

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

CURT MANUFACTURING, LLC,
Petitioner,

v.

HORIZON GLOBAL AMERICAS INC.,
Patent Owner.

IPR2019-00625
Patent 6,068,352

Before WILLIAM V. SAINDON, BARRY L. GROSSMAN, and
MATTHEW S. MEYERS, *Administrative Patent Judges*.

GROSSMAN, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining All Challenged Claims Unpatentable
Incorporating Decision on
Petitioner's Motion to Exclude Evidence
35 U.S.C. § 318(a) and 37 C.F.R. §§ 42.64(c), 42.73

I. INTRODUCTION

A. *Background and Summary*

Curt Manufacturing, LLC (“Petitioner”) filed a Petition requesting an *inter partes* review of claims 1, 64–67, and 70 of U.S. Patent No. 6,068,352 (“the ’352 patent”). Paper 1 (“Pet.”). Horizon Global Americas Inc. (“Patent Owner”) filed a Preliminary Response. Paper 6 (“Prelim. Resp.”).

We concluded that Petitioner satisfied the burden, under 35 U.S.C. § 314(a), to show that there was a reasonable likelihood that Petitioner would prevail with respect to at least one of the challenged claims. Accordingly, on behalf of the Director (37 C.F.R. § 42.4(a)), we instituted an *inter partes* review of all the challenged claims, on all the asserted grounds. Paper 7 (“Dec. Inst.”).

After institution, Patent Owner filed a Response. Paper 10 (PO Resp.). Petitioner filed a Reply. Paper 18 (“Pet. Reply”). Patent Owner filed a Sur-reply. Paper 20 (“Sur-reply”).

Petitioner submitted 24 exhibits (Exs. 1001–1024). Petitioner relies, in part, on the Declaration testimony of Dr. Leland Spangler (Ex. 1003).

Patent Owner submitted 36 exhibits (Exs. 2001–2036). Patent Owner relies, in part, on the Declaration testimony of Dr. John Martens (Ex. 2024), and Declaration testimony from each of the four named inventors (Exs. 2030–2033).

Petitioner filed a Motion to Exclude several of Patent Owner’s exhibits. Paper 24 (Mot. Excl.). Patent Owner filed a Response to the Motion to Exclude. Paper 25 (PO Resp. to Mot. Excl.). Petitioner filed a Reply to Patent Owner’s Response to the Motion to Exclude. Paper 28 (Reply Mot. Excl.).

A hearing was held May 11, 2020. Paper 29 (“Tr.”).

We have jurisdiction under 35 U.S.C. § 6. We enter this Final Written Decision pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73.

Petitioner has the burden of proving unpatentability of a claim by a preponderance of the evidence. 35 U.S.C. § 316(e).

The primary issue in this proceeding is whether Patent Owner antedated the McGrath reference (Ex. 1004) with evidence of prior conception, diligence, and reduction to practice. Patent Owner does not otherwise dispute the merits of Petitioner's asserted grounds of unpatentability (*see* Tr. 36:14–24)¹.

Based on the findings and conclusions below, we determine that Patent Owner has not antedated the McGrath reference and that Petitioner has proven by a preponderance of the evidence that claims 1, 64–67, and 70 are unpatentable.

B. Real Parties-in-Interest

Petitioner states it is the sole real party-in-interest. Pet. 67. Patent Owner states that it is the sole real party-in-interest. Paper 4, 1.

C. Related Matters

Patent Owner sued Petitioner for infringement of the '352 patent. *See* Pet. 67 (citing *Horizon Global Americas Inc. v. CURT Mfg., LLC*, No. 2:17-cv-11879 (E.D. Mich. June 13, 2017)). Pet. 67; Paper 4, 1.

A prior petition by a different petitioner for *inter partes* review of claims 1, 7, 8, 10, 11, 19, 20, 64–67, 70–72, and 74–76 of the '352 patent was denied. Pet. 68; Paper 4, 1; *see Hopkins Mfg. Corp. et al v. Cequent*

¹ Q. [from the Board]: “. . . should we read into that, that you are conceding that, on the substance of merits, if we ever get there, under 102 and 103, that you are not asserting any defense?

A. [counsel for Patent Owner]: That's correct, Your Honor.” Tr. 36:21–24.

Performance Products, Inc., IPR2015-00616, (PTAB August 17, 2015) (Paper 9) (the “’616 IPR”). A Request for Rehearing in the ’616 IPR also was denied. *Id.*, at Paper 11 (Nov. 4, 2015).

Petitioner and Patent Owner also cite the following two, settled and dismissed cases as related matters: *Cequent Performance Prods., Inc. v. Hopkins Mfg. Corp.*, No. 2:13-cv-15293 (E.D. Mich. Dec. 13, 2013); and *Cequent Elec. Prods., Inc. v. Valley Indus., LLC*, No. 2:05-cv-73399 (E.D. Mich. Sept. 1, 2005). Pet. 67–68; Paper 4, 2.

D. Prior Art and Asserted Grounds

Petitioner asserts that claims 1, 64–67, and 70 are unpatentable on the following grounds:

Claim(s) Challenged	35 U.S.C. §²	Reference(s)
64–67, 70	102(e)	McGrath ³
1	103(a)	McGrath and Eccleston ⁴

Petitioner also relies on the Declaration testimony of Dr. Leland Spangler.⁵

² The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284, 296–07 (2011), took effect on September 16, 2012. The changes to 35 U.S.C. §§ 102 and 103 in the AIA do not apply to any application filed before March 16, 2013. Because the application for the patent at issue in this proceeding has an effective filing date before either of these dates, we refer to the pre-AIA version of the statute.

³ Exhibit 1004, U.S. Pat. No. 5,620,236, issued April 15, 1997, based on an application filed September 27, 1994.

⁴ Ex. 1005, U.S. Pat. No. 5,149,176, issued September 22, 1992.

⁵ Dr. Spangler earned a Ph.D. in Electrical Engineering. Ex. 1003 ¶ 4. He also has approximately thirty years of experience in the design, development, and manufacture of integrated circuit and semiconductor products for automotive, medical, industrial, commercial and consumer applications. *Id.* ¶ 5. He is a named inventor on thirteen U.S. patents.

II. THE '352 PATENT

The '352 patent claims priority to a PCT application filed August, 20, 1996. Ex. 1001, 1, code (22).

The '352 patent discloses a brake controller for electrically actuated braking systems. Ex. 1001, 1:5–6. These braking systems apply the brakes of towed vehicles, such as a trailer, in response to commands from the towing vehicle. *Id.* at 1:6–7.

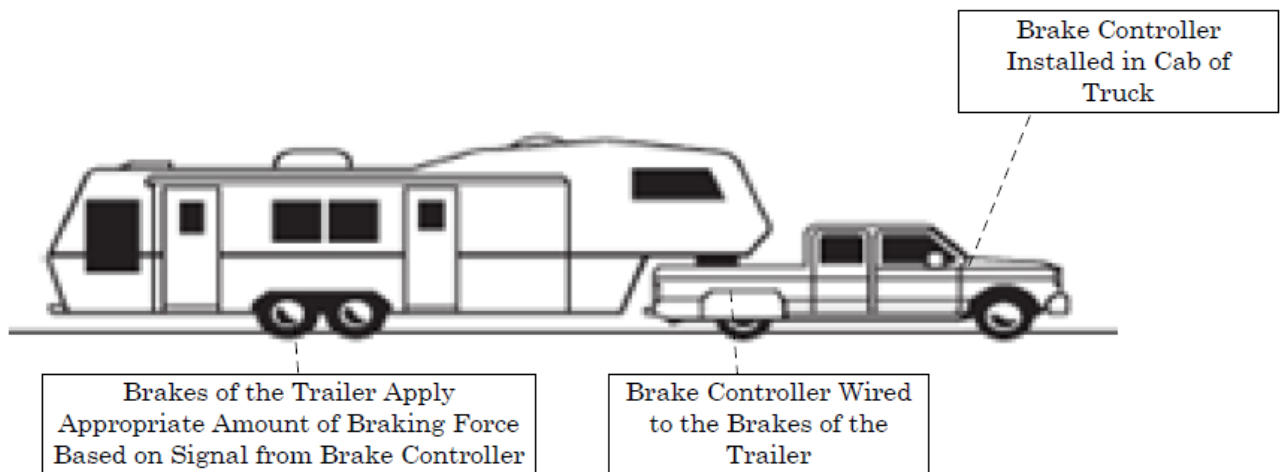
Patent Owner provides the following illustration of a commercially available brake controller that Patent Owner represents is “covered by” the '352 patent. *See* Dec. Inst. 4 (citing Prelim. Resp. 3).



Patent Owner’s commercialized brake controller. *Id.*

Patent Owner also provides the following illustration of a brake controller installed on a truck towing a trailer. *Id.* (citing Prelim. Resp. 4 and Ex. 2001).

Id. ¶ 18; *see also id.* ¶¶ 6–21; Ex. 1017 (providing a detailed summary of Dr. Spangler’s background and experience).



Patent Owner's representation of a brake controller installed for towing a trailer. Dec. Inst. 4.

A more detailed, technical illustration of the invention claimed in the '352 patent is shown in Figure 1 from the '352 patent, which is reproduced below.

