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Patent Trial and Appeal Board
INFORMATIVE AS TO § II.A.i
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Paper No. 11
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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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SEABERY NORTH AMERICA INC.,
Petitioner,

v.

LINCOLN GLOBAL, INC.
Patent Owner.

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Case IPR2016-00840
Patent RE45,398

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

GIANNETTI, *Administrative Patent Judge*.

DECISION
Institution of *Inter Partes* Review
37 C.F.R. § 42.108

Seabery North America Inc. ("Petitioner") filed a Petition pursuant to 35 U.S.C. §§ 311–19 to institute an *inter partes* review of claims 1–195 (all 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 grant Petitioner's request and institute an *inter partes* review.

I. 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:
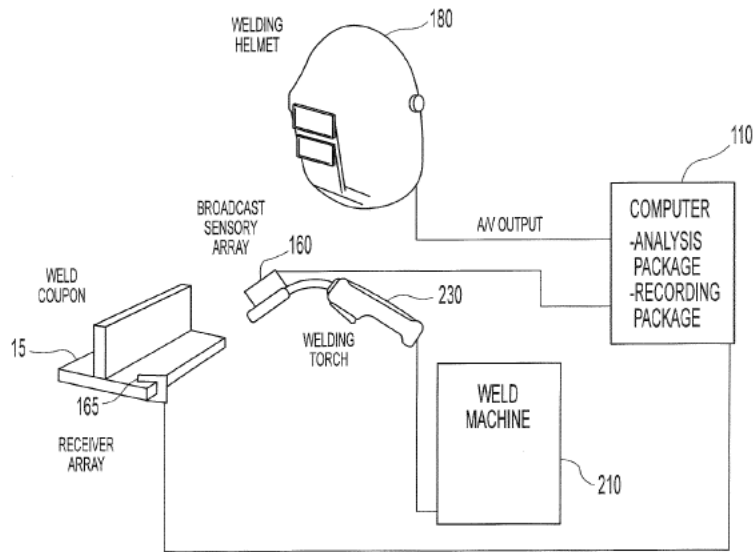
Fig. 2

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 further includes the capability to track automatically the sensed dynamic spatial properties of the welding tool over time, and to

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capture the tracked dynamic spatial properties of the welding tool during the manual welding process. *Id*. at col. 3, ll. 6–11.

The system 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.

B. Illustrative Claim

The '398 patent has 195 claims, 175 of which were added during the reissue proceeding. Claim 9 is illustrative[1]:

> 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

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

interface displaying a quality characteristic of said real world
weld produced by said welding process.

The other claims will be discussed further *infra*.

C. Related Proceedings

Petitioner and Patent Owner identify a related litigation involving the

'398 patent: *The Lincoln Electric Co. et al. v. Seabery Soluciones, S.L. et*

al., Case No. 1:15-cv-01575-DCN (N.D. Ohio). Pet. 1; Paper 8. Patent

Owner identifies requests for *inter partes* reviews involving other patents in

the litigation: IPR2016-00904 and IPR2016-00905. Paper 10. Also,

Petitioner has requested review of another patent involved in the litigation in

IPR2016-00749. Pet. 1.

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

Petitioner relies on the following four 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")[2];

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

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").

In addition to the Petition, Petitioner relies on a Declaration of Dr. Axel Graeser (Ex. 1002; "Graeser Decl."). Patent Owner relies on a Declaration of Kenneth Fast (Ex. 2001; "Fast Decl.") filed with the Preliminary Response.

F. Grounds Asserted

Petitioner challenges the patentability of the '398 patent claims on the following grounds (identified in the Petition as Grounds 1–4):

Reference(s)	Basis	Claim(s)
Ground 1: Aiteanu	35 U.S.C. § 103	1–5, 7–11, 13–17, 19–25, 30, 37, 39–46, 49, 51, 56, 58–73, 79, 80, 82–88, 104, 105, 107–110, 116–120, 123, and 185
Ground 2: Aiteanu and Choquet or Da Dalto	35 U.S.C. § 103	33–36, 52–55, 75–78, 89–98, 100–103, 112–115, 121, 122, 124–133, 135–143, 145–167, 169–184, and 186–195
Ground 3: Aiteanu and Stöger or Da Dalto	35 U.S.C. § 103	6, 12, 18, 26–29, 31, 32, 38, 47, 48, 50, 57, 74, 81, 106, and 111
Ground 4: Aiteanu, Choquet or Da Dalto, and Stöger	35 U.S.C. § 103	99, 134, 144, and 168

