s decision in *In re Bayer*, 568 F.2d 1357 (CCPA 1978), the Federal Circuit concluded that the evidence from the University was sufficient:

But the court [in *Bayer*] did not hold, as appellant would have it, that accessibility can only be shown by evidence establishing a *specific* date of cataloging and shelving before the critical date. While such evidence would be desirable, in lending greater certainty to the accessibility determination, the realities of routine business practice counsel against requiring such evidence. The probative value of routine business practice to show the performance of a specific act has long been recognized. . . . Therefore, we conclude that competent evidence of the general library practice may be relied upon to establish an approximate time when a thesis became accessible.

781 F.2d at 899.

The decision in *Hall* is further explained in *In re Klopfenstein*, 380 F.3d 1345 (Fed. Cir. 2004). In *Klopfenstein*, the alleged printed publication was a printed slide presentation displayed continuously for two and a half days at a professional society meeting. 380 F.3d at 1347. The Federal Circuit rejected the argument that distribution and indexing was a requirement for a printed publication under *Hall* and other cases:

In *Hall*, this court determined that a thesis filed and indexed in a university library did count as a “printed publication.” . . . But the court in *Hall* did not rest its holding merely on the indexing of the thesis in question. Instead, it used indexing as a factor in determining “public accessibility.”

386 F.3d at 1349.

To the same effect is *In re Lister*, 583 F.3d 1307 (Fed Cir 2009):

While cataloging and indexing have played a significant role in our cases involving library references, we have explained that neither cataloging nor indexing is a necessary condition for a reference to be publicly accessible. . . . Depending on the circumstances surrounding the disclosure, a variety of factors may be useful in determining whether a reference was publicly accessible.

583 F.3d at 1312.⁴

We begin our analysis by summarizing the record presented by Petitioner. Petitioner relies on the following evidence.

Dr. Axel Graeser is Petitioner’s principal witness on this issue. In his initial declaration, Dr. Graeser testifies that Aiteanu’s thesis was supervised by him at the University of Bremen. Graeser Decl. ¶ 65. He testifies that according to the rules at that time, Aiteanu’s dissertation had to be deposited in the University’s library for Aiteanu to receive his Ph.D. *Id.* He further testifies that he confirmed the dissertation was deposited and thereafter available for retrieval by the public on March 3, 2006. *Id.* He testifies also

⁴ The same rule applies to the electronic format of the Aiteanu thesis (Ex. 1018). *See Voter Verified, Inc. v. Premier Election Solutions, Inc.*, 698 F.3d 1374 (Fed. Cir. 2012) (“Thus, while often relevant to public accessibility, evidence of indexing is not an absolute prerequisite to establishing online references . . . as printed publications within the prior art.”).

that the work is indexed in the national library system at www.dnb.ddb.de.

Id. He testifies that a reprint of the dissertation (Ex. 1018) bears a copyright and publication date and portions and excerpts based on the dissertation were published elsewhere. *Id.*

In his supplemental declaration, Dr. Graeser confirms that he had reviewed shelving records at the University's library (Ex. 1034) that confirm his testimony. He explains the differences in the title in the library shelving record and the dissertation published by Shaker Verlag in book format. He explains that the "subtitle" in the book format "comes from the format for the book series by the publisher, which is why it is not part of the dissertation title." Ex. 1047 ("Graeser Supp. Decl.") ¶ 5.

He testifies that three copies of the thesis are available in the Bremen University library. *Id.* ¶ 6. He has visited the library and provided a screen shot of the library's online catalog (Ex. 1038). The screen shot shows the three copies of the thesis and a date of 2006. *Id.* Dr. Graeser has also reviewed the library check-out history and determined one of the copies was first checked out in May 2006. *Id.* ¶ 9; Ex. 1040. He also testifies that the German national library system catalogues doctoral dissertations, and that German procedures require such dissertations to be deposited with the university library where they are catalogued into the national system. Graeser Supp. Decl. ¶ 10.

Dr. Graeser further testifies: "The shelving record shows that practice was followed in this case, and indeed Dorin Aiteanu would not have been able to receive his degree if it had not been followed." *Id.* Further, he testifies that such dissertations are then "formally published" including being assigned an ISBN identifier, and electronic copies are available for sale –

this is what Exhibit 1018 represents.” *Id.* He testifies to having been a professor at the University of Bremen since well before the Aiteanu thesis was published, and a user of the University’s library since 1994. *Id.* ¶ 11.

Dr. Graeser checked out a copy of the dissertation from the library and brought it to his deposition on December 15, 2016. *Id.* ¶ 12. At his deposition, on cross-examination by Patent Owner’s counsel, Dr. Graeser confirmed his declaration testimony that to receive his Ph.D., Aiteanu had to submit copies of his thesis to the library. Graeser Dep. 20:10–16. He confirmed that the book format (Ex. 1050) was given to the library. *Id.* at 28:15–20. On redirect, he confirmed that there are no differences in substance among the three formats. *Id.* at 97:2–5. And he again explained the reason a subtitle appears in the book format. *Id.* at 97:23–98:19.

Finally, Petitioner points to “collateral evidence” of publication in 2006, including the shelving, checkout, and online catalogue evidence relied on by Dr. Graeser and made available to Patent Owner, as well as the selection of Shaker Verlag as the publisher of and the citation of the TEREBES project, which gave rise to Aiteanu’s work, in a 2004 article by Patent Owner’s expert, Mr. Fast. Ex. 1016, 7.

We find that this record establishes by a preponderance of the evidence that the Aiteanu thesis was accessible to the public more than a year before the March 2010 filing date of the ’398 patent. We find Dr. Graeser’s testimony to be credible and properly based on his personal knowledge of library practices regarding publication of Ph.D. theses at the university where he is employed. On cross-examination, Patent Owner’s counsel did not effectively challenge Dr. Graeser’s credibility or his personal knowledge of the relevant facts. Instead, counsel focused on the differences

between Exhibit 1003 and the other formats of the Aiteanu thesis. Graeser Dep. 24:14–27:18. For the reasons discussed *supra*, we do not find these differences in format to be significant.

At the same time, on cross-examination, Dr. Graeser provided further support for his conclusions. *Id.* at 17:18–20:12. Thus, we find that based on the record summarized above, the Aiteanu thesis was deposited with and shelved by the Bremen University library, was published in book form by Shaker Verlag, and appeared in the library’s on-line catalog, all well before the critical date.

Patent Owner’s sur-reply contends there is “no proof of public accessibility of Exhibits 1003, 1018, or 1050.” Paper 53, 2. We disagree. At the outset, we reject Patent Owner’s framing of the issue as whether Exhibit 1003, per se, was publicly accessible before the critical date. *Id.* The issue of whether the Aiteanu thesis was publicly accessible does not depend on a particular format. As noted *supra*, Patent Owner’s argument focused on Exhibit 1003 (to the exclusion of Exhibits 1018, 1050, and all the other post-institution evidence introduced by Petitioner) ignores the ability of a Petitioner to supplement the record if appropriate. *Genzyme Therapeutic Prods.*, 825 F.3d at 1367. It overlooks also the fact that, despite minor formatting differences, there is no dispute that the text of the Aiteanu thesis is the same across the three documents. Patent Owner’s challenge to the shelving record (Ex. 1034), online catalog screen shot (Ex. 1039), library check-out records (Ex. 1040), and Dr. Graeser’s supplemental declaration (Ex. 1047) on this basis therefore fails. Paper 53, 2–6. Dr. Graeser’s testimony and Petitioner’s other proofs regarding established practices for

publishing theses at Bremen University do not depend on the particular format of the document.

Equally unavailing, in light of *In re Hall*, are Patent Owner's arguments attacking Petitioner's proofs as insufficiently specific. Thus, for example, Patent Owner criticizes Exhibits 1038 (online catalog) and 1039 (photos of the shelved theses) as showing only that the thesis is available today. Paper 53, 3–4. Likewise, Patent Owner challenges the library circulation records (Ex. 1040) as failing to show “meaningful indexing.” *Id.* at 4. To the same effect are Patent Owner's criticisms of Dr. Graeser's supplemental declaration (Ex. 1047) as well as Exhibit 1068. *Id.* at 5. This argument is put to rest by *Hall*, which counsels against requiring such specificity, and by *Klopfenstein*, which emphasizes that under *Hall*, indexing is only one factor. We also find that Exhibits 1038 (online catalog) and 1039 (photos of the shelved theses), when viewed in light of Petitioner's evidence, show more than that the thesis is available today; they provide circumstantial evidence to support Dr. Graeser's testimony that the thesis was publicly accessible in 2006.

Finally, we address an email sent by Dr. Graeser to a German librarian during the course of the trial. Ex. 1035, 5. Patent Owner contends we should give “little weight” to Dr. Graeser's testimony, as this email indicates “his desire to see European companies—and particularly Seabery—not ‘hindered’ by Lincoln's invention.” PO Resp. 3. We are not persuaded by this argument to discount Dr. Graeser's testimony. We agree with Petitioner that this email does not show bias, and observe that Dr. Graeser's statement that the Lincoln patents “should never have been issued” is consistent with

his expert testimony regarding the '398 patent. Graeser Dep. 100:8–101:13;
Pet. Reply 11.

III. BACKGROUND

A. The '398 Patent

The '398 patent is titled “System for Tracking and Analyzing Welding Activity.” The '398 patent is a reissue of U.S. Patent 8,274,013. The Abstract of the '398 patent describes the subject matter as follows:

A system and a method for tracking and analyzing welding activity. Dynamic spatial properties of a welding tool are sensed during a welding process producing a weld. The sensed dynamic spatial properties are tracked over time and the tracked dynamic spatial properties are captured as tracked data during the welding process. The tracked data is analyzed to determine performance characteristics of a welder performing the welding process and quality characteristics of a weld produced by the welding process. The performance characteristics and the quality characteristics may be subsequently reviewed.