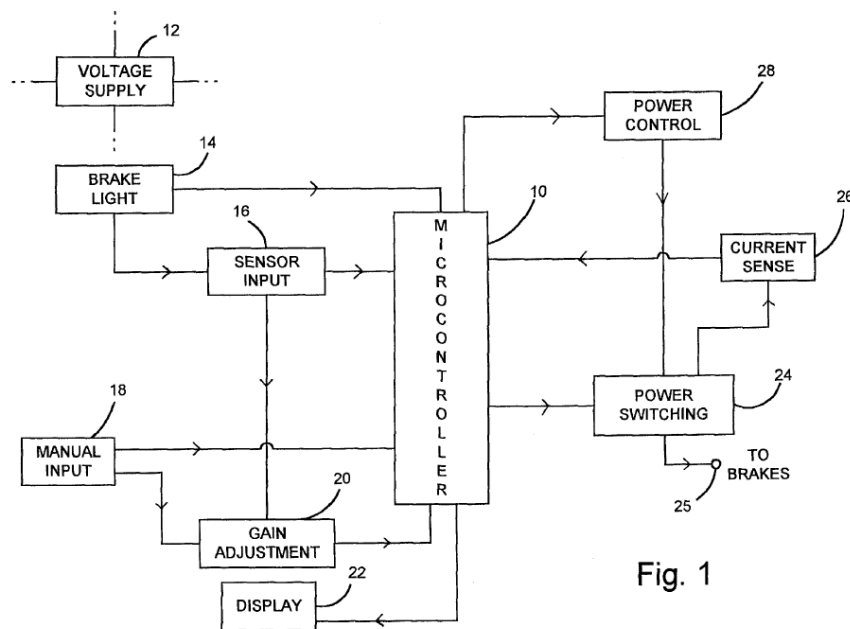


Fig. 1

Figure 1 is a block circuit diagram showing a brake controller in accordance with the disclosed invention. Ex. 1001, 4:27–28.

As shown in Figure 1, connected to microcontroller 10 are a variety of circuits, which include voltage supply circuit 12, brake light circuit 14,

sensor input circuit 16, manual input circuit 18, gain adjustment circuit 20, display circuit 22, power switching circuit 24, current sense circuit 26, and power control circuit 28. *Id.* at 5:27–36. In general operation, either sensor input circuit 16 or manual input circuit 18 supply signals to gain adjustment circuit 20 when braking the towed vehicle. *Id.* at 5:37–62. Gain adjustment circuit 20 generates a signal output that represents the magnitude of the desired braking. *Id.* Microcontroller 10 receives the signal output of gain adjustment circuit 20, and, in response thereto, generates a pulse width modulated (PWM) drive signal. *Id.* This PWM drive signal is supplied to power switching circuit 24, which, in conjunction with power control circuit 28, applies current to the towed vehicle's brakes according to the PWM drive signal. *Id.* Current sense circuit 26 senses the current draw of the towed vehicle's brakes and in cooperation with microcontroller 10 monitors for a short circuit condition in the brakes. *Id.*

A. Illustrative Claim

The '352 patent includes 76 claims. Petitioner challenges only claims 1, 64–67, and 70. Pet. 13. Challenged claims 1 and 64 are independent claims. Claim 64, reproduced below, is representative.

64. A brake controller for controlling the brakes of a towed vehicle, said brake controller comprising:

an input circuit for generating a brake level signal representing the braking force to be applied by the towed vehicle's brakes;

a power switching circuit adapted for coupling to the brakes of the towed vehicle and to the power supply of the towing vehicle, for selectively supplying power from the towing vehicle power supply to the brakes of the towed vehicle in response to a pulse width modulated control signal supplied to a control input terminal whereby the braking current supplied to the towed vehicle brakes

corresponds to a duty cycle of the pulse width modulated control signal; and

a microcontroller coupled to said input circuit and to said power switching circuit, said microcontroller generating and supplying the pulse width modulated control signal to said control input terminal of said power switching circuit, said microcontroller varying the duty cycle of the pulse width modulated control signal in response to the brake level signal supplied to said microcontroller by said input circuit to thereby cause said power switching circuit to deliver a braking current to the brakes of the towed vehicle that corresponds to the desired level of braking.

Ex. 1001, 48:46–49:3.

Challenged claims 65–67 and 70 depend, directly or indirectly, from claim 64. Claim 65 adds a display circuit coupled to the microcontroller for receiving display signals and for displaying information to the operator.

Id. at 49:4–10. Claims 66 and 67 specify additional functionality of the display circuit of claim 65. *Id.* at 49:11–19. Claim 70, dependent from claim 64, states that the input circuit includes an “inertia sensor”

decelerometer that determines deceleration and generates the brake level signal. *Id.* at 50:1–4.

Independent claim 1 is similar to claim 64. The “input circuit” of claim 1 and claim 64 are identical. Ex. 2032 ¶ 13. The “power switching circuit” of claim 1, however, refers to a “switching” control signal rather than a “pulse width modulated” control signal, as stated in claim 64. Bruce Smith, one of the named inventors in the ’352 patent, testifies that “[a] pulse width modulated (PWM) control signal, as recited in claim 64, is a type of switching control signal, as recited in claim 1. Accordingly, the power switching circuits of claims 1 and 64 are the same.” Ex. 2030 ¶ 15. Claim 1

also includes a display circuit and a current sensing circuit, not recited in claim 64.

B. Claim Construction

The Petition was filed on January 27, 2019. Paper 3. This filing date is after the Patent and Trademark Office implemented a new rule on claim construction adopting the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. § 282(b). *See Changes to the Claim Construction Standard for Interpreting Claims in Trial Proceedings Before the Patent Trial and Appeal Board*, 83 Fed. Reg. 51,340 (Oct. 1, 2018) (amending 37 C.F.R. § 42.100(b) effective November 13, 2018) (now codified at 37 C.F.R. § 42.100(b) (2019)). The claim construction standard used in a civil action under 35 U.S.C. 282(b) is generally referred to as the *Phillips* standard. *See Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). This new rule was effective on November 13, 2018, and applies to all petitions filed on or after the effective date. 83 Fed. Reg. 51,340. Thus, the new claim construction rule applies to this proceeding.

Under the *Phillips* standard, words of a claim generally are given their ordinary and customary meaning. *Phillips*, 415 F.3d at 1312. “[T]he ordinary and customary meaning of a claim term is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention.” *Id.* at 1313. Importantly, the person of ordinary skill in the art is deemed to read the claim term not only in the context of the particular claim in which the disputed term appears, but in the context of the entire patent, including the specification. *Id.*

“[W]e need only construe terms ‘that are in controversy, and only to the extent necessary to resolve the controversy.’” *Nidec Motor Corp. v.*

Zhongshan Broad Ocean Motor Co. Ltd., 868 F.3d 1013, 1017 (Fed. Cir. 2017) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

Petitioner proposes a specific construction for the term “coupled.” Pet. 20–23.

Patent Owner does not propose any specific constructions. PO Resp. 32. Patent Owner states that its position in this proceeding “do[es] not rely on the adoption of any particular construction.” *Id.*

We determine that an explicit construction of the claims is not necessary to determine the patentability issues in this proceeding.

1. Level of Ordinary Skill

The level of skill in the art is “a prism or lens” through which we view the prior art and the claimed invention. *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001). It also is related to the “conception” issue in this case because conception occurs when the invention is so clearly defined that “only ordinary skill” would be necessary to reduce the invention to practice, without extensive research or experimentation. *Singh v. Brake*, 222 F.3d 1362, 1367 (Fed. Cir. 2000) (quoting *Burroughs Wellcome Co. v. Barr Lab., Inc.*, 40 F.3d 1223, 1228 (Fed. Cir.1994)).

In our Decision to Institute a trial, based on the prior art and Dr. Spangler’s testimony, we determined that a person of ordinary skill in a technology pertinent to the challenged claims would have had:

a bachelor’s degree in electrical engineering or an equivalent technological discipline and 2–5 years of experience in electrical system or circuit design, which would include an understanding of electrical systems and circuit designs in automotive products. A recipient of other academic degrees may qualify as a person of ordinary skill if they have taken coursework or have experience in a pertinent technology. Additional education, such as an

advanced degree, could offset less work experience; additional work experience could offset less education or coursework.

Dec. Inst. 11–12.

Patent Owner states it “does not challenge this definition because McGrath is not prior art to the ’352 Patent so that all instituted grounds must fail regardless of the definition.” PO Resp. 32.

Accordingly, we adopt the level of skill stated in our Decision to Institute, as quoted above, and for the reasons stated therein.

III. CONCEPTION AND REDUCTION TO PRACTICE

As its only defense to Petitioner’s challenge to the ’352 patent, Patent Owner asserts that: (1) the “inventors of the ’352 Patent conceived of and reduced to practice their inventions [in the challenged claims] before McGrath’s September 27, 1994 priority date;” or, alternatively, (2) the inventors conceived their inventions in the challenged claims before McGrath’s September 27, 1994 priority date and the “inventors worked diligently to commercialize the brake controller for sale and to file a patent application in August 1995.” *E.g.*, PO Resp. 32. Patent Owner does not otherwise argue any defense to the merits of the asserted § 102(e) and § 103(a) grounds of unpatentability. *See* Tr. 36:14–24. Thus, as a threshold issue, to determine whether McGrath remains a reference under 35 U.S.C. § 102(e), we first determine whether Patent Owner’s evidence establishes a conception of the invention in the challenged claims prior to September 27, 1994. We also determine whether there was a timely reduction to practice, either actual or constructive, sufficient to antedate McGrath.

A. Burden of Proof

Patent Owner has the burden of proving that the challenged claims are entitled to a priority date earlier than McGrath’s September 27, 1994 filing

date. *In re Magnum Oil Tools Int'l, Ltd.*, 829 F.3d 1364, 1375-76 (Fed. Cir. 2016) (“[I]n the context of establishing conception and reduction to practice for the purposes of establishing a priority date, ... a patent challenger has the burden of producing evidence to support a conclusion of unpatentability under § 102 or § 103, but *a patentee bears the burden of establishing that its claimed invention is entitled to an earlier priority date than an asserted prior art reference.*”) (emphasis added) (citing *Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1379 (Fed. Cir. 2015)).

The evidence on which Patent Owner relies to meet its burden of proof is: (1) inventor testimony; (2) documents authored by one or more inventors; and (3) expert testimony discussing the content of the inventor-authored documents.

Each of the four named inventors of the '352 patent, Chandrakumar D. Kulkarni, Bruce E. Smith, Marcia S. Albright, and Stephen A. Zavodny, submitted written Declaration testimony in support of Patent Owner's arguments. *See* Exs. 2030–2033.