II. ANALYSIS

A. *Preliminary Matters*

Patent Owner contends several "procedural defects" and other related matters foreclose granting the Petition. Prelim. Resp. 22–31.

i. *Status of Aiteanu as Prior Art*

Patent Owner contends that there is "no evidence" that Aiteanu qualifies as a printed publication. *Id.* at 22. Patent Owner contends also that there is insufficient evidence of Aiteanu's alleged publication date of March 2006. *Id.* at 23. Patent Owner recognizes that Dr. Graeser, Aiteanu's thesis advisor, addresses this issue in his declaration, but challenges the sufficiency of that showing. *Id.* at 23–24.

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. Dr. Graeser testifies that Dorin 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 library. *Id.* He further testifies that he confirmed it was deposited and thereafter available for retrieval by the public on March 3, 2006. *Id.* He testifies also 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.* 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.

ii. Graham Factors

Patent Owner contends that Petitioner failed to follow *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966), because Petitioner has not identified differences between the claimed systems and the asserted references. Prelim. Resp. 24. As an example, Patent Owner points to a statement in the Petition that the claims included in Petitioner's Ground 1 do not include a "score." *Id.* at 25.

We disagree that Petitioner has failed to follow *Graham*. In considering whether to institute a trial, we look at the Petition as a whole and also take into account the Preliminary Response. 37 C.F.R. § 42.108(c) ("The Board's decision [to institute *inter partes* review] will take into account a patent owner preliminary response where such a response is filed."). Considering the record presented at this stage, we disagree that the asserted differences between the challenged claims and the prior art relied on by Petitioner are not properly identified. Thus, for example, it is clear that Petitioner's statement, above, anticipates Patent Owner's argument that Aiteanu does not calculate a score. *See* Prelim. Resp. 47 ("The Petition alleges Aiteanu's calculated weld thickness is a score. It is not.").

Patent Owner's argument would require a petitioner to concede that there are differences between the prior art and the challenged claims in order to raise obviousness, when the petitioner may believe that there are no such differences but a patent owner may assert that there are. For example, a petitioner would be prevented from arguing, in the alternative, that even if there were such differences, the claims still would have been obvious. We

are not persuaded that Petitioner should be precluded from asserting
obviousness here, where the alleged differences between the claims and the
prior art are apparent from the record.

iii. Section 112, ¶ 6

Claims 1–8 contain means-plus-function limitations. For such terms,
our rules require the petition to provide specific identification of the function
and the corresponding structure in the specification. 37 C.F.R.
§ 42.104(b)(3). Patent Owner contends that the Petition should be denied as
to these claims because it fails to provide the appropriate constructions for
several means-plus-function terms. Prelim. Resp. 26–28. This argument
will be addressed *infra*, in discussing claim construction.

iv. Redundancy

We are not persuaded by Patent Owner's argument that the Board
should not institute trial on Petitioner's Grounds 2, 3, and 4 based on
"redundancy." Prelim. Resp. 28. Given the fact that the '398 patent
contains 195 claims, we do not regard the four grounds of challenge and the
number of references relied upon in the Petition as excessive or unduly
burdensome.

B. 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 offer constructions for several claim terms. Pet. 8–13; Prelim. Resp. 4–21. We address these to the extent necessary to resolve the issues before us at this stage. *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. Means-Plus-Function Terms

As noted above, claims 1–8 are written in means-plus-function format. Accordingly, Petitioner is required to provide specific identification of the function and the corresponding structure in the specification. 37 C.F.R. § 42.104(b)(3). Patent Owner contends that Petitioner has failed to meet this requirement. Prelim. Resp. 26–28. We agree.

Claim 1 reads as follows:

> 1. A system for tracking and analyzing welding activity, said system comprising:
>
> means for automatically sensing spatial properties of a welding tool during a welding process producing a real world weld;
>
> means for automatically tracking said sensed spatial properties during said welding process;
>
> means for automatically capturing in real time or near real time said tracked dynamic spatial properties as tracked data during said welding process; and
>
> means for automatically analyzing in real time or near real time said tracked data to determine a quality characteristic of said real world weld produced by said welding process.