Ex. 1001, Abstract. The invention is illustrated in Figure 2 of the '398 patent, following:

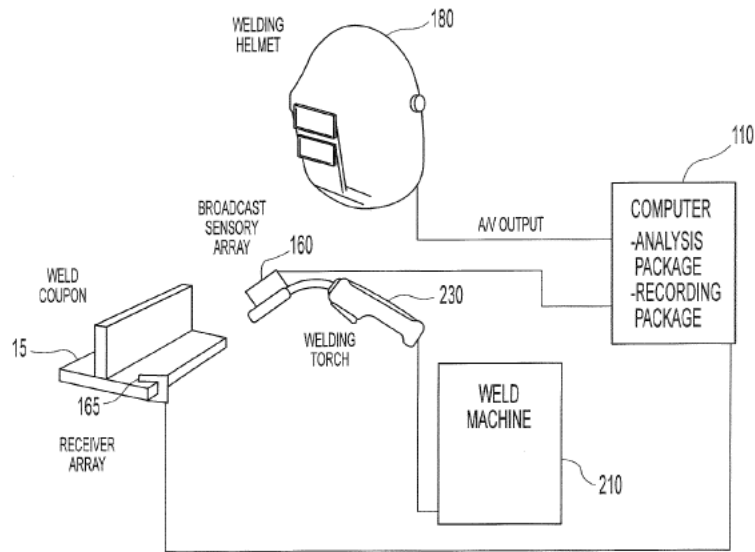


Fig. 2

Figure 2 of the '398 patent is a schematic representation of an embodiment of the invention for tracking and analyzing welding activity. Ex. 1001, col. 2, ll. 5–7. Figure 2 shows a welding system including welding power supply 210, welding torch 230, and welding cables, along with other equipment and accessories. *Id.* at col. 2, ll. 59–62. As a welder performs welding activity on weld coupon 15, the system captures performance data from real-world welding activity using sensors 160, 165. *Id.* at col. 2, ll. 62–66. Welding activity may be a manual welding process in any of its forms. *Id.* at col. 2, ll. 45–46. The system thus includes the capability of automatically sensing dynamic spatial properties (e.g., positions, orientations, and movements) of welding tool 230 during a manual welding process producing a weld in the weld coupon shown in Figure 2. *Id.* at col. 3, ll. 1–6.

The system as described further includes the capability to track automatically the sensed dynamic spatial properties of the welding tool over time, and to capture the tracked dynamic spatial properties of the welding tool during the manual welding process. *Id.* at col. 3, ll. 6–11.

The system also has the capability automatically to analyze the tracked data to determine performance characteristics of a welder performing a manual welding process and the quality characteristics of a weld produced by the welding process. *Id.* at col. 3, ll. 12–16. In that connection, the system includes processor-based computing device 110, configured to track and analyze dynamic spatial properties (e.g., positions, orientations, and movements) of welding tool 230 over time, during a manual welding process producing a weld. *Id.* at col. 3, ll. 34–40.

According to the patent, some weld joints cannot be appropriately x-rayed, i.e., completely or thoroughly x-rayed. *Id.* at col. 6, ll. 32–33. Thus, the system captures performance data during the welding process that can be used to determine the quality of the welded joint. *Id.* at col. 6, ll. 33–36. More specifically, the system can be used to identify potential discontinuities and flaws within specific regions of a weld joint. *Id.* at col. 6, ll. 36–38.

The captured data may be analyzed by an experienced welder or trained professional, or, in an alternative, using an analysis module for identifying areas within the weld joint that may be flawed. *Id.* at col. 3, ll. 38–42. In one example, torch position and orientation along with travel speed and other critical parameters are analyzed as a whole to predict which areas along the weld joint, if any, are deficient. *Id.* at col. 6, ll. 42–45. The patent states that quality is achieved during the welding process when the

operator keeps the weld torch within acceptable operational ranges. *Id.* at col. 6, ll. 45–48. Accordingly, the performance data may be analyzed against known good parameters for achieving weld quality for a particular weld joint configuration. *Id.* at col. 6, ll. 48–50.

B. Illustrative Claim

The '398 patent has 195 claims, 175 of which were added during the reissue proceeding. This trial involves 151 of those claims. *See* discussion *supra*.

Claim 9 has been identified by the parties as a representative claim⁵:

9. A system for tracking and analyzing welding activity, said system comprising:

at least one sensor array configured to sense spatial properties of a welding tool during a welding process producing a real world weld;

a processor based computing device operatively interfacing to said at least one sensor array and configured to track and analyze in real time or near real time said spatial properties of said welding tool during said welding process producing said real world weld; and

at least one user interface operatively interfacing to said processor based computing device, said at least one user interface displaying a quality characteristic of said real world weld produced by said welding process.

Other representative claims will be discussed *infra*.

⁵ In reproducing claims of the '398 patent, we have omitted the portions of the original claim appearing in brackets and removed the italics indicating material added in the reissue proceeding.

C. Related Proceedings

Petitioner and Patent Owner identify a related litigation involving the '398 patent: *The Lincoln Electric Co. v. Seabery Soluciones, S.L.*, Case No. 1:15-cv-01575-DCN (N.D. Ohio). Pet. 1; Paper 8. Petitioner's requests for *inter partes* review of related patents have been denied. IPR2016-00904 (Paper 12); IPR2016-00905 (Paper 12); IPR2016-00749 (Paper 13).

D. Real Party-in-Interest

The Petition identifies the following real parties-in-interest: Seabery North America Inc., Seabery Soluciones, S.L., Miller Electric Mfg. Co., and Illinois Tool Works Inc. Pet. 1–2. Patent Owner does not challenge this information.

E. References and Other Evidence

We instituted trial based on the following references:

1. Dorin Aiteanu, "Virtual and Augmented Reality Supervisor for a New Welding Helmet," Ph.D. dissertation, University of Bremen, Germany (March 2006) (Ex. 1003; "Aiteanu");
2. L. Da Dalto, F. Benus Jr, D. Steib, and O. Balet, "CS WAVE I: Learning Welding Motion in a Virtual Environment," Proceedings of the IIW International Conference 167 (July 10–11, 2008) (Ex. 1006; "Da Dalto")⁶;
3. Claude Choquet, "ARC+®: Today's Virtual Reality Solution for Welders," Proceedings of the IIW International Conference 173 (July 10–11, 2008) (Ex. 1010; "Choquet"); and
4. Markus Stöger, "Welding Method and Welding System with Determination of the Position of the Welding Torch," PCT International Publication WO 2007/009131 A1 (Jan. 25, 2007) (Ex. 1013; "Stöger").

⁶ Citations to Da Dalto refer to the page numbers added by Petitioner, rather than the original page numbers appearing in the document itself.

In addition, as noted *supra*, Petitioner submitted initial and supplemental declarations by Dr. Graeser (Exs. 1002, 1047), as well as a declaration by a welding expert, Mr. Bohnart, filed with its Reply. Ex. 1071 (“Bohnart Decl.”).

Patent Owner relies on a Declaration of Kenneth Fast (Ex. 2001; “Fast Decl.”) filed with the Preliminary Response and a supplemental declaration by Mr. Fast (Ex. 2022; “Fast Supp. Decl.”) filed with its Response.

Deposition transcripts for Mr. Fast (Ex. 1060, “Fast Dep.”) and Mr. Bohnart (Ex. 2024, “Bohnart Dep.”) have been filed, as well as the Greaser deposition transcript (Ex. 2015) mentioned *supra*.

In addition, Patent Owner has filed a motion for observation on the cross-examination of Mr. Bohnart, and Petitioner has filed a response. Papers 51, 57.

F. Grounds Asserted

Trial was instituted on the following grounds:

Reference(s)	Basis	Claim(s)
<u>Ground 1</u> : Aiteanu alone	35 U.S.C. § 103	9–11, 13–17, 19–25, 30, 37, 39–41, 45, 46, 49, 56, 58–62, 66–69, 80, 82–85, 88, 104, 116–120, 123, and 185
<u>Ground 2</u> : Aiteanu and Choquet or Da Dalto	35 U.S.C. § 103	33–36, 52–55, 89–92, 95–98, 100–103, 112–115, 124–127, 130–133, 135–143, 145–150, 152–162, 164–167, 169–177, 179–184, and 186–195
<u>Ground 3</u> : Aiteanu and Stöger or Da Dalto	35 U.S.C. § 103	12, 18, 26–29, 31, 38, 47, 48, 50, 57, and 81
<u>Ground 4</u> : Aiteanu, Choquet or Da Dalto, and Stöger	35 U.S.C. § 103	99, 134, 144, and 168

IV. ANALYSIS

A. Claim Construction

In an *inter partes* review, claim terms in an unexpired patent are construed according to their broadest reasonable interpretation in light of the specification of the patent in which they appear. *See* 37 C.F.R. § 42.100(b); *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2144–46 (2016). Under that standard, claim terms generally are given their ordinary and customary meaning, as would be understood by one of ordinary skill in the art in the context of the entire disclosure. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007).

Petitioner and Patent Owner have offered constructions for several claim terms. Pet. 8–13; Prelim. Resp. 4–21; Resp. 4–12. We address these to the extent necessary to resolve the issues before us. *See Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999) (holding that “only those terms need be construed that are in controversy, and only to the extent necessary to resolve the controversy”).

i. Determining a Score/Computing a Score

The ’398 patent specification states that “a numeric score is provided based on how close to optimum (ideal) a user is for a particular tracked parameter, and depending on the determined level of discontinuities or defects determined to be present in the weld.” Ex. 1001, col. 6, ll. 59–64. Consequently, in our Institution Decision, we construed “score” as “a numeric value based on how close to optimum a user is for a particular tracked parameter.” Paper 11, 12.

Patent Owner contends that claim term “score” means “a number that expresses accomplishment or excellence in comparison to a standard.” PO Resp. 9. Patent Owner asserts that the Board’s construction “is incorrect because it imports a non-limiting embodiment into the claims.” PO Resp. 10. Patent Owner relies instead on “ordinary meaning,” and cites an on-line dictionary definition (Ex. 2007) that it contends “aligns with the specification.” *Id.*

The only mention of scoring in the ’398 patent specification refers to Figure 6 and states:

The analysis engine 122 may provide a scoring capability, in accordance with an embodiment of the present invention, where a numeric score is provided based on how close to optimum (ideal) a user is for a particular tracked parameter, and depending

on the determined level of discontinuities or defects determined to be present in the weld.

Ex. 1001, col. 6, ll. 59–64. Our construction tracks this language from the specification, which makes no mention of scoring as an expression of excellence.