Patent Owner also submitted a number of documentary exhibits authored by one or more of the four inventors concerning the development of the claimed invention. *See, e.g.* Exs. 2003–2025.

Patent Owner also relies on the Declaration testimony of Dr. John Martens.⁶ *See* Ex. 2034.

⁶ Dr. Martens earned B.S., M.S. and Ph.D. degrees in electrical engineering and an M.B.A. Ex. 2034 ¶ 7. His doctoral dissertation was related to closed-loop, computer control of dynamic systems. *Id.* Dr. Martens has been continuously involved in the design and control of complex dynamic systems and computer control since 1988. *Id.* He has experience with individual components, sensors, controllers, actuators, systems, communications, software, and algorithms. *Id.* at ¶¶ 8, 15. *See also id.* at

B. Applicable Law

To show prior invention, Patent Owner must “either prove (1) a conception and reduction to practice before the filing date of [McGrath] or (2) a conception before the filing date of [McGrath] combined with diligence and reduction to practice after that date.” *REG Synthetic Fuels, LLC v. Neste Oil Oyj*, 841 F.3d 954, 958 (Fed. Cir. 2016) (quoting *Taurus IP, LLC v. DaimlerChrysler Corp.*, 726 F.3d 1306, 1323 (Fed. Cir. 2013)); *see also ATI Technologies ULC v. Iancu*, 920 F.3d 1362, 1369 (Fed. Cir. 2019) (stating “[t]he standards for whether the subject matter in a reference has been antedated are stated in Rule 131”); 37 C.F.R. § 1.131(b) (requiring, to antedate a reference, either “reduction to practice prior to the effective date of the reference, or conception of the invention prior to the effective date of the reference coupled with due diligence from prior to said date to a subsequent reduction to practice or to the filing of [a patent] application”).

Conception is “the formation, in the mind of the inventor of a definite and permanent idea of the complete and operative invention, as it is thereafter to be applied in practice.” *Kolcraft Enterprises, Inc. v. Graco Children’s Products, Inc.*, 927 F.3d 1320, 1324 (Fed. Cir. 2019) (citing *REG Synthetic Fuels*, 841 F.3d at 962 (emphasis omitted) (quoting *Coleman v. Dines*, 754 F.2d 353, 359 (Fed. Cir. 1985)). A conception must encompass all limitations of the claimed invention, and “is complete only when the idea is so clearly defined in the inventor’s mind that only ordinary skill would be necessary to reduce the invention to practice, without extensive research or experimentation,” *Singh*, 222 F.3d at 1367 (Fed. Cir. 2000) (quoting

¶¶ 7–15 (providing a more detailed summary of his qualifications and experience).

Burroughs Wellcome, 40 F.3d at 1228. “An inventor need not know, however, that an invention will work for its intended purpose in order for conception to be complete, as verification that an invention actually works is part of its reduction to practice.” *Dana-Farber Cancer Institute v. Ono Pharmaceutical Co., Ltd.*, Appeal No. 2019-2050, slip op. at 11 (citing *Burroughs Wellcome*, 40 F.3d at 1228).

A reduction to practice can be either a constructive reduction to practice, which occurs when a patent application is filed, or an actual reduction to practice. *Cooper v. Goldfarb*, 154 F.3d 1321, 1327 (Fed. Cir. 1998).

In order to establish an actual reduction to practice, Patent Owner must establish three things: (1) construction of an embodiment or performance of a process that met all the limitations of the claim at issue; (2) determination that the invention would work for its intended purpose; and (3) the existence of sufficient evidence to corroborate inventor testimony regarding these events. *Medichem, S.A. v. Rolabo, S.L.*, 437 F.3d 1157, 1169 (Fed. Cir. 2006).

Filing a United States patent application can be regarded as being a constructive reduction to practice of an invention described therein as of the filing date. *Yasuko Kawai v. Metlesics*, 480 F.2d 880, 886 (C.C.P.A. 1973). The written specification in the application is the evidence proving the invention of that which is reduced to practice. *Id.* A constructive reduction to practice, as opposed to an actual reduction to practice, is not proven unless the specification relied upon discloses how to make and use the invention, as required by 35 U.S.C. § 112. *Id.*

The diligence requirement implements the principle that, to antedate a reference, the applicant must not only have conceived the invention before

the reference date, but must have reasonably continued activity to reduce the invention to practice. *ATI*, 920 F.3d at 1369. To establish “due diligence,”

[a] patent owner need not prove the inventor *continuously* exercised reasonable diligence throughout the critical period; it must show there was *reasonably continuous* diligence.” Under this standard, an inventor is not required to work on reducing his invention to practice every day during the critical period. And periods of inactivity within the critical period do not automatically vanquish a patent owner’s claim of reasonable diligence.

Perfect Surgical Techniques, Inc. v. Olympus Am., Inc., 841 F.3d 1004, 1009 (Fed. Cir. 2016) (emphases original; citations omitted). Diligence is not negated if the inventor works on improvements and evaluates alternatives while developing an invention. *ATI*, 920 F.3d at 1372 (citing *In re Jolley*, 308 F.3d 1317, 1328 (Fed. Cir. 2002)).

I. Corroboration

Inventor testimony of conception must be corroborated by other, *independent* information. *Apator Miitor s ApS v. Kamstrup A/S*, 887 F.3d 1293, 1295 (Fed. Cir. 2018) (“It is well established, however, that when a party seeks to prove conception through an inventor’s testimony the party must proffer evidence, ‘in addition to [the inventor’s] own statements *and documents*,’ corroborating the inventor’s testimony.” (quoting *Mahurkar v. C.R. Bard, Inc.*, 79 F.3d 1572, 1577 (Fed. Cir. 1996) (emphasis added))). The requirement of *independent* knowledge remains key to the corroboration inquiry. *Medichem, S.A. v. Rolabo, S.L.*, 437 F.3d 1157, 1170 (Fed. Cir. 2006). “*Independent corroboration* may consist of testimony of a witness, other than the inventor, to the actual reduction to practice or it may consist of evidence of surrounding facts and circumstances *independent of information received from the inventor.*” *Medichem*, 437 F.3d at 1171

(quoting *Reese v. Hurst*, 661 F.2d 1222, 1225 (CCPA 1981) (emphasis added)).

One consequence of the independence requirement is that testimony of one co-inventor cannot be used to help corroborate the testimony of another. *Id.* (citing *Lacks Indus. v. McKechnie Vehicle Components USA, Inc.*, 322 F.3d 1335, 1350 (Fed.Cir. 2003) (holding that the Special Master rightly refused to accept cross-corroboration of oral testimony as being adequate)). Also, an inventor's unwitnessed laboratory notebooks, emails, and drawings, without other independent evidence, cannot corroborate an inventor's testimony. *Kolcraft*, 927 F.3d at 1325–26 (photos and sketches in Exhibits A–H of inventor Declaration, which were undated and lacked any showing of authorship, “failed to independently corroborate inventor testimony of prior conception.”); *Aptor Miitor*, 887 F.3d at 1297 (“an unwitnessed laboratory notebook, alone, cannot corroborate an inventor's testimony of conception. . . . Mr. Drachmann's unwitnessed emails and drawings, alone, cannot corroborate his testimony of conception.”) (citing *Procter & Gamble Co. v. Teva Pharms. USA, Inc.*, 566 F.3d 989, 998-99 (Fed. Cir. 2009) (laboratory notebook that “was unwitnessed and was not corroborated by any other evidence” could not corroborate inventor testimony of conception)); *Brown v. Barbacid*, 276 F.3d 1327, 1335 (Fed. Cir. 2002) (“The Board did not err in holding that an inventor's own unwitnessed documentation does not corroborate an inventor's testimony about inventive facts.”).⁷ Notwithstanding this clear guidance, the law also

⁷ The Court in *Brown* also noted the distinction between testimonial evidence and documentary evidence. *Brown*, 276 F.3d at 1335 (“Brown's *physical evidence*, such as Dr. Reiss' notebooks and autoradiographs, *do not require corroboration to demonstrate the content of the physical evidence*

recognizes that that a notebook entry or other writing that has not been promptly witnessed does not necessarily disqualify it in serving as corroboration of conception under a rule of reason analysis. *See Apator Miitor*, 887 F.3d at 1297 (summarizing cases that permitted unwitnessed notebook entries and other writings to aid in corroborating witness testimony alongside other, more persuasive, evidence).

The requirement for corroboration of testimonial evidence is based on a need to ensure credibility of inventor testimony. As explained in *Mahurkar*, corroboration of “conception through the oral testimony of an inventor . . . arose out of a concern that inventors testifying in patent infringement cases would be tempted to remember facts favorable to their case by the lure of protecting their patent or defeating another’s patent.” *Mahurkar*, 79 F.3d at 1577 (citations omitted). The Court also recognized that “[w]hile perhaps prophylactic in application given the unique abilities of trial court judges and juries to assess credibility, the rule provides a bright line for both district courts and the PTO to follow in addressing the difficult issues related to invention dates.” *Id.*

The clear guidance of the need for independent testimony and documents to corroborate inventor testimony has been tempered by a “rule of reason” analysis. A rule of reason analysis requires “an evaluation of all pertinent evidence . . . so that a sound determination of the credibility of the inventor’s story may be reached.” *NFC Technology, LLC v. Mattal*, 871 F.3d 1367, 1372 (Fed. Cir. 2017) (citing *Singh*, 317 F.3d at 1341 (quoting *Price*, 988 F.2d at 1195)). Controlling case law does not require that

itself, namely that FT assay experiments took place on September 20 and 25, 1989. *Conversely, however, the physical evidence in this case may not single-handedly corroborate Dr. Reiss’ testimony.*”) (emphases added).

evidence have a source independent of the inventors on every aspect of conception and reduction to practice; “such a standard is the antithesis of the rule of reason.” *E.I. du Pont De Nemours & Co. v. Unifrax I LLC*, 921 F.3d 1060, 1077 (Fed. Cir. 2019) (quoting *Knorr v. Pearson*, 671 F.2d 1368, 1374 (CCPA 1982)). The law requires only that the corroborative evidence, including circumstantial evidence, support the credibility of the inventors’ story. *Id.* (citing *NFC Tech.*, 871 F.3d at 1372).