For the claim element "means for automatically tracking said sensed spatial properties . . . .," Petitioner identifies "a computer, programmed with an algorithm that determines the position in space over time of an object" as

the corresponding structure. Pet. 9–10. The algorithm itself is not identified. Under such cases as *Aristocrat Technologies Australia Pty Ltd. v. International Game Technology*, 521 F.3d 1328 (Fed. Cir. 2008), that identification of structure is not sufficient. "In cases involving a computer-implemented invention in which the inventor has invoked means-plus-function claiming, this court has consistently required that the structure disclosed in the specification be more than simply a general purpose computer or microprocessor." *Aristocrat*, 521 F.3d at 1333. For such terms, an algorithm is required. *Id.* at 1337–38. Thus, we do not agree with Petitioner's proposed construction of this term, which does not identify an algorithm.

Similarly, for the claim element "means for automatically capturing in real time or near real time said tracked dynamic spatial properties . . . .," Petitioner identifies block 110 of Figure 2, reproduced above, as corresponding structure. Petitioner thus asserts that the broadest reasonable interpretation of this term is "computerized storage or the step of storing in a computer." Pet. 10 (citing also Ex. 1001, Fig. 5, block 540; col. 3, l. 64–col. 4, l. 2; col. 6, ll. 2–15; col. 5, ll. 25–28). Under *Aristocrat*, however, this is insufficient because no algorithm is identified. Thus, we do not agree with Petitioner's proposed construction of this term.

Similarly, for the term "means for automatically analyzing in real time or near real time said tracked data . . .," Petitioner does not identify any corresponding structure. *Id.* at 11.

We conclude that Petitioner has failed to provide a proper 35 U.S.C. § 112 ¶ 6 analysis of claims 1–8, and therefore we deny institution of an *inter partes* review as to those claims. We do not reach the issue of whether

the claims are indefinite because we are constrained by statute to reviewing challenges under 35 U.S.C. §§ 102 and 103. *See* 35 U.S.C. § 311(b).

ii. Welding/Weld/Weld Joint

Petitioner construes "weld," when used as a noun in the claims, as referring to the melted and fused joint. Pet. 9. Petitioner construes "welding" as the act of forming a weld. *Id.* Patent Owner does not propose a construction for this term. We determine that no construction of these terms is necessary.

iii. Determining a Score/Computing a Score

Petitioner contends that the broadest reasonable construction of "determining a score" is "calculating a numeric value based on at least one performance characteristic and at least one quality characteristic." Pet. 12. Patent Owner contends that claim term "score" should be given its plain meaning in light of the specification: a number that expresses accomplishment or excellence by comparison to a standard. Prelim. Resp. 10.

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, we construe "score" as a numeric value based on how close to optimum a user is for a particular tracked parameter.

iv. Expert System

Petitioner construes this term as "[a] system that uses a set of rules." Pet. 13. Patent Owner construes it as "a computer system that emulates the decision-making ability of a human expert." Prelim. Resp. 4–5. We are not

persuaded by Petitioner's proposed construction as it is not consistent with the specification. The '398 patent specification states:

> 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. . . . The expert system *may be ruled-based* and/or may incorporate fuzzy logic to analyze the weld joint.

Ex. 1001, col. 7, ll. 25–33 (emphasis added). The specification does not require the expert system to be rule-based. We are persuaded that Patent Owner's proposed construction is more consistent with the specification. We, therefore, construe "expert system" as a computer system that emulates the decision-making ability of a human expert.

v. Quality Characteristic of a Weld

Petitioner contends that the proper construction of "determining a quality characteristic" and similar claim terms is "calculating a property of a weld." Pet. 11. Petitioner asserts that such quality characteristics are assessments of the actual weld, as opposed to assessments of the welder or welding torch. *Id.* 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. Prelim. Resp. 7.

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. We, therefore, 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.

vi. Other Terms

We have reviewed the other constructions proposed by the parties in light of the arguments presented and are not persuaded that any further constructions are necessary at this stage.

C. *Level of Ordinary Skill in the Art*

The parties differ on the level of ordinary skill in the art at the time of the invention. According to Petitioner, "[a] person of ordinary skill . . . would have held at least a Bachelor's of Science in Electrical or Mechanical Engineering, as well as at least 4 years of experience designing computer controlled manufacturing systems including systems for welding." Pet. 8. According to Patent Owner, "[a] person of ordinary skill in the art, correctly defined, is someone with first-hand work experience in welding, a degree or training in advanced welding techniques, and an educational background or professional skills in developing computer-assisted spatial tracking applications." Prelim. Resp. 3 (citing Fast Decl. ¶ 19).