The Federal Circuit has emphasized the importance of the specification in claim construction. Thus, the Court has said: “[T]he specification ‘is always highly relevant to the claim construction analysis. Usually it is dispositive; it is the single best guide to the meaning of a disputed term.’” *Phillips v. AWH Corp.*, 415 F.3d 1303, 1315 (Fed. Cir.2005) (en banc) (quoting *Vitronics Corp. v. Conceptor, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir.1996)).

Patent Owner provides no citations to the specification supporting its construction requiring that the score “express excellence.” Moreover, Patent Owner provides no persuasive support for its theory that the description of scoring in the ’398 patent specification is a “non-limiting embodiment.” Patent Owner cites *In re Am. Acad. of Sci. Tech. Ctr.*, 367 F.3d 1359 (Fed. Cir. 2004), an appeal from a PTO reexamination involving a patent on computer networking. PO Resp. 11. Affirming the Board’s construction of the term “indirectly issuing” as not being limited to the database simulator of the preferred embodiment, the Federal Circuit concluded: “The specification makes clear that the database simulator is a preferred embodiment and just one of the ‘variety of conventional protocol procedures.’ . . . Thus the specification does not limit the term ‘indirectly issuing’ to the use of a database simulator.” *In re Am. Acad. of Sci. Tech. Ctr.*, 367 F.3d at 1369. This case does not support Patent Owner’s construction. As noted above,

the '398 patent specifically describes what it means by “scoring.” Ex. 1001, col. 6, ll. 59–64. Moreover, the '398 patent does not refer to “scoring” a “preferred embodiment” or “just one of a variety of conventional protocols.” *Id.*

For the foregoing reasons, consistent with our Institution Decision and with the '398 patent specification, we construe “score” as “a numeric value based on how close to optimum a user is for a particular tracked parameter.”

ii. Quality Characteristic of a Weld

The '398 patent specification states, “[t]he quality characteristics of a weld produced by the welding process may include, for example, discontinuities and flaws within certain regions of a weld produced by the welding process.” Ex. 1001, col. 3, ll. 22–26. Consequently, in our Institution Decision, we construed “quality characteristic” as “a property of a weld that indicates the quality of the weld joint or joints, for example, discontinuities and flaws within certain regions of a weld produced by the welding process.” Paper 11, 13.

Patent Owner contends the broadest reasonable interpretation of a quality characteristic of a weld is a characteristic of how good or bad a weld is. PO Resp. 4. Patent Owner relies mainly on dictionary definitions of the word “quality.” *Id.* at 5–6. Moreover, Patent Owner asserts that the word “quality” appears in the '398 patent specification 29 times, “[a]nd every time, quality relates to how good or bad a weld is.” *Id.* at 6.

Patent Owner criticizes the Board’s construction for including a reference to “discontinuities and flaws.” *Id.* at 8. Patent Owner argues that this inclusion “introduces complexity.” *Id.* at 9. We disagree. As noted, the Federal Circuit has emphasized the importance of the specification in claim

construction. *Phillips*, 415 F.3d at 1315. Our construction follows the language from the specification. *See supra*. In contrast, Patent Owner provides no citations to the specification describing the quality characteristic as “how good or bad” a weld is. Patent Owner’s citations are to the word “quality,” and in any case those portions of the specification do not describe weld quality in those terms. In fact, Patent Owner’s preferred dictionary definition for quality (“degree of excellence”) suggests the existence of degrees of quality, contradicting a construction that implies a binary choice between a “good weld” and a “bad weld.” *See PO Resp. 6* (referring to Ex. 2012 (second definition)).

As will be discussed *infra*, the evidentiary record in this case indicates that in real world welding, such choices are made based on the evaluation of various quality characteristics of the weld such as discontinuities and flaws, and not a single factor that determines whether a weld is “good” or “bad.” *See Bohnart Decl. ¶ 12*. Thus, a construction of “quality characteristic” that implies a binary choice based on a single factor is not consistent with common meaning.

For the foregoing reasons, consistent with our Institution Decision and the ’398 patent specification, we construe “quality characteristic” as “a property of a weld that indicates the quality of the weld joint or joints, for example, discontinuities and flaws within certain regions of a weld produced by the welding process.”

iii. Other Terms

During trial, and especially at the final argument, the parties relied on certain definitions appearing in the American Welding Society’s *Welding*

Handbook (ninth ed. 2001). Ex. 1023. Those definitions, which are not in contest, follow:

defect. A discontinuity or discontinuities that by nature or accumulated effect render a part or product unable to meet minimum applicable acceptance standards or specifications. The term designates rejectability. See also discontinuity and flaw.

discontinuity. An interruption of the typical structure of a material, such as a lack of homogeneity in its mechanical, metallurgical, or physical characteristics. A discontinuity is not necessarily a defect. See also defect and flaw.

flaw. An undesirable discontinuity. See also defect.

Ex. 1023, 16, 17, 23. For the purposes of this Decision, we adopt those definitions as the common meaning of the specified terms.

B. Level of Ordinary Skill in the Art

In our Institution Decision, we determined that a person of ordinary skill would have held a bachelor's degree in science, including computer science, engineering, or mathematics, had some familiarity with welding (which may have been acquired through experience or research), and at least four years of experience in developing computer-aided manufacturing systems. Paper 11, 15.

We were not persuaded that a person of ordinary skill would necessarily have had first-hand work experience in welding. We determined that the problem addressed by the patent is more likely to pertain to a computer engineer with some familiarity with welding than a welder familiar with computers. *See, e.g., In re Grout*, 377 F.2d 1019, 1022 (CCPA 1967) (“Under section 103 we must look to the person of ordinary skill in the art to which the invention pertains, not those who may use the invention.”). Paper 11, 14.

At final argument, the parties indicated that they did not challenge this determination. Hr’g Tr. 6:19–7:4, 23:15–21. We, therefore, adopt this definition as a finding for the purpose of this Decision.

C. Description of Prior Art Asserted

i. Aiteanu

The Aiteanu thesis (Exs. 1003, 1019, 1050) is titled “Virtual and Augmented Reality Supervisor for a New Welding Helmet.” Aiteanu describes an augmented reality helmet that is intended to give the welder improved insight into the welding process. Graeser Decl. ¶ 19. This work was part of the research project TEREBES at the University of Bremen. *Id.* ¶ 7; Ex. 1003, 6. In Aiteanu, based on the recognized position, speed, and inclination of the welding torch, the geometry of the components to be welded, and the welding machine parameters, a mathematical model is used to model the welding seam. Graeser Decl. ¶ 19; Ex. 1003, 86. Aiteanu relates this weld seam calculation to quality of the weld:

The relevant outcome of the dissertation is the online feedback on the seam quality. Using an algorithm for calculation of the seam’s thickness of the virtual model and based on the similarity between the real and virtual seams, estimation of the thickness of the real seams can be done as an important quality indicator. An appropriate diagram is displayed in the user’s field to give information about the seam’s thickness of the current welding area.

Ex. 1003, 4. Further details of Aiteanu will be presented in the discussion following.

ii. Da Dalto and Choquet

Da Dalto (Ex. 1006) is a paper describing CS-Wave, a training system for welders. Graeser Decl. ¶¶ 21–22. As described by Dr. Graeser, the

system tracked, analyzed, and recorded the motion of a welder, generated a virtual “seam,” and scored the welder’s performance. *Id.* ¶ 21. At the end of the training exercise, the system provided a graphical representation of the trainee’s performance. Ex. 1006, 17.

Choquet (Ex. 1009) describes a virtual reality trainer similar to CS-Wave. Graeser Decl. ¶ 25.

iii. Stöger

According to Dr. Graeser, Stöger (Ex. 1013) describes a system for tracking welding activity in real time. Graeser Decl. ¶ 29. Stöger includes a network for monitoring and recording that activity. *Id.*

Stöger is originally written in the German language. Petitioner has provided what it states is a “certified translation into English.” *Id.*; Ex. 1013, 53–108.

D. Petitioner’s Challenges

Petitioner’s challenges are organized into Grounds 1 through 4. These grounds are summarized at pages 5–7 of the Petition. In addition to a summary, for each ground, Petitioner has provided a detailed analysis including element-by-element claim charts showing the relation of the claims to the references relied upon. Pet. 14–33 (Ground 1), 33–52 (Ground 2), 52–59 (Ground 3), and 59 (Ground 4). Further details on each of these grounds are presented in Dr. Graeser’s Declaration.

We now discuss Grounds 1 through 4, in turn, in relation to the representative claims of the ’398 patent agreed to by the parties.

i. Ground 1 (Aiteanu alone)

The representative claims challenged in Ground 1 are: claims 9, 14, 23, and 24. Claim 9, an independent claim, is reproduced *supra*. Claim 14,

also independent, claims a method similar to claim 9. Claims 23 and 24 are dependent claims.

According to Petitioner, the claims in Ground 1 are “directed to tracking a welding torch and making a determination of weld quality based on the tracked motion.” Pet. 5. These claims are directed to determining weld quality and do not mention determining a score that reflects the welder’s performance, a feature that appears in other claims discussed *infra*. *Id.* at 14.

Petitioner contends that Aiteanu teaches at least the claimed “quality” feature and includes all other limitations of the Ground 1 claims. *Id.* Petitioner further contends that it would have been obvious to add any remaining “peripheral” features of the Ground 1 claims to Aiteanu. *Id.* at 14–17. Petitioner contends that, besides tracking the welder’s torch, Aiteanu describes a “seam model” that takes the measured welder performance metrics and motion and determines the geometry, particularly the position and thickness, of the welding seam in real time. *Id.* at 15.