As succinctly stated by Judge Rich, the “rule of reason” ensures that “[i]n the final analysis, each corroboration case must be decided on its own facts with a view to deciding whether the evidence as a whole is persuasive.” *Berges v. Gottstein*, 618 F.2d 771, 776 (C.C.P.A. 1980).

The same requirement for evidence that corroborates inventor testimony on conception also applies to the reduction to practice determination. *E.I. du Pont De Nemours*, 921 F.3d at 1075–76. Also, “[a]n inventor’s testimony regarding [the inventor’s] reasonable diligence must be corroborated by evidence.” *Perfect Surgical*, 841 F.3d at 1007.

Against this general background, we review the evidence of conception and reduction to practice on which Patent Owner relies.

IV. MCGRATH

We make the following findings regarding McGrath.

McGrath issued on April 15, 1997 (Ex. 1004, 1 (code 945)) based on an application that was filed on September 27, 1994 (*id.*, code (22)). McGrath does not claim any earlier filing date.

There is no dispute between the parties that September 27, 1994 is the earliest filing date claimed by McGrath. *See e.g.*, Pet. 14 (“McGrath’s filing date is September 27, 1994 and is therefore § 102(e) prior art”); PO Resp. 1 (“McGrath, however, is not prior art to the ’352 Patent because the inventors

conceived of and reduced to practice the inventions in the challenged claims prior to McGrath's September 27, 1994 priority date.").

V. ANALYSIS OF WHETHER MCGATH REMAINS AS A PRIOR ART REFERENCE

Patent Owner asserts that (1) by January 28, 1994⁸ the co-inventors reduced to practice the subject matter in claims 64 and 70; (2); by September 21, 1994, the co-inventors reduced to practice the subject matter in claims 1 and 65–70⁹; and (3) between September 21, 1994 and August 1995, Patent Owner worked diligently to commercialize the brake controller and to file a

⁸ There is some confusion in Patent Owner's Response and Sur-reply as to the correct *year* for the asserted January 28 date for a reduction to practice of claims 64 and 70. In some places Patent Owner refers to January 28, 1993. *See* PO Resp. 5, heading III.A ("May 1992 – January 28, 1993: Patent Owner's Inventors Reduce Claims 64 and 70 to Practice"); Sur-reply 2, heading III ("Patent Owner Proved Reduction to Practice of Claims 64 and 70 by January 28, 1993"). In other places, however, Patent Owner refers to January 28, 1994. *See* PO Resp. 5, first sentence of Section III.A ("The following facts show the conception and actual reduction to practice of the inventions of claims 64 and 70 is no later than January 28, 1994; Sur-reply 1 (arguing Patent Owner "established prior conception for: (1) claims 64 and 70 by January 28, 1994"); *See also* PO Resp. 17, where heading "4" uses the 1993 date as the reduction to practice, whereas the first sentence of this section uses the 1994 date as the reduction to practice. We note that Patent Owner's Invention Timeline from the Hearing, reproduced below, uses the January 28, 1994 date as when claims 64 and 70 were reduced to practice. Based on the evidence, the January 28, 1994 date appears to be the correct date of asserted reduction to practice for claims 64 and 70, which is the date on which we have based our analysis. *See, e.g.*, Ex. 2005 (letter dated January 28, 1994 forwarding invention disclosure to patent counsel and requesting an estimate of the cost of a patent search for a microprocessor based brake control.)

⁹ Claims 68 and 69, included by Patent Owner are not involved in this proceeding. The challenged claims are 1, 64–67, and 70.

patent application.¹⁰ *See e.g.* PO Response 2–3. As discussed here in footnote 10, the “August, 1995” date asserted by Patent Owner as the date a patent application was filed appears to refer to a provisional patent application filed on August 21, 1995. Having just discussed the provenance of the application that matured into the ’352 patent, we consider first Patent Owner’s third point, the asserted constructive reduction to practice based on a patent application filed in August, 1995.

A. Constructive Reduction to Practice

A provisional patent application is a U.S. national application filed in the USPTO under 35 U.S.C. § 111(b). A provisional application is not required to have a formal patent claim or an oath or declaration. It is, however, required to have a written description of the invention. *See* 35 U.S.C. § 111(b)(2); 37 C.F.R. § 1.51(c). A provisional application provides the means to establish an early effective filing date in a later filed

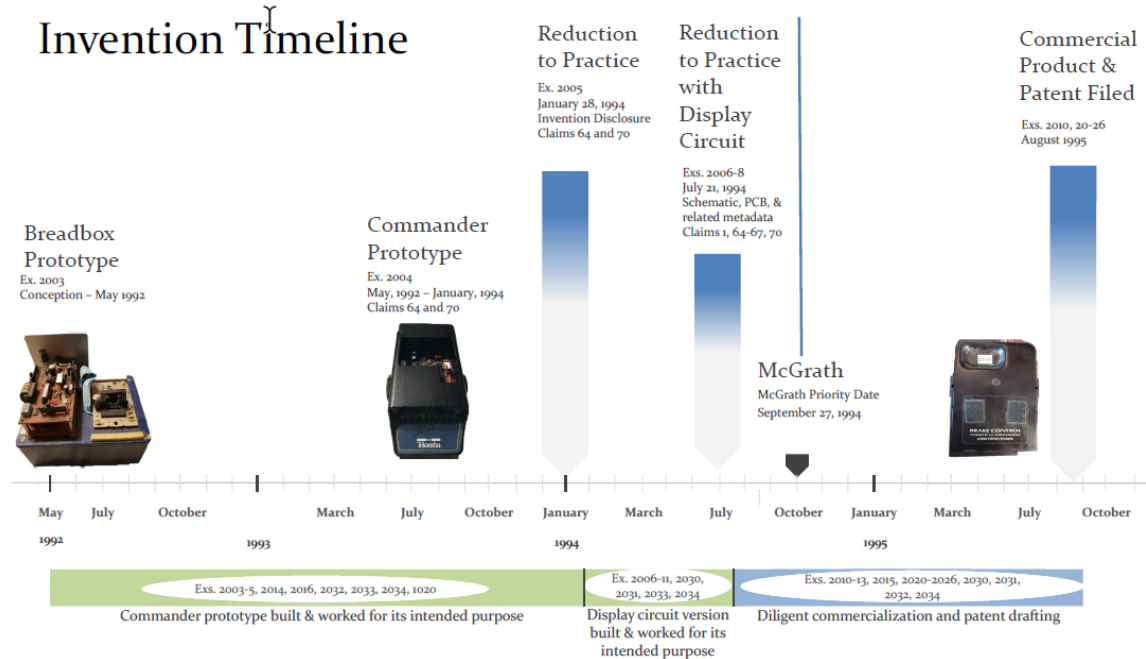
¹⁰ We note that August 21, 1995 is the filing date of a U.S. provisional patent application. *See, e.g.*, Ex. 1002, 811, which is the cover page of a “NOTIFICATION OF ACCEPTANCE OF APPLICATION UNDER 35 U.S.C. 371 AND 37 CFR 1.494 OR 1.495,” for U.S. Patent Application No. “09/011.125,” the application that matured into the ’352 patent. Petitioner clearly gleaned this exhibit from IPR2015-00616 but did not redact the markings or pagination from this earlier case. Petitioner merely added its own pagination with the label “Curt – Exhibit 1002 – [pg. No.]” This document was mailed to applicant’s counsel by the U.S. PTO on “04/27/98.” *Id.* It states this U.S. application corresponds to International Application No. “PCT/US96/13507,” with an “I.A. [international application] Filing Date” of “08/20/96,” and a “Priority Date” of “08/21/95.” *Id.* The corresponding published PCT Application, Pub. No. WO/97/07003, published February 27, 1997, identifies an earliest ‘Priority Date’ of “21 August 1995” based on U.S. document “60/002,540” (*id.* at 605), which is a provisional U.S. patent application. Patent Owner relies on an August 1995 patent filing date, but has not directed us to any exhibit in this proceeding that is a copy of the U.S. provisional patent application No. 60/002,540.

nonprovisional patent application. *See* <https://www.uspto.gov/patents-getting-started/patent-basics/types-patent-applications/provisional-application-patent>.

We have not been directed to a copy of the provisional application as an exhibit in this proceeding. Other than as discussed in footnote 10, we have not been directed to any evidence in the issued '352 patent (Ex. 1001) citing or referring to the provisional application. Thus, we do not know what was disclosed in the provisional application. We do not know whether the provisional application contains the same disclosure as the issued patent. Thus, the only constructive reduction to practice for which we have evidence is August 20, 1996. *See* Ex. 1001, code (22).

Patent Owner relied on the following demonstrative exhibit at the hearing summarizing and illustrating its argument for the “Invention Timeline.” *See, e.g.*, Tr. 35:21–23¹¹.

¹¹ This Timeline is not evidence in this proceeding. It is, however, a useful summary and illustration of Patent Owner’s arguments in this case and the evidence (exhibits) on which Patent Owner relies.



Patent Owner's Invention Timeline.

Patent Owner's Timeline above shows, *inter alia*, a number of entries between approximately May 1992 and August 1995, reflecting when various prototypes were allegedly made or actions allegedly taken within that timeframe. As shown as the last entry, referring to "Patent Filed," it states "August 1995" and cites "Exs. 2010, 20-26." *See also*, PO Resp. 48-49 (citing these same exhibits to support Patent Owner's argument that these documents support a constructive reduction to practice). The August 1995 date is the date the provisional application was filed, as explained above. The cited exhibits, however, are not the provisional application nor do they provide evidence of what was disclosed in the provisional application, as filed. There is no persuasive inventor or other testimony linking these specific documents to the provisional application. We are left only with attorney argument in Patent Owner's response. *Id.* Moreover, the inventor testimony does not identify the documents that are Exhibits 2020-2026 as being sent to patent counsel for purposes of preparing a patent application.