We are not persuaded that a person of ordinary skill would necessarily have had first-hand work experience in welding. 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."). Nor are we convinced that a mechanical or electrical engineering degree was necessary. Many computer systems designers or programmers have degrees in computer science, mathematics, physics, or other technical disciplines. In that connection we find we find Dr. Graeser's testimony helpful. *See* Graeser Decl. ¶ 47 ("The

field to which the '398 patent is directed is the field of Augmented Reality systems, simulation systems, and electronic based training systems."). Accordingly, we determine 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.

D. Description of Prior Art Asserted

i. Aiteanu

The Aiteanu thesis (Ex. 1003) 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. 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. Further details of Aiteanu will be presented in the following discussion.

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.

E. Petitioner's Challenges

As noted *supra*, 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 provides a detailed analysis including claim charts of the claims in relation to the references relied upon. Pet. 14–33 (Ground 1), 33–52 (Ground 2), 52–59 (Ground 3), and 59 (Ground 4). Further details are presented in Dr. Graeser's Declaration. We discuss these four Grounds in turn.

i. Ground 1

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. According to Petitioner, 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 and which is contested by Patent Owner. *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 seam thickness at different points along the seam reveals "discontinuities and flaws," i.e., points where the thickness is unacceptably high or low. *Id.* 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. *Id.* at 16. Petitioner states this calculated thickness is displayed as a numeric value. *Id.* Petitioner 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 are 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 all the Ground 1 claims are present in Aiteanu. Pet. 32. However, Petitioner recognizes that Patent Owner may contend the "expert system" and "neural network" features of claims 42–44, 63–65, 86, and 87 are missing from Aiteanu. *Id.* Petitioner contends that "[t]he prior art already suggested using an expert, 'neural network' system, in Aiteanu itself." *Id.* at 33 (citing Ex.

1003, 11). We will discuss these contentions further when considering Patent Owner's response *infra*.

ii. Ground 2

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 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.

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. We will discuss these contentions further when considering Patent Owner's response *infra*.

iii. Ground 3

Petitioner describes 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.*

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 or 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. According to Petitioner, other features it would have been obvious to add to Aiteanu include robotics from Stöger and recording and tracking for record keeping from Stöger and Da Dalto. *Id.* at 54–55.

Further details of Petitioner's analysis are set forth in the claim charts appearing at pages 55–59 of the Petition and paragraphs 100–116 of Dr. Graeser's Declaration. We will discuss these contentions further when considering Patent Owner's response *infra*.

> ### iv. Ground 4

The four claims in this Ground depend from Ground 2 claims and add features from Stöger and Da Dalto discussed in connection with Ground 3. Pet. 59. The details of Petitioner's analysis is provided in a claim chart at page 59 of the Petition and paragraphs 100–116 of Dr. Graeser's Declaration.

F. Patent Owner's Responses

Patent Owner contends that the Grounds proposed by Petitioner fail to establish a reasonable likelihood of prevailing. Prelim. Resp. 31–59. Before specifically addressing the claims, Patent Owner outlines its argument as follows:

1. Aiteanu proposes a weld-thickness model. But weld thickness "standing alone" does not indicate weld quality. *Id.* at 31.

2. Even if weld thickness were a quality indicator, Aiteanu's system does not make any judgments about weld quality. It only presents modeled thickness. *Id.*

3. The '398 patent is about automatically assessing weld quality with a computer-based system. Aiteanu does not do this. *Id.*

At this point, the Preliminary Response addresses the individual claims in groups. As Patent Owner's contentions do not track the claim groupings in the grounds provided by Petitioner, we shall discuss them separately in the order presented by Patent Owner.

Patent Owner Contention No. 1: "*Aiteanu does not teach an expert system configured to identify defective or potentially defective areas of a weld (claims 42, 63, 86, 121, 151, 163, and 178 and their dependent claims)*"

According to Patent Owner, these claims in Grounds 1 and 2 require an expert system configured to identify defects or potential defects in a weld joint. Prelim. Resp. 32. Patent Owner contends that Aiteanu does not teach this limitation. *Id.*

We agree with Patent Owner. We construed "expert system" as "a computer system that emulates the decision-making ability of a human expert." We do not find sufficient disclosure of such a system in the portions of Aiteanu cited by Petitioner. First, Petitioner's analysis is predicated on an overly-broad definition of expert system as a set of rules, which we did not adopt. Moreover, the passing reference in Aiteanu to a "neural net" in connection with a prior system is insufficient disclosure of an expert system and certainly does not teach or suggest a modification of Aiteanu. In addition, the '398 patent distinguishes between neural nets and expert systems. Ex. 1001, col. 7, ll. 42–51. The patent explains that neural nets may be incorporated into the expert system (analysis engine 122). *Id.* at col. 7, ll. 42–43.