Petitioner contends the “geometric profile” of a seam in Aiteanu is a quality characteristic. *Id.* For example, referring to Figure 8-36 of Aiteanu, Petitioner contends that Aiteanu’s measurement of weld seam thickness at different points along the seam reveals “discontinuities and flaws,” i.e., points where the thickness is unacceptably high or low. *Id.* Figure 8-36 of Aiteanu, with portions enlarged and annotations added by Petitioner, follows:

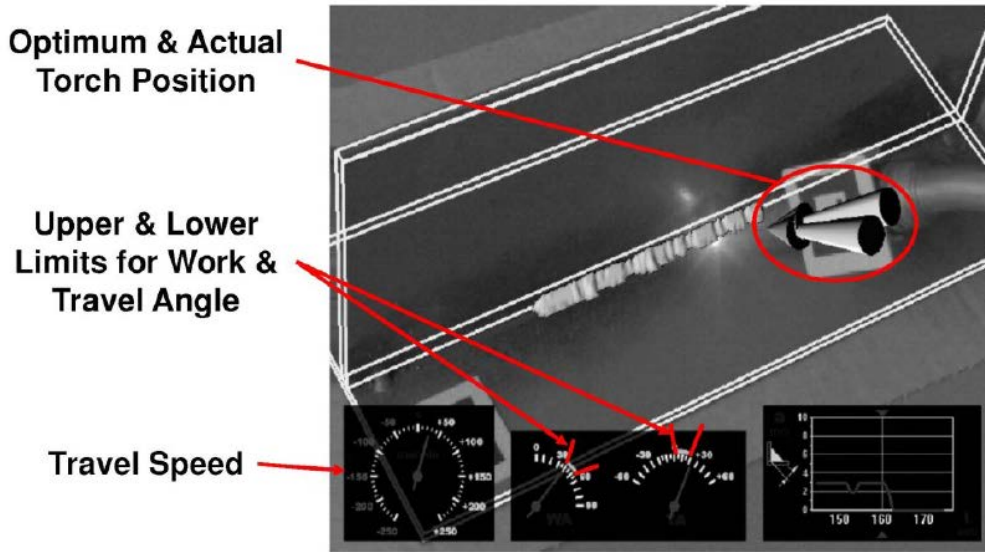
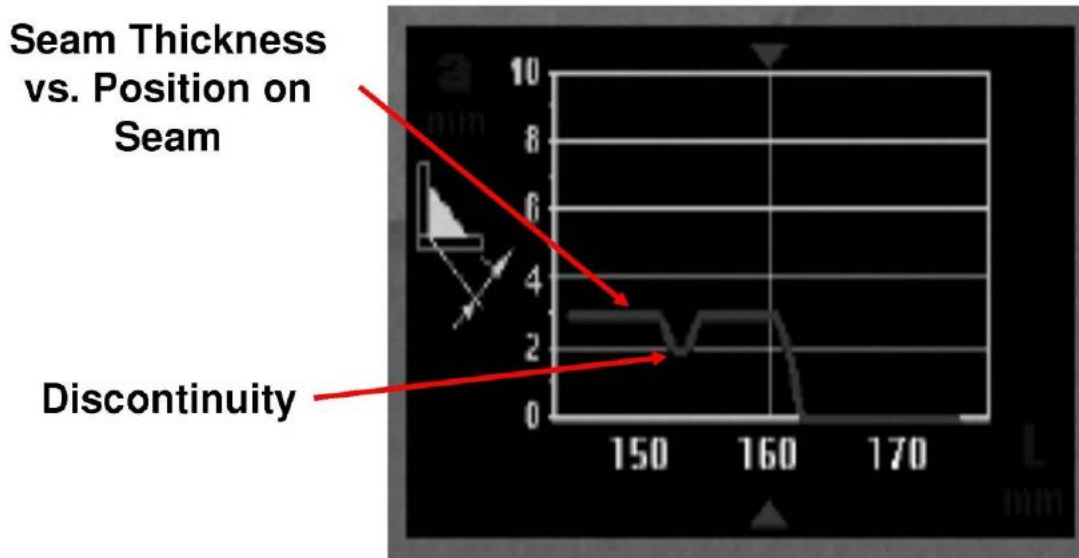
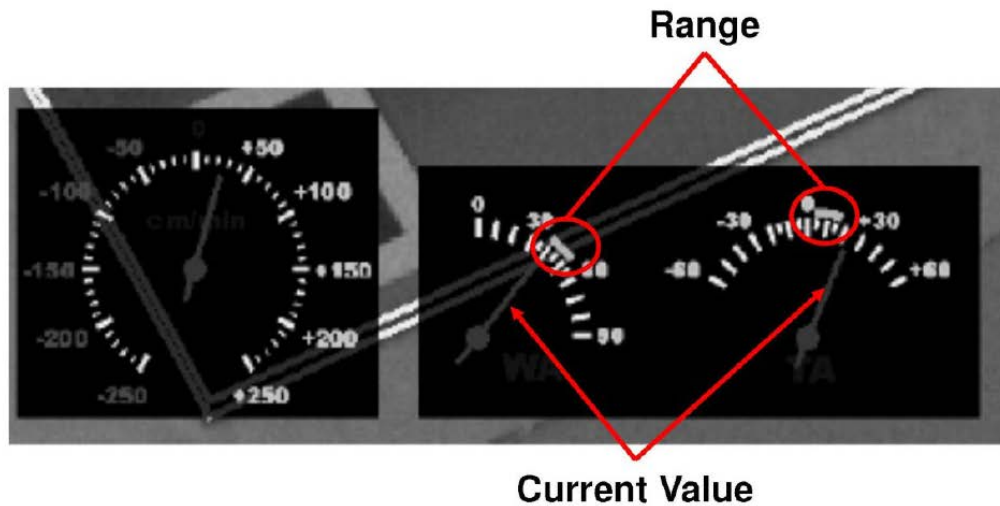


Fig. 8-36. View of the welder enriched displaying the thickness of the welding seam





These enlarged images from Fig. 8-36 of Aiteanu show the display of information presented to the welder and are reproduced from the Petition, with Petitioner's annotations. Pet. 15–17. The torch icon in Fig. 8-36 (top image) changes color when the torch angles are out of limits. Ex. 1003, 69–73. Likewise, the dials in the display (lower images) show the current value and optimum range for torch angle and travel speed. *Id.* These figures are explained in Dr. Graeser's testimony. Graeser Decl. ¶¶ 73–80.

Petitioner contends that weld seam thickness is a quality characteristic that is, in Aiteanu, calculated from the welder's performance characteristics such as torch speed and angle. Pet. 16. Petitioner states this calculated thickness is displayed as a numeric value. *Id.* Petitioner further contends Aiteanu's calculation of seam thickness "is done in real time, with a real, manual welding torch, and displayed to the welder." *Id.*

The details of Petitioner's analysis of Aiteanu with respect to the Ground 1 claims is set forth in the claim charts appearing at pages 17–32 of the Petition and paragraphs 65–82 of Dr. Graeser's Declaration. Petitioner

contends that “all elements” of the Ground 1 claims (including representative claims 9, 14, 23, and 24) are present in Aiteanu. Pet. 32.

a. Representative Claims 9 and 14

Patent Owner’s response focuses on claim 14, and specifically on the limitation: “analyzing said tracked data in real time or near real time to determine a quality characteristic of said real world weld produced by said welding process.” PO Resp. 38. A similar recitation appears in claim 9.

According to Patent Owner, the graph of modeled weld thickness in Aiteanu does not determine quality because it “does not indicate to an ordinary artisan how good or bad a weld is.” PO Resp. 39. We are not persuaded by this argument, as it is predicated on a construction of “quality characteristic” that we did not adopt. *See* discussion at IV.A.ii., *supra*. Under our construction, a “quality characteristic” is “a property of a weld that indicates the quality of the weld joint or joints.”

We find that Aiteanu’s determination of weld thickness qualifies as a “quality characteristic” under our construction of that term. We find record support for this in Aiteanu’s description of the purpose of the weld seam calculation as “an important quality indicator.” Ex. 1003, 3 (see quotation *supra*). In addition, we rely on the supporting testimony of Dr. Graeser (Graeser Decl. ¶ 72; Graeser Dep. 68:16–22) and Mr. Bohnart (Bohnart Decl. ¶ 16), as well as on the testimony of Patent Owner’s expert, Mr. Fast:

Q. Would you agree with me that the thickness of the seam may relate to the quality of the seam?

A. May, yes.

Q. Okay. And, for example, if the thickness of the seam was zero, i.e., no welding had been accomplished, that would be a really bad joint, true?

A. That's usually true.

Q. Or if the seam thickness was zero in one of your critical pressure hull seams, if the seam thickness was zero along half of its overall length, that would be a pretty bad joint, too, right?

A. That's true.

Q. Without looking at anything else, you could say not a good joint. They didn't weld half of it, true?

A. True.

Fast Dep. 94:1–17. Accordingly, based on the foregoing we determine that Petitioner's analysis of representative claims 9 and 14 demonstrates by a preponderance of the evidence that those claims would have been obvious over Aiteanu. We adopt as additional findings the analysis set forth in Petitioner's claim charts for those claims. Pet. 23–25.

b. Representative Claims 23 and 24

Representative claims 23 and 24 are dependent claims including limitations relating to discontinuities and flaws. *See* discussion *supra*. Petitioner contends that the calculated thickness of the welding seam in Aiteanu meets these limitations. Thus, Dr. Graeser testifies, referring to Fig. 8-36 of Aiteanu:

The “dip” in the graph above at approximately 152 mm along the seam corresponds to a reduction in seam thickness from 3 to 2 mm. This is a sufficient reduction to show a “discontinuity” or “flaw” in the seam that could further indicate a porosity condition at that point. Alternatively, if the seam thickness departed above 3 mm in this case, that would indicate “overfill” at that location. A [person of ordinary skill] would interpret either case as a potential flaw.

Graeser Decl ¶ 80. Similarly, Mr. Bohnart testifies:

Aiteanu's graph would certainly show when, because for example, the gun was pulled away and the seam went to zero

thickness. That would clearly be a discontinuity, flaw, or underfill as the patent is using those terms.

Bohnart Decl. ¶ 17.

Patent Owner's response focuses on representative claim 23. PO Resp. 42. According to Patent Owner, the "1 mm dip" in the thickness graph in Aiteanu's Fig. 8-36 does not indicate a discontinuity or flaw. *Id.* at 43–45. We disagree with Patent Owner's argument for several reasons.

First, as Petitioner points out in its reply, the 1 mm dip in Fig. 8-36 is exemplary only; Aiteanu's calculations will yield, and the graph will show, the thickness of the welding seam, "whatever it is," including zero. Pet. Reply 28. This was acknowledged by Patent Owner's counsel at oral argument:

[THE BOARD]: Wouldn't you agree that this is just an example of the display? This display will change in different welding situations.

[PATENT OWNER'S COUNSEL]: Correct.

[THE BOARD]: It might be a dip of 1 millimeter -- whatever unit it is. It could be a dip all the way down to zero. Wouldn't a person of ordinary skill in the art understand that this is just an example?

[PATENT OWNER'S COUNSEL]: Correct.

Hr'g Tr. 28:13–22.