Exhibit 2010 is a one-page circuit diagram.

Exhibits 2020 and 2021 each are one page drawings of a printed circuit board. The initial date of Exhibit 2020 is “12 Dec 94,” with multiple revisions from “12 Dec 94” through “19 Jul 99.” *See* Ex. 2020. The revisions are described in a cryptic notation, which is not understandable without testimony or other evidence, which was not provided. The Engineer named on the diagram is Bruce E. Smith. *Id.* We have not been directed to any evidence linking Exhibit 2020 to the filing of a provisional or other patent application filed in “August 1995.” We have not been directed to any evidence that Exhibit 2020 was sent to Patent Counsel to include in the Provisional application filed on August 21, 1995.

Exhibit 2021 has an original date of October 2, 1994. Bruce Smith is the named Engineer.

Exhibit 2022 is an undated, unsigned photograph of a device labelled as a “Brake Control, covered by U.S. Patent #5,058,960, other patents pending.” Exhibit 2023 is an 8 page flow diagram. Page 1 is labelled “Main Routine.” Each page has a handwritten notation of “2-1-95,” which appears to be a date. Each page also is marked with an alpha or alpha-numeric designation (*e.g.*, “FC,” “FC2,” “FC3,” “FC4,” “FC5,” “FC6,” “FC10,” and “FC11”). “FC” likely refers to “flow chart.” Exhibit 2024 is a list of 9 alpha or alpha-numeric file names, identifying the “Date Modified,” and the “Size” of the listed files. The file names correspond to the designations in Exhibit 2023, except Exhibit 2024 lists a file name of “FC9,” whereas Exhibit 2023 has no page labeled as “FC9.” Exhibit 2024 otherwise is unidentified. This document does not identify the substance of the listed files; it only identifies their name. Patent Owner identifies Exhibit 2024 as “Metadata for Exhibit 2023.” *See* PO Resp., pg. “v,” (marked “Exhibit

List”).¹² We have not been directed to any persuasive evidence linking the named files in Exhibit 2024 to metadata for anything related to this proceeding. Exhibit 2025 is a flow chart that appears to be a duplicate of Exhibit 2023, although Patent Owner’s Exhibit List labels these two exhibits as having different dates. *Id.* In fact, each page of Exhibits 2023 and 2025 are marked identically with a handwritten notation of “2-1-95.” Exhibit 2026 is identical to Exhibit 2024, except with different dates listed in the “Date Modified” column. Patent Owner identifies Exhibit 2026 as “Metadata for Exhibit 2024.” *Id.* We have not been directed to any persuasive evidence linking the named files in Exhibit 2026 to metadata for anything related to this proceeding.

Patent Owner argues that Exhibits 2023–2026 were created for the provisional patent application. PO Resp. 48 (“Create flowcharts for Provisional Patent Application” (citing Exs. 2023, 2024); *id.* (“Create additional flowcharts for Provisional Patent Application” (citing Exs. 2025, 2026). Mr. Smith testifies that the flow charts in Exhibit 2023 were created for outside patent counsel for the provisional patent application. Ex. 2030 ¶ 171. Mr. Smith also testifies that “we had several revisions of the provisional application.” Ex. 2030 ¶ 173. Neither these revisions, nor related correspondence, are evidence in this proceeding. There also is no persuasive corroborating evidence to support Mr. Smith’s testimony that there were several revisions. For example, there is no correspondence *from* patent counsel forwarding or discussing drafts of the provisional application

¹² The labels used in Patent Owner’s Exhibit List are not evidence of what the exhibit is. The labels are considered attorney argument, and have no probative weight.

for inventor review. Also, as stated previously, the provisional application is not of record in this case.

Applying the rule of reason, and considering all the evidence, including circumstantial evidence concerning the asserted constructive reduction to practice, we have not been directed to persuasive evidence or argument linking Exhibit 2010 or Exhibits 2020–2026, or any other evidence, to the substance of what was included in the provisional application filed in “August 1995,” as argued by Patent Owner. We acknowledge, based on the analysis above in footnote 10, an application appears to have been filed on August 21, 1995. We have no persuasive evidence, however, of what was disclosed in that application.

Accordingly, Patent Owner’s argument of a constructive reduction to practice based on a document not of record in this case fails for lack of proof.

B. The Inventor Declarations

Each of the four named inventors submitted Declarations describing in detail the development of the invention disclosed and claimed in the ’352 patent. *See*, Ex. 2030 (Declaration of Bruce Smith); Ex. 2031 (Declaration of Chandrakumar Kulkarni); Ex. 2032 (Declaration of Stephen Zavodny); and Ex. 2033 (Declaration of Marcia Albright). These declarations cite, and rely on, numerous documents, diagrams, and correspondence. A significant amount of the inventor Declarations are redundant and repetitive. They cite many of the same exhibits, which we review in detail in the following sections of this Decision. The sole Exhibit document that is witnessed is the Invention Disclosure, which was prepared by inventor Zavodny and witnessed by his co-inventors Albright and Smith. At the hearing in this proceeding, Counsel for Patent Owner argued that, because it was not clear

that Ms. Albright and Mr. Smith were co-inventors *at the time* they signed the Invention Disclosure, they are able to corroborate Exhibit 2005. *See* Tr. 46:6–11.¹³ We have not been directed to any persuasive case law or other authority that supports Counsel’s argument. Moreover, this argument is inconsistent with Patent Owner’s statement that both Ms. Albright and Mr. Zavodny “conceived of a microprocessor-based brake controller that is the subject of the ’352 Patent.” PO Resp. 5; *see also* Ex. 2033 ¶¶ 26–29 (Ms. Albright’s testimony discussing Mr. Smith’s significant role in the development and testing of the invention prior to January 28, 1994, the date the Invention Disclosure was “witnessed”). Accordingly, we find that the Invention Disclosure included with Exhibit 2005 is *not* witnessed by anyone who is not a named inventor of the ’352 patent.

None of the other documents relied on by Patent Owner to antedate McGrath are witnessed by anyone.

As discussed above, one inventor’s testimony does not provide probative independent corroboration of the testimony of another inventor. *See Medichem*, 437 F.2d at 1171 (“One consequence of the independence requirement is that testimony of one co-inventor cannot be used to help corroborate the testimony of another.”). “[A]doption of the ‘rule of reason’ has not altered the requirement that evidence of corroboration must not depend solely on the inventor himself.” *Id.* at 1170–1171 (quoting *Reese v. Hurst*, 661 F.2d 1222, 1225 (CCPA 1981)). Thus, in considering whether

¹³ Q. [from the Board]: “. . . those witness signatures, my understanding of your position, is because you -- we should look at the time. It wasn’t clear that they were inventors at the time they signed that, and, therefore, they are able to corroborate exhibit 2005? . . .

A. [counsel for Patent Owner]: That’s exactly right.”

there is independent evidence to corroborate the inventor testimony, we look to the exhibits in this case or the testimony of Patent Owner's expert Declarant, Dr. Martens.

Mr. Zavodny and Ms. Albright began the development project. *E.g.*, Ex. 2030 ¶ 28. Mr. Smith and Mr. Kulkarni joined the company, and the development project, at a later time. *E.g.*, *id.* ¶¶ 28, 92. Accordingly, we begin with the Declaration testimony of Mr. Zavodny and Ms. Albright.

1. *Declaration of Inventor Stephen Zavodny (Ex. 2032)*

Mr. Zavodny's Declaration is 29 pages. He provides a detailed account of the development of the brake controller disclosed and claimed in the '352 patent, and his interaction with the other inventors in developing this brake controller.

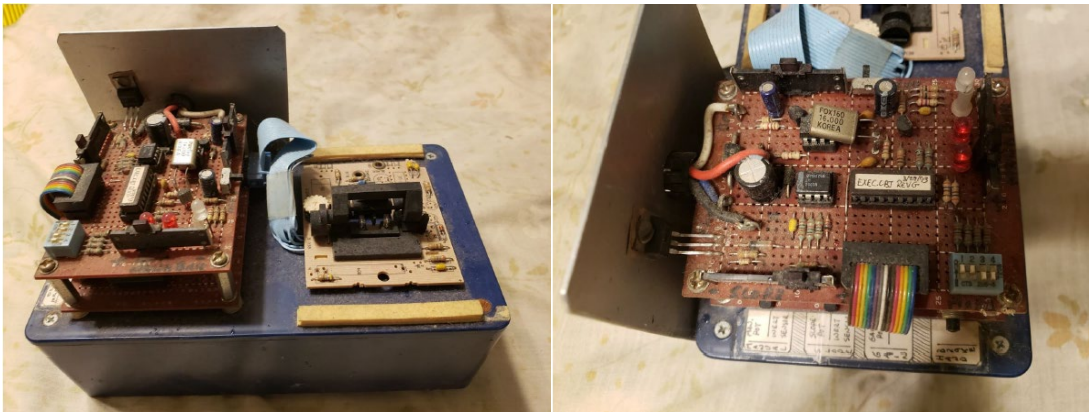
We make the following findings based on Mr. Zavodny's testimony. Because he is a named inventor, however, facts related to conception and reduction to practice of the claimed invention must be corroborated by evidence independent of information received from Mr. Zavodny or any co-inventor. *E.g.*, see *Medichem*, 437 F.3d at 1171.

Mr. Zavodny worked for Tekonsha, the predecessor company of Patent Owner,¹⁴ from 1992 into 1994. Ex. 2032 ¶ 4. The first product Mr. Zavodny worked on at Tekonsha was a microcontroller based brake controller, which led to the '352 patent. *Id.* ¶¶ 21–22. He worked on this project with Marcia Albright. *Id.*

¹⁴ Tekonsha Engineering Company became Cequent Performance Products, Inc., which is now known as Horizon Global Americas Inc., the Patent Owner in this proceeding. See, e.g., Ex. 2030 ¶ 4.

a) Exhibit 2003 Prototype

In 1992 and 1993, Mr. Zavodny “built a microprocessor-based brake controller on a blue breadboard.” *Id.* at ¶ 23. Ex. 2003 is two photographs of the breadboard taken to use in his Declaration. *Id.* Mr. Zavodny testifies that the breadboard shown in Ex. 2003 “has not been altered since 1993.” *Id.* Exhibit 2003 is reproduced below. Exhibit 2003 is neither witnessed nor dated.