Because we conclude that Aiteanu does not teach or suggest use of an expert system with the system described, we determine that Petitioner has failed to establish a reasonable likelihood of succeeding on its challenge to these claims.

Patent Owner Contention No. 2: "Aiteanu does not teach an expert system (claims 93 and 128 and their dependent claims)"

These claims in Ground 2 also contain the expert system limitation discussed above. Prelim. Resp. 36. Patent Owner contends that the same analysis applies here as for claim 42, discussed *supra*, because the Petition does not rely on either Choquet or Da Dalto to meet the expert system limitation. *Id.* at 37.

We agree with Patent Owner. Because we conclude that Aiteanu does not teach or suggest use of an expert system with the system described, we determine that Petitioner has failed to establish a reasonable likelihood of succeeding on its challenge to these claims.

Patent Owner Contention No. 3: "Aiteanu does not teach comparing performance data to known parameters to determine a quality characteristic of a weld (claims 32, 51, 70, and 105, and their dependent claims)"

The claims in this grouping are in Grounds 1 and 3 and recite "comparing said performance data to known parameters to determine said quality characteristic of a weld." Patent Owner contends that Aiteanu does not meet this limitation. Prelim. Resp. 38. Specifically, Petitioner contends:

> Aiteanu does not teach the calculated weld thickness is based on a comparison of torch speed or angle (the alleged performance data) to known parameters. Ex. 2001 ¶ 48. Instead, Aiteanu calculates weld thickness from the input parameters directly, without comparing them to any other parameters. *Id.*

Id. at 39. We agree with Patent Owner. The Petition does not persuade us that this requirement is met. For example, Petitioner's analysis of claim 32 (in Ground 3) refers back to its analysis of claim 1, element 5, which relies only on Aiteanu (in Ground 1). Pet. 58. The description in that analysis does not teach or suggest a comparison to known parameters. *See id.* at 19–

21. Because we conclude that Aiteanu does not teach or suggest such a comparison, we determine that Petitioner has failed to establish a reasonable likelihood of succeeding on its challenge to these claims.

Patent Owner Contention No. 4: "Aiteanu does not teach the limitations relating to discontinuities and flaws (claims 8, 20, 23, 71, 107, 139, 152, 164, and 175 and their dependent claims)"

The claims in this grouping are in Grounds 1 and 2 and recite limitations relating to "discontinuities" and "flaws" in the weld. Prelim. Resp. 39. Claim 8, in means-plus-function format, depends from claim 1 and is considered in connection with Claim Construction, *supra*, and Patent Owner's Contention No. 11, *infra*. Claim 71 depends from claim 70 and claim 107 depend from claim 105, and therefore are considered (along with their dependent claims 72–79 and 108–111) in our discussion of Patent Owner's Contention No. 3, *supra*. The following discussion is directed only to the remaining claims identified by Patent Owner.

As noted in the discussion above, the Petition identifies Aiteanu's modeled weld seam thickness as a quality characteristic. Further, relying on Dr. Graeser, the Petition, referring to an example experiment depicted in Figure 8-36 of Aiteanu, asserts that a "dip" in the thickness would have been recognized as a discontinuity by a person of ordinary skill. Pet. 16 (citing Graeser Decl. ¶ 80).

Patent Owner contends that Dr. Graeser's opinion "has no probative value." Prelim. Resp. 41. Patent Owner contends that because Dr. Graeser's ordinary artisan "knows nothing about welding," he or she has no basis to say whether the 1-mm "'dip' in thickness" in Figure 8-36 of Aiteanu is a discontinuity. *Id.* Further, relying on the testimony of its expert, Mr. Fast, Patent Owner contends an ordinary artisan would have recognized that

Aiteanu's calculated weld thickness alone, without additional information, does not provide enough to identify a discontinuity or flaw. Prelim. Resp. 42 (citing Fast Decl. ¶ 51).