Further, as noted *supra*, Mr. Fast admitted that a seam thickness of zero "would be a really bad joint." Bohnart Dep. 94:4–8. Mr. Bohnart's testimony confirms that such a dip would be a discontinuity or flaw. Bohnart Decl. ¶ 17. This conclusion is further supported by the relevant definitions of "discontinuity" as "an interruption of the typical structure of a material," and "flaw" as "an undesirable discontinuity." *See* IV.A.iii, *supra*.

We conclude from the testimony and other evidence that the calculations and graph of weld thickness in Aiteanu would meet both the “discontinuity” and “flaw” limitations of claim 23.

Patent Owner challenges this conclusion on several grounds. First, Patent Owner contends “Aiteanu does not teach a quality characteristic including a discontinuity and/or flaw within a region of a weld produced by a welding process.” PO Resp. 44. According to Patent Owner, “Dr. Graeser’s declaration does not explain why, in Figure 8-36, the 1-mm dip in thickness would have indicated interruption of the typical structure the corresponding real world weld (e.g., lack of homogeneous mechanical, metallurgical, or physical characteristics), or the 1-mm dip in thickness would have indicated insufficient melted and fused material to make a strong joint.” *Id.* We disagree. Dr. Graeser’s conclusion is confirmed by Mr. Bohnart’s testimony and the testimony of Patent Owner’s expert, Mr. Fast, that a seam thickness of zero, which would be apparent in Aiteanu’s weld thickness display, “would be a real bad joint.” *See infra.*

Patent Owner’s next argument is that “Aiteanu’s modeled thickness does not indicate whether the corresponding real world weld includes a discontinuity or flaw, and Aiteanu does not determine or display a quality characteristic of a real world weld including a discontinuity and/or flaw within a weld region.” PO. Resp. 45–46. We disagree. A “discontinuity” is “an interruption of the typical structure of a material.” The record, including testimony by Dr. Graeser and Mr. Bohnart, establishes that the “dip” in Aiteanu’s graph of weld thickness, indicates a discontinuity or flaw.

Claim 24 further requires the “flaw” of claim 23 to be “at least one of porosity and weld overfill.” Petitioner contends that this is met by Aiteanu’s

display of seam thickness: “Aiteanu’s measurement of seam thickness at different points along the seam reveals ‘discontinuities and flaws,’ points where the thickness is unacceptably high or low, as shown in Figure 8-36.” Pet. 15; Graeser Decl. ¶ 80.

Patent Owner responds that Dr. Graeser “conceded” that the 1-mm dip does not indicate overfill. PO Resp. 44. We do not agree with this argument. As noted above, the 1-mm dip in Fig. 8-36 is exemplary only. As Petitioner points out in its reply, an overfill condition is the opposite of an underfill. Pet. Reply 28; Graeser Decl. ¶ 80; Bohnart Decl. ¶¶ 9, 17. There is no dispute that Aiteanu’s calculations and display of seam thickness could produce a graph in which the thickness rises sharply above the 3 mm line. We conclude, therefore, that just as a substantial “dip” in the graph indicates underfill, a sharp rise in the opposite direction indicates overfill. Pet. Reply 28–29.

At the oral hearing, counsel for Patent Owner took a different approach to these claims. Patent Owner tried to distinguish Aiteanu’s display of weld seam thickness by asserting that the claims require “the system itself” to determine a discontinuity or flaw in the weld, and not an experienced welder. Hr’g Tr. 25:8–12. When pressed for support in the claims for this limitation, counsel pointed to the preamble of claim 9. *Id.* at 25:16–23. Patent Owner’s counsel also relied on a “determination step” in claim 21 and an additional limitation in claim 23, which recites: “wherein said quality characteristic includes at least one of a discontinuity and a flaw within a region of said weld produced by said welding process.” Ex. 1001, claims 21, 23; Hr’g Tr. 26:3–10.

We are not persuaded by Patent Owner's argument that these claims require the "system itself" to determine whether there is a discontinuity or flaw in the claims. First and foremost, Patent Owner's theory is not supported by the claim language or the specification. The '398 patent specification describes several separate embodiments. In one, the collected data is displayed and analyzed by a user (i.e., a trainer) for determining the weld quality:

Performance data may be stored electronically in a data base 140 (see FIG. 3) and managed by a database manager in a manner suitable for indexing and retrieving selected sets or subsets of data. In one embodiment, the data is retrieved and presented to an analyzing user (e.g., a trainer 123) for determining the weld quality of a particular weld joint. The data may be presented in tabular form for analysis by the analyzing user. *Pictures, graphs, and or other symbol data may also be presented as is helpful to the analyzing user in determining weld quality.*

Ex. 1001, col. 6, l. 55–col. 7, l. 7.

In another, separate embodiment, the data is captured and stored in a data base and analyzed by a computer running an analysis program:

In another embodiment, data captured and stored in the database 140 is analyzed by an analyzing module 122 (a.k.a., an analysis engine) of the system 100. The analyzing module 122 may comprise a computer program product executed by the processor based computing device 110. The computer program product may use artificial intelligence. In one particular embodiment, an expert system may be programmed with data derived from a knowledge expert and stored within an inference engine for independently analyzing and identifying flaws within the weld joint.

Id. col. 7, ll. 20–29.

Claim 9, from which claims 23 and 24 depend, requires the following: “at least one user interface operatively interfaced to said processor based computing device, said at least one user interface *displaying* a quality characteristic of said real world weld produced by said welding process.” Ex. 1001, claim 9 (emphasis added). We find that this claim, and thus its dependent claims 23 and 24, by requiring a displaying of a quality characteristic, is directed to the embodiment described above in which determination of weld quality is made by the user, i.e., a welding trainer. *See* discussion, *supra*. The specification specifically describes providing [p]ictures, graphs, and or other symbol data” for “the analyzing user in determining weld quality.” Ex. 1001, col. 7, ll. 5–7. Put another way, there would be no need to display the quality characteristics for the user if the analysis of weld quality were to be left to a computer.

Furthermore, we do not agree with Patent Owner that the presence in claim 21 of the word “determining” requires the system (as opposed to user) to determine “at least one of a discontinuity and a flaw” in claim 23 and a “flaw” in claim 24. *See* Hr’g Tr. 26:3–10. What is being determined in claim 21 is a quality characteristic, and although claims 23 and 24 require that the quality characteristic recited in those claims includes certain features, nothing in those claims requires that the “determining” of claim 21 apply to “determining” those features.

In addition, in the first embodiment discussed *supra*, the ’398 patent specification describes the analyzing user (not the computer) making a “determination of weld quality” from the displayed data (e.g., the determined and displayed quality characteristic). Ex. 1001, col. 7, ll. 5–7 (emphasis added). As discussed in our Institution Decision, certain claims

of the '398 patent are specifically directed to the second embodiment discussed *supra*, and require the use of expert systems configured to identify defects. Paper 11, 21. Those expert system claims, however, are not included in this trial, as we determined that Aiteanu did not meet that limitation. *Id.* The specification thus makes it clear that in this context, certain determinations or analysis may be performed by a user, and not a computer.

Thus in the context of claims 23 and 24, we agree with Petitioner that Aiteanu's system determines a quality characteristic (i.e., weld seam thickness). Consistent with the testimony of Dr. Graeser, Mr. Bohnart, and Mr. Fast discussed above, we find a person of ordinary skill in the art would understand a user would determine whether the displayed quality characteristic in Aiteanu includes at least one of a discontinuity and flaw, as recited in claim 23, and a porosity or weld overfill flaw, as recited in claim 24.

In summary, for the foregoing reasons we determine that Petitioner's analysis of representative claims 9, 14, 23, and 24 demonstrates by a preponderance of the evidence that those claims would have been obvious over Aiteanu. Furthermore, we adopt as additional findings the analysis of those claims set forth in Petitioner's claim charts. Pet. 23–26. Finally, to the extent that Patent Owner has not raised arguments against other claims in its Patent Owner Response or its Sur-replies, those arguments are waived.

Novartis AG v. Torrent Pharm. Ltd., 853 F.3d 1316, 1330 (Fed. Cir. 2017);
In re Nuvasive, 842 F.3d 1376, 1381 (Fed. Cir. 2016).⁷

ii. Ground 2 (Aiteanu and Choquet or Da Dalto)

The representative claims challenged under Ground 2 are: claims 33, 52, 89, 90, 91, 92, 95, 96, 137, 138, 139, 140, and 141. Claims 89 and 137 are independent claims.

Petitioner states these claims are similar to the Ground 1 claims, except they add “score” or “scoring” (or replace “quality” with “score”). Pet. 6, 33. Petitioner contends that under its proposed construction, in which weld seam thickness would be a score, Aiteanu “scores” welder performance on a scale reflected by analyzing the welder’s performance and numerically reporting weld seam thickness. *Id.* at 6.

If the Board decides to use a different construction of “score,” however, Petitioner asserts that Choquet and Da Dalto would provide “additional support” for obviousness because they show the concept of a “score” or grade as a percentage. *Id.* Petitioner contends that a person of ordinary skill “would have been motivated to add Choquet and Da Dalto’s percentage score to Aiteanu’s system since both systems are directed to the same problem, training and evaluating welders, with the same solution, real time tracking and evaluation of the welder.” *Id.* at 6–7. Dr. Graeser’s testimony provides further support for modifying Aiteanu’s display as described. *See* discussion of claim 33, *infra*.

⁷ As in *Nuvasive*, the Scheduling Order here cautioned Patent Owner that “any arguments for patentability not raised in the response will be deemed waived.” Paper 12, 3.

More specifically, Petitioner contends Chapters 7 and 8 of Aiteanu, including Figure 8-36, “teach a numeric ‘score’ based on performance and numerically related to quality by showing a numeric value for the weld seam thickness, based on the performance of the welder.” *Id.* at 34. Alternatively, if “score” is interpreted such that Aiteanu’s weld thickness does not meet the limitation, then Petitioner contends a person of ordinary skill “given Aiteanu’s system and knowing the scoring methods of ‘Choquet’ or ‘Da Dalto’ would have readily combined them, with full expectation of success, to provide additional numerical feedback to the user.” *Id.* at 51–52. Petitioner cites “Aiteanu’s goals of evaluating performance and training” as a further rationale for making this combination. *Id.* at 52.