Photographs of the 1993 “breadboard” circuit. Ex. 2003.

Mr. Zavodny also testifies that after Bruce Smith was hired, Mr. Zavodny and Mr. Smith “tested the prototype,” and Mr. Zavodny “made changes to the code and circuitry based on our testing.” Ex. 2032 ¶ 24. Mr. Zavodny states “[a]ll of this prototyping and testing was done prior to January 28, 1994.” *Id.*

Mr. Zavodny cites no evidence concerning the results of the “tests,” or the “changes to the code and circuitry” he made based on the tests. Mr. Zavodny does not refer to any independent evidence to corroborate his testimony that all the prototyping and testing was done prior to January 28, 1994.

Also, there is no evidence that relates the circuit shown in Ex. 2003 to the invention recited in the challenged claims. As we stated above, the

corroboration rule does not apply with the same force to proof of inventive facts with physical exhibits. *Mahurkar*, 79 F.3d at 1577–78 (“This court does not require corroboration where a party seeks to prove conception through the use of physical exhibits. The trier of fact can conclude for itself what documents show, aided by testimony as to what the exhibit would mean to one skilled in the art.”). To the extent the photographs are considered a “physical exhibit,” it is not evident, however, that the circuit represented in the photographs bears any relation to the invention disclosed in the ’352 patent and claimed in the challenged claims. Moreover, there is no non-inventor testimony or other evidence as to what circuit elements and functions are represented in Exhibit 2003.

b) Exhibit 2004 Prototype

Mr. Zavodny testifies that, after testing the Exhibit 2003 breadboard prototype, prior to *January* 28, 1994 (Ex. 2032 ¶ 24), by *June* 28, 1994, he “had *another* prototype made by modifying a different brake controller made by Tekonsha, the Commander brake controller, to include a programmed microcontroller. Ex. 2032 ¶ 25 (emphasis added). Exhibit 2004 includes photographs Mr. Zavodny took while preparing his Declaration. *Id.* Mr. Zavodny testifies that the Exhibit 2004 photographs “accurately show the prototype as it exists today, and it has not been altered since at least *January* 28, 1994.” *Id.* (emphasis added). It is unclear why Mr. Zavodny references *January* 28, 1994, when he has testified that the Exhibit 2004 prototype was completed by *June* 28, 1994.¹⁵ *Id.* Moreover, in his Declaration, Mr.

¹⁵ Even if the reference to “June” rather than January is an error, we find that neither Mr. Zavodny’s testimony, nor any other testimony or documentary evidence, ties the Exhibit 2004 prototype to the invention in the challenged claims.

Zavodny labels one of the Exhibit 2004 photographs as a “1993 Prototype,” even though his testimony is that the Exhibit 2004 prototype was not completed until June 28, 1994. *See id.* ¶ 25.

The Exhibit 2004 photographs are reproduced below. These photographs are neither witnessed nor dated.



Photographs of “Commander” prototype circuit. Ex. 2004.

There is no evidence that relates the circuit shown in Ex. 2004 to the invention recited in the challenged claims. Similar to the Exhibit 2003 photographs, it is not evident that the circuit represented in the Exhibit 2004 photographs bears any relation to the invention disclosed in the '352 patent and claimed in the challenged claims. Moreover, there is no non-inventor testimony or other evidence as to what circuit elements and functions are represented in Exhibit 2004. *See* Tr. 46:1–5 (Counsel for Patent Owner stating “. . . the only evidence that we have would be Mr. Zavodny, himself, and the other inventors, Mr. Smith and Ms. Albright, that’s true. That’s what we have for exhibit 2004”).

c) Invention Disclosure (Exhibit 2005)

Mr. Zavodny testifies that after completing the Commander prototype and testing it to ensure that “it worked as intended,” Ms. Albright asked him to complete an Invention Disclosure for the prototype. Ex. 2032 ¶ 26.

There is no evidence of any test data or other information establishing that

the prototype “worked as intended.” Mr. Zavodny states that “[a] true and accurate copy of the Invention Disclosure” is at “pages 3–12 of Exhibit 2005.” *Id.* ¶ 27. Mr. Zavodny also states that pages 1–2 of Exhibit 2005 are true copies of the January 28, 1994 cover letter by Ms. Albright, under which she sent the Invention Disclosure to outside patent counsel. *Id.*

Mr. Zavodny testifies that he “personally completed the Invention Disclosure by January 25, 1994.” *Id.* ¶ 26. Mr. Zavodny is named as the sole inventor in the Invention Disclosure. Ex. 2005, 3. Marcia Albright and Bruce Smith, also named as inventors of the ’352 patent (*see* Ex. 1001, 1 code [75]), are not identified as inventors in the Invention Disclosure. Ms. Albright and Mr. Smith each signed the Invention Disclosure as a “Witness.” Ex. 2005, 15. We determine, however, that because they are named inventors they cannot independently corroborate the invention disclosure or Mr. Zavodny’s testimony. *See Medichem*, 437 F.3d at 1170–1171.

Mr. Zavodny testifies that pages 5–14 of Exhibit 2005 are photocopies of pages out of his lab notebook. Ex. 2032 ¶ 27(B). During his work on the brake controller invention, Mr. Zavodny maintained handwritten notes, sketches, and circuit diagrams/schematics of his work in a bound lab notebook. *Id.* Mr. Zavodny states that he “drew all of the circuit diagrams/schematics,” and wrote the text, shown on pages 5–14 of Ex. 2005 “before January 28, 1994.” *Id.* This testimony is not corroborated. Mr. Zavodny also states that the circuit diagrams that have handwritten dates on them were completed by Mr. Zavodny by the date shown on the diagram, and “the dates were written down by me on that particular date.” *Id.* ¶ 27(C). For example, Mr. Zavodny testifies that he completed “page 7 of the Invention Disclosure (page 9 of Exhibit 2005) on 5/20/93 and signed and dated the drawing on that day.” *Id.* Pages 5–14 of Exhibit 2005,

however, were not signed by anyone other than Mr. Zavodny. Co-inventors Albright and Smith each signed page 15 of the Invention Disclosure as a “Witness.” Ex. 2005, 15. As stated above, however, we find that the Invention Disclosure included with Exhibit 2005 is *not* witnessed by anyone who is not a named inventor of the ’352 patent, and thus we treat it as an *unwitnessed* document.

In his Declaration Testimony, Mr. Zavodny provides a detailed analysis and explanation of figures 1.1, 1.2, 1.3, 1.4, and 1.5 from the invention disclosure. Ex. 2032 ¶¶ 28–30. He also provides a detailed explanation of the components and their functions in Figure 1.1 (*id.* ¶¶ 31–42) and Figure 1.2 (*id.* ¶¶ 43–50). The substance of this analysis is that he concludes that the drawings disclose the brake controller recited in independent claims 1 and 64 of the ’352 patent. *Id.* ¶ 50 (“Therefore, Figure 1.2 of the Invention Disclosure shows the power switching circuits of claims 1 and 64.”). In his conclusions, however, Mr. Zavodny states that only “claims 64 and 70” were conceived and reduced to practice by January 28, 1994. *See id.* ¶¶ 79, 80.

We also recognize that Mr. Zavodny testifies that “[a] pulse width modulated (PWM) control signal, as recited in claim 64, is a type of switching control signal, as recited in claim 1. Accordingly, *the power switching circuits* of claims 1 and 64 are the same.” *Id.* ¶ 15 (emphasis added). Mr. Zavodny testifies that the “current sensing circuit” in claim 1 (*see* Ex. 1001, 39:41–45), but *not* included in claim 64, is shown in Figure 1.1. *Id.* ¶¶ 36, 48.

Mr. Zavodny does not state specifically that he conceived and reduced to practice the inventions in claims 65–67, which include a display, notwithstanding his testimony that “[t]he prototypes, which were all

constructed and tested before January 28, 1994, also included indicator lights” and “a separate display.” *Id.* ¶ 40.

Mr. Zavodny also tested the prototype and concluded that it worked for its intended purpose. *Id.* ¶¶ 66–73.

As stated in the Invention Disclosure, “[t]he software in the microcontroller is what really determines how the Brake Control operates.”

Ex. 2005, 3. The Invention Disclosure also states

The software functions include Manual and Inertial Braking Level Determination, Braking Level Calculations, Pulse Width Modulation (PWM) Generation, Short Circuit or overload output Override, and Highside MOSFET Drive Charge Pump Clock Generation. Figure 1.2 illustrates the basic configuration of these blocks. The switch blocks in figure 1.2 show how the software is able to change its operation in response to the Feature/Mode input states.

Id. There is no persuasive evidence that links the software functions, or the required software code, to the functions included in the challenged claims.

Mr. Zavodny testifies that he wrote the computer code for the brake controller describe in the Invention Disclosure. Ex. 2032 ¶ 74–77 (citing Exs. 2014 (computer code), 2016 (screenshot of metadata for Ex. 2014)). Mr. Zavodny does not explain details of how or why the software code implements the functionality in the challenged claims. Dr. Martens, as we explain below when discussing his testimony, discusses the software code and how it operates the brake controller.

Mr. Zavodny concludes his testimony by stating that, “no later than January 28, 1994,” he is “confident” that he and the other named inventors in the ’352 patent “designed and conceived of a fully operational brake controller having all of the limitations in claims 64 and 70 of the ’352 patent.” Ex. 2032 ¶ 79. Mr. Zavodny also is “confident” that no later than

January 28, 1994, he constructed and tested a functioning prototype that confirmed that the invention would work for its intended purpose and contained all of the limitations of claims 64 and 70. *Id.* ¶ 80.