We are not persuaded by Patent Owner's argument. We disagree that Dr. Graeser's opinion should be given no weight. It is within our discretion to assign the appropriate weight to testimony offered by the witnesses. *See, e.g., Yorkey v. Diab*, 601 F.3d 1279, 1284 (Fed. Cir. 2010) (holding the Board has discretion to give more weight to one item of evidence over another "unless no reasonable trier of fact could have done so"). We find Dr. Graeser's testimony helpful on this issue. Also, we disagree with Patent Owner's position that a person of ordinary skill has to be an expert in welding. *See* discussion *supra*. Thus, at this stage in the proceeding, we resolve this conflict in testimony on this issue between Dr. Graeser and Mr. Fast in favor of Petitioner. 37 C.F.R. § 42.108(c) ("The Board's decision will take into account a patent owner preliminary response where such a response is filed, including any testimonial evidence, but a genuine issue of material fact created by such testimonial evidence will be viewed in the light most favorable to the petitioner solely for purposes of deciding whether to institute an *inter partes* review."). Accordingly and for the reasons explained in the Petition, we determine that Petitioner has established a reasonable likelihood of succeeding on its challenge to these claims.

Patent Owner Contention No. 5: *"Aiteanu does not teach the limitations relating to porosity and weld overfill (claims 24, 67, 79, 108, 140, 153, 165, and 176 and their dependent claims)"*

The claims in this grouping state that the recited flaw in the weld is porosity or weld overfill. Prelim. Resp. 42. These claims fall in Grounds 1 and 2. Claim 79 depends from claim 70 and claim 108 depends from claim

105, and therefore are considered in our discussion of Patent Owner's
Contention No. 3, *supra*. The following discussion is directed only to the
remaining claims identified by Patent Owner.

The Petition alleges Aiteanu's system teaches this limitation, relying
on the graph in Figure 8-36 of Aiteanu and Dr. Graeser's testimony that if
the graph showed a thickness above nominal, that would represent an
"overfill." Pet. 16 (citing Graeser Decl. ¶ 80).

Patent Owner repeats its previous argument that Dr. Graeser's opinion
has no probative value. Prelim. Resp. 43. Patent Owner contends also the
Petition lacks sufficient evidence to establish Aiteanu's calculated weld
thickness would indicate an overfill flaw within a region of a real world
weld. *Id*. at 43–44. Further, an ordinary artisan (correctly defined,
according to Patent Owner) would have recognized that thickness alone,
without additional information, does not provide enough to identify a weld
overfill flaw. *Id.* at 44 (citing Fast Decl. ¶ 52).

Similar arguments were addressed in connection with Patent Owner's
Contention 4 *supra*. For the reasons stated there and for the reasons
explained in the Petition, we determine that Petitioner has established a
reasonable likelihood of succeeding on its challenge to these claims.

*Patent Owner Contention No. 6: "Aiteanu does not teach the
limitations relating to a quality characteristic of a real world weld (claims
9, 14, 16, 69, 104, and 185 and their dependent claims)"*

These claims fall in Ground 1. Prelim. Resp. 45. The Petition alleges
they are unpatentable based on obviousness over Aiteanu alone, relying on
Dr. Graeser's testimony that the "geometric profile of the seam is a quality
characteristic as defined by the patent." Pet. 15 (citing Graeser Decl. ¶ 72).
Claims 70–79, depending from claim 69, and claims 105–111, depending

from claim 104, are considered in our discussion of Patent Owner's

Contention No. 3, *supra*. Claims 121 and 122, depending from claim 104,

are considered in our discussion of Patent Owner's Contention No. 1, *supra*.

The following discussion is directed only to the remaining claims identified

by Patent Owner.

Patent Owner contends Dr. Graeser's supporting opinion that has no

probative value. Prelim. Resp. 45. We do not agree for the reasons

discussed previously. Patent Owner contends the Petition lacks sufficient

evidence to establish Aiteanu's calculated weld thickness indicates weld

quality. *Id.* at 46. Relying on testimony from Mr. Fast, Patent Owner

asserts an ordinary artisan would have recognized Aiteanu's calculated weld

thickness does not indicate how good or bad a real world weld is. *Id.* (citing

Fast Decl. ¶ 50). Again citing Mr. Fast's testimony, Patent Owner also

contends that the American Welding Society (AWS) uses other metrics for

assessing weld quality. *Id.*

At this stage in the proceeding, we resolve this conflict in testimony

between Dr. Graeser and Mr. Fast in favor of Petitioner. 37

C.F.R. § 42.108(c). Accordingly and for the reasons explained in the

Petition, we determine that Petitioner has established a reasonable likelihood

of succeeding on its challenge to these claims.