Further details of Petitioner’s analysis are set forth in the claim charts appearing at pages 39–51 of the Petition and paragraphs 83–99 of Dr. Graeser’s Declaration.

a. Representative Claims 137–140

Claims 137–140 follow:

137. A system for tracking welding activity, said system comprising:

an optical tracking system that tracks at least one of a position, a movement, and an orientation of a welding tool; and

a computer operatively interfacing to said optical tracking system, said computer determining at least one parameter that is at least one of a travel speed, a pitch angle, a roll angle, and an electrode distance to a center weld joint of said welding tool,

wherein said processor based computing device determines for each of said at least one parameter a score based on a comparison of said parameter to at least one predetermined limit for said parameter.

138. The system of claim 137, wherein said score relates to a weld quality of a real world weld.

139. The system of claim 138, wherein said score relates to said weld quality of said real world weld, and

wherein said weld quality includes an indication of at least one of a discontinuity and a flaw within a region of said real world weld.

140. The system of claim 139, wherein said weld quality includes an indication of said flaw and said flaw comprises at least one of porosity and weld overfill.

Petitioner's analysis of these claims appears at pages 44 and 45 of the Petition. Petitioner finds each element of the claims in the combination of Aiteanu with Choquet or Da Dalto. *Id.*

Patent Owner's response focuses on claim 140. PO Resp. 47. Patent Owner asserts that the limitations of that claim relating to porosity and overfill are not met. Specifically, Patent Owner asserts "[t]he claim limitations require the claimed system or method to determine whether the quality characteristic is a *flaw* also whether that flaw comprises *porosity or overfill.*" *Id.* at 48.

We disagree with Patent Owner's position regarding the word "determine" and adopt Petitioner's analysis for claims 137–140. Pet. 44–45. As to "determine," the word appears twice in claim 137, from which claim 140 depends. The first occurrence reads as follows: "said computer *determining* at least one parameter that is at least one of a travel speed, a pitch angle, a roll angle, and an electrode distance to a center weld joint of said welding tool." The second occurrence reads as follows: "said processor based computing device *determines* for each of said at least one parameter a

score based on a comparison of said parameter to at least one predetermined limit for said parameter.” (Emphases added.)

Claim 139, however, from which claim 140 depends, does not use the word “determination.” Instead, it states that the weld quality “includes *an indication* of at least one of a discontinuity and a flaw.” (Emphasis added.). To the same effect is claim 140, which states that the weld quality “includes *an indication* of said flaw and said flaw comprises at least one of porosity and weld overfill.”

Patent Owner’s argument equates an “indication” with a “determination.” All that is required in these claims is that the quality characteristic in Aiteanu, namely weld thickness, *indicate* porosity or weld overfill. The record presented by Petitioner establishes that it does both. Specifically, for the reasons discussed, we find that a “dip” in the thickness graph in Aiteanu’s Fig. 8-36 does indicate a discontinuity or flaw. Testimony of Dr. Graeser and both welding experts confirms this. *See* IV.D.i.b, *supra*.

As to indicating overfill, our analysis under Ground 1 applies here. We, therefore, find for the reasons stated there that at least the overfill limitation in these claims is met by Aiteanu. Alternatively, Dr. Graeser testifies that a dip in Aiteanu’s weld seam display “could further indicate a porosity condition at that point.” Graeser Decl. ¶ 80.

b. Representative Claim 33

Patent Owner turns to claim 33 for its next argument. PO Resp. 51. Claim 33 depends from claim 9, reproduced *supra*. Claim 33 follows:

33. The system of claim 9, wherein said analyzing comprises determining a score based on a comparison of at least one of

said tracked spatial properties to an optimum value corresponding to said at least one of said tracked spatial properties.

Using this claim as an example, Patent Owner contends that Petitioner has failed to demonstrate that the cited art meets the limitation of “determining a score.” PO Resp. 52. As to Aiteanu, Patent Owner contends weld thickness is not a score. *Id.* As to Choquet and Da Dalto, Patent Owner dismisses the performance graphs in those references as “illegible.” *Id.* at 54–56.

We discussed these arguments in our Institution Decision. Paper 11, 26–28. We have construed “score” as a numeric value based on how close to optimum a user is for a particular tracked parameter. *See* IV.A.i., *supra*.

Petitioner argues that Aiteanu teaches scoring. Pet. Reply 29–32. Petitioner refers to the colorized icons that display optimum and actual torch positions with a color shift from red to green as the torch moved farther from the optimum position. *Id.* at 30–31. Petitioner contends also that Aiteanu’s thickness calculation is a score. *Id.* at 31. We are not persuaded by these arguments. Our construction of “score” requires determining a “numeric value.” The colorized icons in Aiteanu do not meet this limitation. Further, under our construction the value must be based on how close to optimum a user is for a particular parameter being tracked. The weld thickness graphic in Aiteanu (*see supra*) displays the calculated thickness and (arguably) an “optimum” value of 3 millimeters. It fails, however, to explain how the thickness “score” is based on how close to optimum a user is. For these reasons we find that Aiteanu alone does not meet the scoring limitation.

Petitioner relies also on Da Dalto and Choquet to meet this scoring limitation. Pet. Reply 32–40. Dr. Graeser testifies that both Choquet and Da Dalto describe upper, lower, and optimum values for welding parameters,

and a percentage score for how accurate the welder was for a particular try. Graeser Decl. ¶¶ 86–90 (Da Dalto), ¶¶ 91–95 (Choquet).

Patent Owner asserts that Choquet and Da Dalto do not meet this limitation because the text in the black and white figures cited by Petitioner is illegible. PO Resp. 54. Patent Owner contends, specifically, that “[b]ecause their text is illegible, Choquet and Da Dalto do not teach percentages.” *Id.* We are not persuaded by this argument. Petitioner has provided more legible color copies of the figures, and Dr Graeser refers to them in his testimony. Graeser Decl. ¶¶ 88–90, 93–95.⁸ In addition, Petitioner has provided a color reprint of Da Dalto. Ex. 1031.

Patent Owner contends that by referring in his declaration to the more legible color copies of these figures from Da Dalto and Choquet, Dr. Graeser is relying on “different references.” PO Resp. 54–56. Patent Owner makes a similar argument for the color reprint of Da Dalto (Ex. 1031 Fig. 4) submitted by Petitioner and referred to by Dr. Graeser. Graeser Decl. ¶¶ 40, 90. This argument is similar to Patent Owner’s “prima facie case” argument, that copies of the Aiteanu thesis differing in minor formatting details constitute different references. *See* discussion *supra*. Patent Owner does not dispute that these more legible figures are the same as those in the documents relied upon in the Petition. For the reasons discussed with respect to the Aiteanu thesis, we are not persuaded by Patent Owner’s

⁸ As he explains in his declaration, Dr. Graeser obtained these copies from materials provided by CS Wave and 123 Certification Inc. Those companies offered the commercial welding trainers described in Da Dalto and Choquet. Graeser Decl. ¶¶ 88, 91. *See* Exs. 1007 (CS Wave User Manual), 1011 (ARC+ Customer Presentation).

attempt to discredit Dr. Graeser's testimony on the basis of legibility of these drawings.

Patent Owner's secondary argument assumes that Da Dalto's and Choquet's figures are legible, and focuses on claim 89, which requires "a processor subsystem configured . . . to determine a score based on a comparison of said at least one welding parameter to an optimum value." PO Resp. 56. According to Patent Owner, the percentages shown on the graphs in Choquet and Da Dalto represent how often a particular welding parameter falls within a given range, which does not involve a comparison to an optimum value. *Id.* at 57.

Petitioner responds that, in welding, an optimum value can include a range. Pet. Reply 36. Petitioner points to Figure 6 of the '398 patent, which is referred to in the patent's only discussion of scoring:

FIG. 6

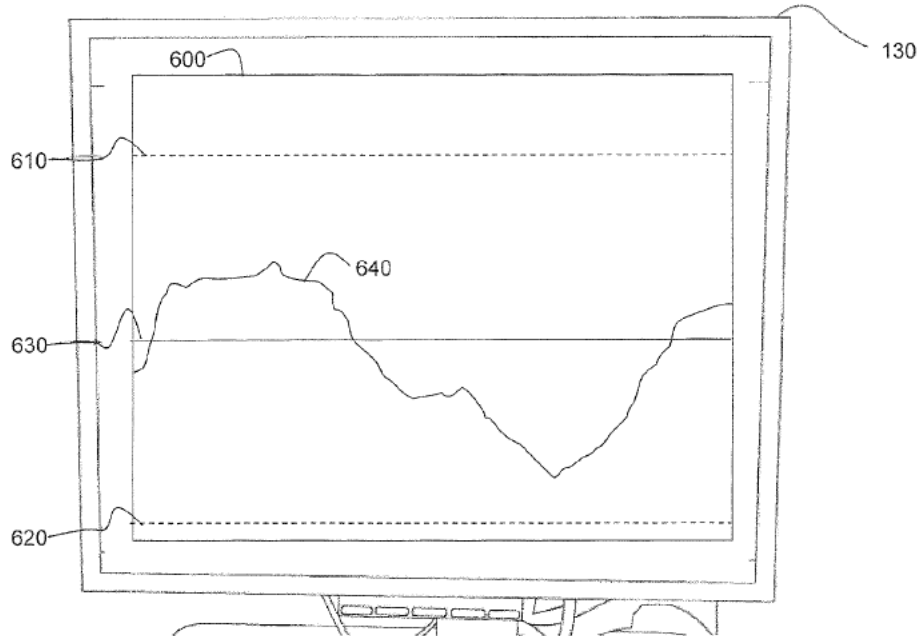
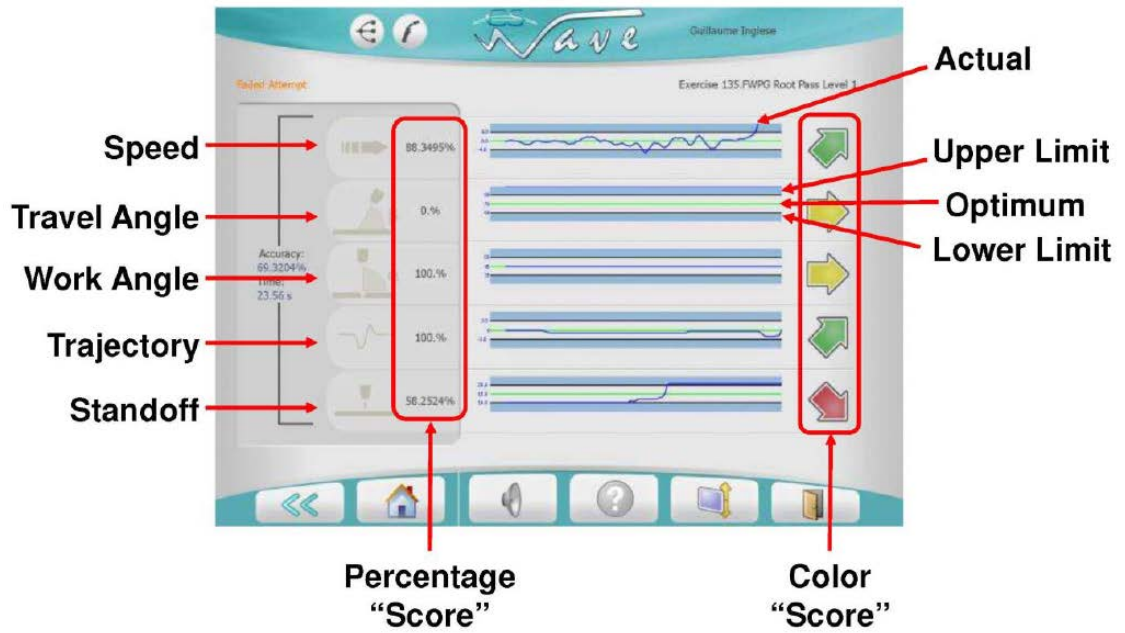
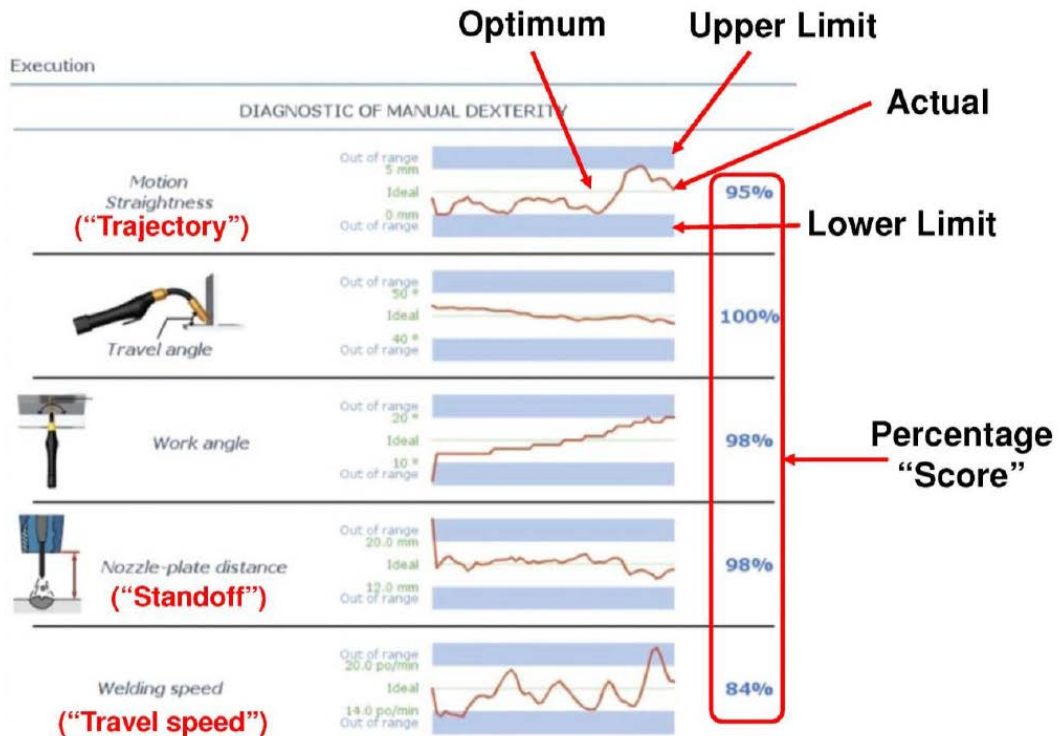


Figure 6 of the '398 patent illustrates a graph 600 showing tracked welding tool pitch angle 640 versus time with respect to an upper pitch angle limit 610, a lower pitch angle limit 620, and an ideal pitch angle 630. The upper and lower limits 610 and 620 define a range of acceptability between them. Ex. 1001, 6:51–56. Petitioner contends that this figure, showing upper and lower limits, is the “only example” the '398 patent provides of an optimum value for the tracked properties. Pet. Reply 36.

We agree with Petitioner that this example from the '398 patent specification supports the conclusion that the optimum value can be a range. Moreover, we agree with Petitioner that the similar graphs in Da Dalto and Choquet meet this limitation; three such figures from Da Dalto and Choquet (with annotations by Petitioner) are reproduced below:



The figure above is an annotated graphic showing Da Dalto's display.
 Graeser Decl. ¶ 89.



The figure above is an annotated graphic showing Choquet's display. *Id.* at ¶ 94.



The figure above is an annotated graphic showing tracking of seam thickness in Choquet. *Id.* ¶ 94. These graphics and the testimony from Dr. Graeser persuade us that both Choquet and Da Dalto teach determining a score based on a comparison of said at least one tracked spatial property to an optimum value. Also supporting this conclusion is the testimony of Petitioner's welding expert, Mr. Bohnart. Bohnart Decl. ¶ 18. We note that Mr. Bohnart has many years of experience in welding and has written and taught extensively in that field. Bohnart Decl. ¶ 3, Ex. 1070 (Bohnart CV). We find his testimony to be credible and helpful in this case. For these reasons, we determine that Da Dalto and Choquet meet the scoring limitation.

Furthermore, Dr. Graeser provides a convincing rationale for modifying Aiteanu in accordance with these teachings. Graeser Decl. ¶¶ 96–99. Specifically, Dr. Graeser testifies that Aiteanu is a computer-

based system, with software models to evaluate seam thickness, and therefore collects the raw data for whatever display of information is desired. *Id.* ¶ 96. He further testifies that Da Dalto and Choquet, as well as Stöger, show the same thing as Aiteanu, namely, real-time welding activity, spatially tracked and analyzed to determine whether a process parameter is out of limits. *Id.* ¶ 97. He testifies, with reference to the TEREDES project, that use of a graphical display instead of a numerical score was a matter of design choice. *Id.* ¶ 99. He concludes that a person of ordinary skill would have had no difficulty combining the analysis features of Da Dalto and Choquet with Aiteanu. *Id.* ¶ 96. We agree with and adopt Dr. Graeser’s analysis, and are, therefore, satisfied that on this record Petitioner has met its burden on this issue of combining the references. Patent Owner does not challenge this rationale.

c. Representative Claim 141

This claim depends from claim 139, discussed *supra*, and further recites the following:

141. The system of claim 139, wherein said determination of said score is performed in real time or near real time.

We addressed this limitation in our Institution Decision (Paper 11, 29–30) by referring to Da Dalto’s description: “Each exercise is based on pre-defined parameters that are monitored during the exercise in order to assess the trainee’s performance.” Ex. 1006, 16. In addition, we referred to the fact that Dr. Graeser describes Aiteanu as a real time system. Graeser Decl. ¶ 57 (“Aiteanu . . . provid[es] a real time, numerical assessment of the seam cross sectional thickness.”). Likewise, he describes Choquet and Da Dalto as real time systems. Graeser Decl. ¶ 91 (“Like Aiteanu, Choquet also

presents additional real time analysis of the weld itself, including seam thickness.”), ¶ 97 (“All of these systems [referring to Aiteanu, Choquet, and Da Dalto] . . . show the same thing: real time welding activity, tracked in space, and analyzed to determine whether a process parameter is in or out of limit.”).

Patent Owner contends that “the Petition does no[t] show the art of record teaches determining a score in real time or near real time.” PO Resp. 60. Patent Owner further argues that “the numbers and graphs in Choquet are not determined in real time.” *Id.*

Patent Owner’s argument is unavailing for several reasons. First, it does not address the combination of Aiteanu and Da Dalto or Aiteanu and Choquet that was a basis for the Board’s Institution Decision. As noted *supra*, we specifically referred in our Institution Decision to Dr. Graeser’s testimony that Aiteanu provides a “real time, numerical assessment” of weld seam thickness. Paper 11, 30. Patent Owner’s argument ignores the showing that Aiteanu provides a real-time display of welding performance, a fact that Patent Owner’s counsel conceded at oral argument:

[THE BOARD]: Do you contend that the [Aiteanu] display is in real time?

[PATENT OWNER’S COUNSEL]: There are real time aspects to Aiteanu. I do understand that there is real time aspects of it.

[THE BOARD]: Because it’s putting up those displays in the welder’s helmet while the welding is going on. That’s real time, isn’t it?

[PATENT OWNER’S COUNSEL]: I understand that to be true.

Hr’g Tr. 49:14–21.

Patent Owner's argument fails for the additional reason that the claim does not call for displaying a score in real time, it calls for "*determination* of said score is performed in real time or *near real time*." (Emphasis added.) As Petitioner points out, and as Dr. Graeser's testimony indicates, in Da Dalto and Choquet, performance is monitored in real time during the welding activity, even if it may not display until the end. Pet. Reply 39; Graeser Decl. ¶¶ 91, 97. Finally, the claim does not just call for "real time"; it also includes "near real time." Patent Owner's argument consistently ignores this distinction in the claim language, as in its statements: "The numbers and graphs in Choquet and Da Dalto are not determined in real time" and "[t]he Board can readily see for itself Choquet and Da Dalto do not describe a [sic] determining a score in real time." PO Resp. 60, 61. This failure to account for the differences in the claim language is an additional reason why Patent Owner's argument fails, for "near real time," a term not defined in the specification, can reasonably include a post-activity display of results. See the following discussion at the oral hearing:

[THE BOARD]: What do you mean by "near real time?" First of all, real time itself is sometimes a debatable term, but here we have further complication because it says "near real time." How close does it have to be to real time to be near real time?

[PATENT OWNER'S COUNSEL]: That would be a better question for the district court in an assessment of an infringement case. Here, what the prior art discloses is waiting until the end, and then after everything is all done, displaying splash screens.