Mr. Zavodny refers to testing he conducted (*see* Ex. 2032 ¶¶ 65–73), but provides no data or results from the tests to support his testimony that each tested prototype was “fully operational” (*id.* ¶ 79) and “would work for its intended purpose” (*id.* ¶ 80).

Mr. Zavodny testifies that he is “confident” that, no later than January 28, 1994, the inventors conceived and reduced to practice a fully operational brake controller having all of the limitations in claims 64 and 70. *See id.* ¶¶ 79, 80.

Mr. Zavodny does *not* make a similar conclusory statement for claims 1 and 65–67, which also are at issue in this proceeding. As stated above, Mr. Zavodny testified that the Invention Disclosure documents (Ex. 2005) disclose the elements a “display circuit,” as recited for example in claim 1. Ex. 2032 ¶ 40.

In sum, we find Dr. Zavodny’s testimony inconsistent and *not* corroborated by the unwitnessed inventor documents on which he relies. His conclusions relate only to claims 64 and 70, although his testimony also discusses claim 1 (*see* Ex. 2032 ¶ 50). He does not mention claims 65–67, but testifies that the circuit diagrams include a display, which is recited in claims 65–67. His failure to address claims 1, and 65–67 and to state a position on conception and reduction to practice, as he does for claims 64 and 70, suggests that he does not believe claims 1, and 65–67 were conceived and reduced to practice by January 28, 1994, as Mr. Zavodny testifies for claims 64 and 70. *See* Ex. 2032 ¶¶ 79, 80.

The schematic circuit diagrams in the Invention Disclosure included with Exhibit 2005 illustrate various elements included in the challenged claims. The circuit diagrams, however, do not disclose any functional limitations included in the challenged claims. As the Invention Disclosure, authored by Mr. Zavodny, states, “[t]he software in the microcontroller is what really determines how the Brake Control operates.” Ex. 2005, 3.

Figure 1.2 in Exhibit 2005 (*see id.* at 6) is a software block diagram, but it does not itself relate to the functions recited in the challenged claims.

Accordingly, we determine that Mr. Zavodny’s testimony is *not* corroborated by the unwitnessed inventor-generated documents on which he relies. *See, e.g., Kolcraft*, 927 F.3d at 1325–26 (an inventor’s unwitnessed laboratory notebooks, emails, and drawings, without other independent evidence, cannot corroborate an inventor’s testimony); *Apator Miitor*, 887 F.3d at 1297 (“an unwitnessed laboratory notebook, alone, cannot corroborate an inventor’s testimony of conception.”); *Brown v. Barbacid*, 276 F.3d at 1335 (“an inventor’s own unwitnessed documentation does not corroborate an inventor’s testimony about inventive facts.”).

2. Declaration of Inventor Marcia Albright (Ex. 2033)

Ms. Albright’s Declaration is 36 pages. She provides a detailed account of the development of the brake controller disclosed and claimed in the ’352 patent, and her interaction with the other three inventors in developing this brake controller.

We make the following findings based on Ms. Albright’s testimony. Because she is a named inventor, however, facts related to conception and reduction to practice of the claimed invention must be corroborated by evidence independent of information received from Ms. Albright or any co-inventor. *E.g., see Medichem*, 437 F.3d at 1171.

Ms. Albright testifies that in 1988, she was hired by Tekonsha Engineering (which became Cequent Performance Products, Inc., now known as Horizon Global Americas Inc.) as the Chief Engineer. Ex. 2033 ¶ 4. She later held positions of Director of Engineering, Vice President of Engineering, General Manager, and Vice President of Electronics and Towing before leaving the employ of Horizon Global in 2015. *Id.* ¶ 4–5. Ms. Albright states that her testimony refers specifically to claim 1, but her “statements equally correspond to the circuits and functionality recited in claims 64-67 and 70. Ex. 2033 ¶ 20.

Ms. Albright states she has reviewed the various exhibits referenced in her Declaration, and believes them to be “true and accurate copies.” *Id.* at ¶ 21. Except for the Invention Disclosure included as part of Exhibit 2005, which was asserted to be “witnessed” by co-inventors Albright and Smith, none of the documents relied on by Ms. Albright, or the other inventors in their Declaration testimony, are witnessed. As stated above, however, we find that the Invention Disclosure included with Exhibit 2005 is *not* witnessed by anyone who is not a named inventor of the ’352 patent, and thus we treat it as an *unwitnessed* document.

*a) Invention Development
Conception and Reduction to Practice*

Starting in 1992, Ms. Albright began development of a microcontroller-based brake controller with Mr. Zavodny. *Id.* ¶ 22. In 1993, Tekonsha hired Bruce Smith to assist in development of this project. *Id.* ¶ 26. Ms. Albright testifies that she, along with Bruce Smith and Steve Zavodny, “decided what features to include in [this] project.” *Id.* ¶ 27.

According to Ms. Albright, in 1993, she and Mr. Zavodny “had already developed a prototype for a microprocessor based brake controller

built on a blue breadboard. *Id.* ¶ 28. A controller built on a breadboard is shown in Exhibit 2003. Exhibit 2003 includes undated, unwitnessed photographs. Ms. Albright testifies that she “recall[s] overseeing the testing of the prototype,” and that “[a]fter testing, Bruce [Smith] and I reviewed any changes to be made and I oversaw Steve and Bruce’s implementation of those changes.” *Id.* at ¶ 29.

Ms. Albright also testifies that the breadboard prototype (Ex. 2003) she and Mr. Zavodny developed was tested (*id.* at ¶¶ 30–36) “prior to July 21, 1994.” *Id.* ¶ 36. Ms. Albright also refers to testing of the “brake controller inventions recited by claims 64 [and] 70 of the ’352 patent” (*id.*) but provides no testimony relating the “breadboard” prototype (Ex. 2003) to the specific elements and functions in claims 64 and 70.

Ms. Albright also “oversaw Bruce Smith in building another prototype that he built” by modifying a “Commander” brake controller, made by Tekonsha, “to include a programmed microcontroller.” *Id.* ¶ 37. The “Commander” prototype is shown in Exhibit 2004. Exhibit 2004 contains undated, unwitnessed photographs. Ms. Albright testifies that the “Commander” prototype also was tested, with the tests completed “prior to January 28, 1994.” *Id.* ¶ 38.

Ms. Albright does not provide any data from, or describe the results of, any of the testing.

After testing, and “satisfied with the performance of the brake controller,” Ms. Albright states that Mr. Zavodny prepared the invention disclosure in Exhibit 2005, which she forwarded to patent counsel with a cover letter on January 28, 1994. *Id.* ¶ 39; *see also* Ex. 2005 (which includes Ms. Albright’s cover letter and the Invention Disclosure).

Contrary to Patent Owner's assertion that both Ms. Albright and Mr. Zavodny "conceived of a microprocessor-based brake controller that is the subject of the '352 Patent" (PO Resp. 5), the Invention Disclosure names Stephen A. Zavodny as the sole inventor. Ex. 2005, 3. Mr. Zavodny is a named inventor in the '352 patent. *See* Ex. 1001, 1 at code [75]. Ms. Albright and Mr. Bruce E. Smith each signed the Invention Disclosure as a "Witness." Ex. 2005, 15. Ms. Albright and Mr. Smith each are named as inventors of the '352 patent. *See* Ex. 1001, 1 at code [75].

In her Declaration, Ms. Albright testifies about the substance of the circuits, diagrams, and written description in the Invention Disclosure. Ex. 2033 ¶¶43–76. Her testimony is consistent with the testimony of Mr. Zavodny.

Ms. Albright states that she "recall[s] testing and verifying that the brake controller prototype described in the Invention Disclosure worked as we had designed it to prior to January 28, 1994. *Id.* ¶ 77. She testifies that

the input circuit or accelerometer/decelarometer would generate a signal and would supply it to the microcontroller. The microcontroller would then generate a PWM signal, and would apply that signal to a power switching circuit. The power switching circuit then powered the brakes based on the duty cycle of the PWM signal.

Id.

Ms. Albright testifies that "[s]ometime after January 28, 1994 and prior to June 24, 1994, Tekonsha hired Kumar Kulkarni, another named inventor of the '352 patent, and Steve Zavodny later left the company." *Id.* ¶ 78. Mr. Kulkarni joined the Sentinel brake controller project, along with Ms. Albright and Bruce Smith. *Id.* ¶ 79. Mr. Kulkarni, Ms. Albright, and Mr. Smith decided to add additional functional requirements for the

brake controller. *Id.* Apparently, Mr. Zavodny was not involved in developing these “additional functional requirements.” Prior to June 24, 1994, Mr. Kulkarni suggested a change from a PIC microprocessor to a Toshiba microprocessor, which allegedly offered cost-savings and additional functionality. *Id.* at ¶ 80.

Ms. Albright testifies that “[c]hoice of the microcontroller was critical, because you need the microcontroller to know which pins to use for which signals.” *Id.* ¶ 81. The microcontroller they chose “was a one-time programmable microcontroller, meaning the pin functionality could only be set once.” *Id.* Ms. Albright testifies that “[t]his supports my memory that the microcontroller was programed by the time I approved the design for production.” *Id.*

After building additional prototypes, testing of the prototypes, and creating a bill of materials, Ms. Albright “approved the circuit design for commercialization and oversaw Bruce’s formalizing the circuit design by creating a CAD version of prior hand-drawn schematics.” *Id.* ¶ 84.

Exhibits 2006, 2010, and 2011 are computer printout of a CAD drawing. *Id.* ¶¶ 86, 87; *see* Ex. 2006, 2010, 2011. All three exhibits identify “Kumar Kulkarni” as the “Engineer.” *See* Ex. 2006, 2010, 2011. All three exhibits are titled “SCHEMATIC – Toshiba Controller.” *Id.* The headings identify the drawings as “PROPRIETARY” (*id.*), but they are *not* designated as confidential documents in this proceeding.