*Patent Owner Contention 7: "Aiteanu, Choquet, and Da Dalto do not
teach determining a score (claims 33, 52, 75, 89, 112, 124, 137, 141, 149,
154, 161, 166, 173, 177, 186, 187, 189, 191, 193, and 195 and their
dependent claims)"*

These Ground 2 claims recite determining a "score." Prelim. Resp.

47. The following claims are considered in connection with Patent Owner

Contentions Nos. 1–3, *supra*: claims 75–79; 93–94; 128–129; 151; 163, and

178. The following discussion is directed only to the remaining claims identified by Patent Owner.

The Petition alleges these claims are unpatentable based on obviousness over Aiteanu in view of Choquet or Da Dalto. Pet. 6. The Petition alleges Aiteanu's calculated weld seam thickness is a score. *Id.* at 6, 34. Alternatively, Petitioner relies on Choquet and Da Dalto for this feature:

> Choquet and Da Dalto show the concept of a "score" or grade as a percentage. 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.

Pet. 6–7; *also see id.* at 34–38.

Petitioner contends that the graphs of percentages and graphs associated with motion straightness, travel angle, work angle, nozzle-plate distance, welding speed, wire speed, voltage, heat input, weld size, and root penetration allegedly shown in Choquet are scores. Pet. 36 (citing Ex. 1009, Fig. 9). The Petition similarly argues that percentages and graphs for speed, travel angle, work angle, trajectory, and standoff allegedly shown in Da Dalto are scores. *Id.* at 35 (citing Ex. 1006, 17).

Patent Owner contends Aiteanu's calculated weld thickness is just a number that does not express accomplishment or excellence in the weld. Prelim. Resp. 47. Patent Owner contends the alleged graphs in Choquet and Da Dalto are not scores because they are not numbers. *Id.* at 48. Patent Owner contends that certain color screen shots of Choquet's Figure 9 and Da Dalto's Figure 4 are "additional references" that cannot be considered. *Id.* at 48–49. Finally, Patent Owner contends Choquet and Da Dalto "do not teach

percentages" because they are illegible. *Id.* at 49. We are not persuaded by Patent Owner's arguments.

We construed "score" as a numeric value based on how close to optimum a user is for a particular tracked parameter. 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). In addition, Dr. Graeser provides a convincing rationale for modifying Aiteanu in accordance with these teachings. *Id.* ¶¶ 96–99. We are, therefore, satisfied that on this record Petitioner has met its burden on this issue. Moreover, we are not persuaded that by referring to more legible color copies of certain figures, Petitioner is relying on "different references." Prelim. Resp. 48. Patent Owner does not dispute that these more legible figures are the same as those in the references relied upon.

For the reasons stated and for the reasons explained in the Petition, we determine that Petitioner has established a reasonable likelihood of succeeding on its challenge to these claims.

Patent Owner Contention No. 8: "Aiteanu, Choquet, and Da Dalto do not teach determining a score based on a comparison of sensed and tracked spatial properties to other values (claims 33, 52, 75, and 112, and their dependent claims)"

These claims, as discussed *supra* in connection with Patent Owner Contention No. 7, recite determining a "score." Prelim. Resp. 49. In addition, however, they require that the score be based on a comparison of sensed and tracked spatial properties to other values. *Id.* Claims 75–79 are considered in connection with Patent Owner Contention No. 3, *supra*. The

following discussion is directed only to the remaining claims identified by Patent Owner.

The Petition alleges these claims are unpatentable based on Ground 2 (obviousness over Aiteanu in view of Choquet or Da Dalto). Pet. 6. Patent Owner responds that Petitioner identifies Aiteanu's calculated weld seam thickness as the "spatial properties" in the claims. Prelim. Resp. 50. Patent Owner contends that this claim element is not met because Aiteanu does not "track" the weld thickness, but instead calculates it from geometric equations. *Id.*

We are not persuaded by this argument. We are not convinced that Ground 2 relies only on Aiteanu alone for this feature. For example, the Petition states: "If the [Patent Owner] urges a different meaning for 'score', such as a 'percentage' requirement or other rationale to distinguish Aiteanu, multiple alternative 'scores' are disclosed by Choquet and Da Dalto and would have been obvious to use in Aiteanu as an additional or alternate feature." Pet. 34. Likewise, Dr. Graeser's testimony explains persuasively how the "analysis features" and scores of Da Dalto and Choquet would have been combined with Aiteanu. Graeser Decl. ¶¶ 96–99.