[THE BOARD]: It's better than waiting a week, right?

[PATENT OWNER'S COUNSEL]: Yes.

Hr'g Tr. 48:13–25.

d. Representative Claims 52, 89–92, 95, and 96

Patent Owner does not address, individually, the remaining representative claims (claims 52, 89–92, 95, and 96) in this ground. We adopt as additional findings the analysis of these claims set forth in Petitioner’s claim charts. Pet. 41–42. To the extent that Patent Owner has not raised arguments against these other representative claims in its Patent Owner Response or its Sur-replies, those arguments are waived. *See supra*.

In summary, we determine that Petitioner’s analysis of representative claims 33, 52, 89, 90, 91, 92, 95, 137, 138, 139, 140, and 141 demonstrates by a preponderance of the evidence that those claims would have been obvious over Aiteanu in combination with Da Dalto or Choquet.

iii. Ground 3 (Aiteanu and Stöger or Da Dalto)

The representative claims challenged in Ground 3 are claims 12 and 81. Both are dependent claims. Claim 12 depends from representative claim 9, discussed *supra*. Claim 81 depends from claim 69, which is included in Ground 1.

Petitioner describes the claims challenged by this ground as the same as Ground 1, except the dependent claims add features relating to “back end networking and administrative functions.” Pet. 52. Petitioner also cites different features such as “minor variations on the sensor choice and location (on the torch), and robotic welding, features to date not relied on by [Patent Owner] to distinguish the art.” *Id.* at 53. Petitioner contends Aiteanu discloses multiple computers networked together, suggesting a built in networking capability. *Id.*

Claim 12 calls for “a network interface configured to interface said processor based computing device to an external communication network.”

Petitioner contends Stöger and Da Dalto add the disclosure of a network element where multiple welding stations are networked together for gathering information from multiple processes and other minor details. Pet. 7, 52–53. Petitioner contends a person of ordinary skill would have combined Aiteanu with Da Dalto or Stöger. *Id.* at 54–55. Among other reasons, Petitioner contends that Aiteanu suggests networking multiple devices and using a network would have been obvious in a multi-user environment. *Id.* at 54.

Claim 81 calls for performance of the welding process by a robotic welder. According to Petitioner, Aiteanu discloses a robotic arm, and it would have been obvious to add to Aiteanu the robotics from Stöger. *Id.* at 54–55.

Further details of Petitioner’s analysis are set forth in the claim charts appearing at pages 55 and 59 of the Petition and paragraphs 100–110 of Dr. Graeser’s Declaration.

Patent Owner does not separately argue either of these claims. We adopt as additional findings the analysis of those claims set forth in Petitioner’s claim charts for claims 12 and 81 and its rationale for combining the references. To the extent that Patent Owner has not raised arguments against these claims in its Patent Owner Response or its Sur-replies, those arguments are waived. *See supra.*

In summary, we determine that Petitioner’s analysis of representative claims 12 and 81 demonstrates by a preponderance of the evidence that those claims would have been obvious over Aiteanu and Stöger or Da Dalto.

iv. Ground 4 (Aiteanu, Choquet or Da Dalto, and Stöger)

Claim 168 is the only representative claim challenged in Ground 4. Claim 168 depends directly from claim 167 and indirectly from independent claim 161, which is included in Ground 2.

Claim 168 adds the feature “wherein said processor based computing device is further configured to record at least one of weldment materials, electrode materials, user name, and project ID number.” Petitioner’s obviousness analysis relies on Aiteanu, Choquet, and Da Dalto. The details are provided in a claim chart at page 59 of the Petition, which refers back to claim 31. For that claim, which is similar to claim 168, Petitioner cites the disclosure in Aiteanu of storing various information such as an identifier assigned to the various workpieces and a code that permits the evaluation unit to assign a welder’s name and number. Pet. 57–58. Claim 31, in turn, refers back to claim 156, which cites Aiteanu, Da Dalto and Choquet. *Id.* at 47. In addition, Dr. Graeser testifies:

Stöger and Da Dalto explicitly track user information and information about the job itself. Aiteanu suggests this also. Ex. 1003 p.10. It would have been obvious, given the desire to track more than one welder, to add the back end multi-user features of Da Dalto and Stöger to Aiteanu.

Graeser Decl. ¶ 111.

Patent Owner does not separately argue claim 168. We credit Dr. Graeser’s testimony and Petitioner’s analysis, and conclude that Petitioner has demonstrated by a preponderance of the evidence that this claim would have been obvious. We adopt as additional findings the analysis set forth in Petitioner’s claim charts for claims 168 and 31. To the extent that Patent

Owner has not raised arguments against this claim in its Patent Owner Response or its Sur-replies, those arguments are waived. *See supra*.

In summary, we determine that Petitioner's analysis of representative claim 168 demonstrates by a preponderance of the evidence that this claim would have been obvious over Aiteanu, Choquet or Da Dalto, and Stöger.

v. Claim 142

Claim 142 includes the limitation that “an expert system identifies defective or potentially defective areas along said real world weld.” In our Institution Decision, we concluded with respect to expert systems that “[w]e do not find sufficient disclosure of such a system in the portions of Aiteanu cited by Petitioner.” Paper 11, 21. On that basis, we declined to institute *inter partes* review on a number of claims. *Id.*

Both Petitioner and Patent Owner recognize that the inclusion of claim 142 was an error because it refers to expert systems. PO Resp. 13. Patent Owner asserts that we should therefore determine that claim 142 is patentable in this Final Written Decision. *Id.* Petitioner, on the other hand, requests that the claim be “removed from the list of instituted claims.” Pet. Reply 17.

We agree with the parties that there was an error and claim 142 should not have been included in this *inter partes* review. Because this was an error by the Board, and neither party has addressed the patentability of claim 142 post-institution, we determine that the appropriate remedy is to terminate the proceeding as to that claim under 37 C.F.R. § 42.72.

vi. Remaining Claims

As discussed at the outset, the parties agreed to 20 representative claims. Paper 25, 2. Further, at our request, Patent Owner submitted a

memorandum “associating each of the . . . representative claims with one or more of the remaining claims of the ’398 patent for which trial was instituted.” *Id.*; Paper 27. Patent Owner provided the following chart:

Representative Claim	Associated Remaining Claims
9	10, 11, 13, 21, 22, 30, 37, 39–41, 45, 69, 80, 82–85, 88, 185
12	26–28, 31, 38
14	15, 16, 17, 19, 46, 49, 56, 58–62, 66, 104, 116–20, 123
23	20
24	25, 67, 68
33	34–36
52	53–55, 112–15
81	18, 47, 48, 50, 57
89	99, 102, 103, 124, 131–33, 134, 135, 136
90	125
91	100, 101, 126
92	127
95	130
96	97, 98
137	143, 145–50, 155–62, 167, 169–74, 179–84, 186–88, 190, 192, 194
138	142
139	152, 164, 175
140	153, 165, 176
141	154, 166, 177, 189, 191, 193, 195
168	144

Paper 27, 1.⁹ Further, Patent Owner represented: “[Patent Owner] currently believes each representative claim and its associated remaining claims stand or fall together.” *Id.* Patent Owner did not alter this representation in its Patent Owner Response. *See generally* PO Resp. Our determination that each of the representative claims 9, 12, 14, 23, 24, 33, 52, 81, 89–92, 95, 96,

⁹ Patent Owner’s chart omits claim 29. We associate it with representative claim 12, from which it depends. In addition, we have dealt separately with claim 142, which was erroneously included in the trial. *See supra*.

137–141, and 168 is not patentable, therefore, applies also to all the associated remaining claims.

V. CONCLUSION

Petitioner has demonstrated by a preponderance of the evidence that:

A. The following claims of the '398 patent are unpatentable over Aiteanu under 35 U.S.C. § 103(a): claims 9–11, 13–17, 19–25, 30, 37, 39–41, 45, 46, 49, 56, 58–62, 66–69, 80, 82–85, 88, 104, 116–120, 123, and 185;

B. The following claims of the '398 patent are unpatentable under 35 U.S.C. § 103(a) over Aiteanu and Choquet or Da Dalto: claims 33–36, 52–55, 89–92, 95–98, 100–103, 112–115, 124–127, 130–133, 135–141, 143, 145–150, 152–162, 164–167, 169–177, 179–184, and 186–195;

C. The following claims of the '398 patent are unpatentable under 35 U.S.C. § 103(a) over Aiteanu and Stöger or Da Dalto: claims 12, 18, 26–29, 31, 38, 47, 48, 50, 57, and 81; and

D. The following claims of the '398 patent are unpatentable under 35 U.S.C. § 103(a) over Aiteanu, Choquet or Da Dalto, and Stöger: claims 99, 134, 144, and 168.

VI. ORDER

It is, therefore,

ORDERED that claims 9–12, 13–31, 33–41, 45–50, 52–62, 66–69, 80–85, 88–92, 95–104, 112–120, 123–127, 130–141, 143–150, 152–162, 164–177, and 179–195 of the '398 patent are unpatentable under 35 U.S.C. § 103(a);

FURTHER ORDERED that *inter partes* review of claim 142 of the '398 patent was instituted in error and is, therefore, terminated under 37 C.F.R. § 42.72; and

FURTHER ORDERED that this is a Final Written Decision of the Board under 35 U.S.C. § 328(a); parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

Case IPR2016-00840
Patent RE45,398

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Case IPR2016-00840
Patent RE45,398

I hereby certify that the original of this Notice of Appeal was filed via U.S.P.S. Priority Mail Express on December 1, 2017 with the Director of the United States Patent and Trademark Office at the address below:

Office of the General Counsel
Director of the U.S. Patent & Trademark Office
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450

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Copies of this Notice of Appeal are being filed and served on December 1, 2017 as follows:

To the U.S. Court of Appeals for the Federal Circuit
Clerk of Court
U.S. Court of Appeals for the Federal Circuit
717 Madison Place, N.W.
Washington, DC 20439

(via CM/ECF – with filing fee)

To the USPTO Patent Trial and Appeal Board
Patent Trial and Appeal Board
Madison Building East
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(via PTAB E2E, as authorized by the Board)

Case IPR2016-00840
Patent RE45,398

To Counsel for Seabery North America, Inc.
(via FedEx and email pursuant to 37 C.F.R. § 42.6(e))

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