For the reasons stated and for the reasons explained in the Petition, we determine that Petitioner has established a reasonable likelihood of succeeding on its challenge to these claims.

Patent Owner Contention No. 9: "Aiteanu, Choquet, and Da Dalto do not teach determining a score in real time or near real time (claims 141, 154, 166, 177, 189, 191, 193, and 195 and their dependent claims)"

These claims require that the score be determined in real time. Prelim. Resp. 51. Patent Owner responds by repeating arguments previously addressed. However, Patent Owner asserts also that the numbers and graphs

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in Choquet and Da Dalto are not determined in real time, but in both cases, are determined at the end of a welding session. Prelim. Resp. 52.

We are not persuaded by this argument. According to Da Dalto: "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, 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."). We find this testimony credible and sufficient at this stage. 37 C.F.R. § 42.108(c).

For the reasons stated and for the reasons explained in the Petition, we determine that Petitioner has established a reasonable likelihood of succeeding on its challenge to these claims.

Patent Owner Contention No. 10: *"Aiteanu, Choquet, and Da Dalto do not teach determining a score based on a comparison of at least one welding parameter to an optimum value (claims 89 and 124 and their dependent claims)"*

These Ground 2 claims require that the score be based on the comparison of at least one welding parameter to an optimum. Prelim. Resp. 52. Claims 93 and 94, depending from claim 89, and claims 128 and 129, depending from claim 124, are considered in connection with Patent Owner

Contention No. 2, *supra*. The following discussion is directed only to the remaining claims identified by Patent Owner.

In this contention, Patent Owner repeats arguments previously addressed. However, Patent Owner also asserts that Choquet and Da Dalto do not teach determining a score based on a comparison of a welding parameter to an optimum value. *Id.* at 53. Patent Owner contends the percentages shown in those references are not based on a comparison to an optimum value but reflect, instead, how often a parameter falls within a range. *Id.*

We are not persuaded by this argument. As Dr. Graeser explains, "[t]he Aiteanu dissertation added a 'score' by gradually changing the color of a guiding icon displayed in the welder's field of view as the welder drifted from an optimum limit towards an outer limit, and used the spatial measurements as input to an algorithm that developed a numerical model of the seam quality." Graeser Decl. ¶ 53; *see also id.* ¶¶ 73–74. Moreover, the displays in Da Dalto and Choquet of welding parameters over time show a comparison of the parameters to upper, lower, and optimum values. *Id.* ¶¶ 88, 94–95.

For the reasons stated and for the reasons explained in the Petition, we determine that Petitioner has established a reasonable likelihood of succeeding on its challenge to these claims.

Patent Owner Contention No. 11: *"Aiteanu does not teach the analyzing means of claim 1 and its dependent claims"*

This argument is addressed under the heading Claim Construction, *supra*. We agree with Patent Owner that Petitioner has failed to identify

corresponding structure for the means-plus-function limitations recited in these claims. Prelim. Resp. 54.

III. SUMMARY

Petitioner has failed to demonstrate a reasonable likelihood of prevailing on its challenge to the following claims of the '398 patent: 1–8, 32, 42–44, 51, 63–65, 70–79, 86, 87, 93, 94, 105–111, 121, 122, 128, 129, 151, 163, and 178. For the reasons stated above as well as the reasons explained in the Petition, Petitioner has demonstrated a reasonable likelihood of prevailing as to the remaining claims in the '398 patent.

IV. ORDER

It is, therefore,

ORDERED that, pursuant to 35 U.S.C. § 314(a), an *inter partes* review of the '389 patent is hereby instituted on the following grounds:

A. Obviousness of the following claims over Aiteanu: 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. Obviousness of the following claims over Aiteanu and Choquet or De Dalto: claims 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;

C. Obviousness of the following claims over Aiteanu and Stöger or Da Dalto: claims 12, 18, 26–29, 31, 38, 47, 48, 50, 57, and 81; and

D. Obviousness of the following claims over Aiteanu, Choquet or Da Dalto, and Stöger: claims 99, 134, 144, and 168.

FURTHER ORDERED that review based on any other proposed grounds of unpatentability is not authorized; and

FURTHER ORDERED that pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, notice is hereby given of the institution of a trial commencing on the entry date of this decision.

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