Exhibit 2006 has an initial date of June 24, 1994 (“6-24-94”) in the heading and a revision date (“Rev. A”) of July 20, 1994 (“20 Jul 94”).¹⁶

¹⁶ Exhibit 2006 also has a handwritten date of “8-4-94” followed by the handwritten notation “DEVELOP1.sch.” Related exhibits 2010 and 2011 have similar handwritten dates and notations. At the hearing, Counsel for

Exhibit 2010 has an initial date of June 24, 1994, and a revision date of August 31, 1994. Exhibit 2011 has an initial date of June 24, 1994 and a revision date of September 21, 1994.

Ms. Albright testifies that she “reviewed [the Exhibit 2006] CAD drawing of the brake controller along with test results before Bruce Smith requested to order a printed circuit board (PCB) of this drawing.”

Ex. 2033 ¶ 86. She also testifies that she “recall[s] that the prototype for this drawing worked as intended and was the first PCB that we ordered.”

Ex. 2033 ¶ 86. Concerning Exhibits 2010 and 2011, Ms. Albright testifies that these exhibits involve “some minor changes but the overall functionality of the input circuit, display circuit, power switching circuit, current sensing circuit, and how they are coupled to and interact with the microcontroller would not have changed after July 21, 1994.” *Id.* ¶ 87. According to Ms. Albright, “the functionality was all in place and tested no later than July 21, 1994.” *Id.*

Ms. Albright also refers to Exhibit 2012 and a drawing therein dated June 24, 1994. Ex. 2033 ¶¶ 90, 93–98, 100, 101. Based on Exhibit 2012, Ms. Albright testifies that “we had a prototype of the brake controller shown in Exhibit 2012 before June 24, 1994.” *Id.* ¶ 91. Exhibit 2012 does not support this testimony.

Exhibit 2012 is an 8 page document. It includes a one page letter to outside counsel forwarding “copies of the ECN 452 for the Sentinel Brake control.” Ex. 2012, 1. The letter states the product was “released for production” on “8/14/95” and “ECN 452 was released on 9/15/95 to improve

Patent Owner stated that this date and notation refer to a revision date and the related computer metadata file. Tr. 57:24–58:11. We have not been directed to any evidence supporting Counsel’s explanation.

the unit.” *Id.* Also enclosed with the letter was a brochure “used to introduce the Prodigy to the dealer network.” *Id.*

Page 4 of Exhibit 2012 is a schematic drawing that has an original date of “6-24-94.” It is the only page in Exhibit 2012 that includes the date June 24, 1994. Thus, page 4 is the only page in Exhibit 2012 that can support Ms. Albright’s testimony that Exhibit 2012 shows “we had a prototype of the brake controller shown in Exhibit 2012 before June 24, 1994.” *See* Ex. 2033 ¶ 91. The schematic drawing at page 4 of Exhibit 2012, however, also shows an “initial production” date of “8/14/95” and two revisions, one on “9/15/95” and one on “9/11/95.” Ex. 2012. Thus, page 4 of Exhibit 2012 does not establish what existed on June 24, 1994, because it includes revisions made in 1995.

Ms. Albright states that Exhibit 2009 contains “excerpts from a binder containing part number assignments from Tekonsha.” *Id.* ¶ 110. She concludes that Exhibit 2009 “confirms [and] verifies that a production version of the Sentinel was finalized at least by July 27, 1994.” *Id.*

Exhibit 2009 is a hand-written six page list titled “Part Number Assignment.” Ex. 2009, 1. The part numbers run consecutively from “7400” (*Id.*) to “7507” (*id.* at 6). Each part number has a “Title” and a “Date.” The dates run from “7/27/94” (*id.* at 1) to “2/21/00” (*id.* at 6).

The first two part numbers on page 1 of Exhibit 2009 are for an “unprogrammed microprocessor (part number 7400) and a programmed microprocessor (part number 7401), identified as a ‘masked-micro.’” *Id.* ¶ 114. These part numbers were assigned on July 24, 1994. *Id.* ¶ 115; *see* Ex. 2009, 1.

According to Ms. Albright, “By assigning a part number to the programmed microprocessor, this means that we had a version of code ready for use along with the other hardware.” *Id.* ¶ 119.

Ms. Albright states that pages two and three of Ex. 2009 “show part numbers assigned to components of the [commercial embodiment] of the Sentinel project from September 1994 to April 1995.” *Id.* ¶ 121. Ms. Albright does not explain why part numbers assigned in 1995, such as Part Nos. 7446 (Ex. 2009, 3) and 7453 (*id.*) don’t indicate that the product was not “ready for use” (*see id.* ¶ 119) until 1995. We also find that several part numbers were assigned in November or December of 1994. *See* Ex. 2009, 4 (showing Part Nos. 7454–7468 with dates ranging from “11/16/94”–“12/15/94”). Ms. Albright testifies that “the date that a part number is given signifies that we had a prototype and were transitioning to manufacturing and commercialization of a finished design.” Ex. 2033 ¶ 113. Numerous part numbers assigned in November and December of 1994 are inconsistent with Ms. Albright’s testimony that “a production version of the Sentinel was finalized at least by **July 27, 1994.**” *Id.* ¶ 110 (emphasis added); *see also id.* ¶ 120 (Ms. Albright’s testimony that “by at least **July 21, 1994,** we had a tested prototype with fully functioning code and circuitry that contained all of the limitations of claims 1, 64-67, and 70 of the ’352 patent” (emphasis added)). Ms. Albright’s testimony does not correlate any of the part numbered components with elements or limitations in the challenged claims. She also does not explain the inconsistency between the “July 27, 1994” date (Ex. 2033 ¶ 110) and the “July 21, 1994” date (*id.* ¶ 120) for a finalized production version or a tested prototype.

Regarding conception of claims 64 and 70, Ms. Albright concludes that based on the exhibits she cited, she is “confident that by no later than

January 28, 1994,” the named inventors “had designed and conceived of a fully operational brake controller having all of the limitations in claims 64 and 70 of the ’352 patent” and “had a definite and permanent idea of the complete and operative invention recited in claims 64 and 70.” Ex. 2033 ¶ 131.

Regarding reduction to practice of claims 64 and 70, Ms. Albright concludes that based on the exhibits she cited, she is “confident that by no later than January 28, 1994,” the named inventors “had constructed functioning prototypes of the brake controller described in the Invention Disclosure that confirmed that the invention would work for its intended purpose and contained all of the limitations of claims 64 and 70 of the ’352 patent” and “had reduced to practice the inventions recited in claims 64 and 70.” *Id.* ¶ 132.

Notwithstanding her testimony quoted above for claims 64 and 70, Ms. Albright testifies to *different* dates of conception and reduction to practice for these same claims, claims 64 and 70, as well as claims 1 and 65–67. She does not explain why she provides different alternative dates for claims 64 and 70.

Regarding conception of claims 1, 64–67, and 70, Ms. Albright concludes that based on the exhibits she cited, she is “confident that by no later than July 21, 1994,”¹⁷ the named inventors “had designed and conceived of a fully operational brake controller having all of the limitations in claims 1, 64–67, and 70 of the ’352 patent” and “had a definite and

¹⁷ As noted above, Ms. Albright does not explain the inconsistency between the “July 27, 1994” date (Ex. 2033 ¶ 110) and the “July 21, 1994” date (*id.* ¶ 120) for a finalized production version or a tested prototype. Either date, however, is prior to the September 27, 1994 critical date of McGrath.

permanent idea of the complete and operative invention recited in claims 1, 64–67, and 70.” *Id.* ¶ 133.

Regarding reduction to practice of claims 1, 64–67, and 70, Ms. Albright concludes that based on the exhibits she cited, she is “confident that by no later than July 21, 1994,” the named inventors “had constructed functioning prototypes of the brake controller described in Exhibit 2006¹⁸ that confirmed that the invention would work for its intended purpose and contained all of the limitations of claims 1, 64–67, and 70 of the ’352 patent” and “had reduced to practice the inventions recited in claims 1, 64–67, and 70.” Ex. 2033 ¶ 134

Accordingly, Ms. Albright testifies that conception was January 28, 1994 (Ex. 2033 ¶¶ 120, 133, 134) or July 21st or 27th, 1994 (*id.* ¶¶ 131, 132). We have no basis to determine from the totality of her testimony that Ms. Albright’s testimony in paragraphs 120, 133 and 134 of her Declaration regarding claims 64 and 70 is a mistake; it is, however, clearly inconsistent with her testimony in paragraphs 131 and 132, respectively, of her Declaration.

b) The Patent Application

Ms. Albright testifies that “[s]ometime in late 1994, we also started working with our attorney, Bill DeWitt, to draft a provisional patent for the microprocessor based brake controller.” Ex. 2033 ¶ 108. Ms. Albright “instructed Bruce and Kumar to work with Bill” on preparing the

¹⁸ We note that Ms. Albright refers to “Exhibit 2006,” a schematic circuit diagram with a revision date of July 20, 1994, in paragraph 134 of her Declaration. She refers to the “Invention Disclosure” in paragraph 132. The Invention Disclosure is included with Exhibit 2005, which is a letter dated January 28, 1994, from Ms. Albright to patent counsel enclosing the Invention Disclosure.

application. *Id.* ¶ 109. Ms. Albright recalls “receiving drafts from Bill throughout early 1995, until we filed the provisional application on August 21, 1995.” *Id.* None of these drafts or related correspondence is of record in this proceeding. The provisional application has not been filed as an exhibit in this proceeding.

Exhibit 2013 is a memo dated August 20, 1996, prepared by Ms. Albright, to Joan McKinnon, then President of the company. Ms. Albright recalls that the memo was drafted on August 14, 1996. Ex. 2033 ¶ 122. It discusses a meeting with patent counsel on August 19, 1996. This meeting occurred approximately one year *after* the provisional application was filed. The memo states:

Kumar, Bruce and myself were at our patent attorney’s office yesterday going over the claims of the microprocessor based brake. One of the claims that caused some major discussion was E1. E1 is a broad claim, which if it were allowed would allow us to be able to patent any brake control using a microprocessor. When Bruce and Kumar and I read the claim, we said; we could not have that claim, because that the claim already described Kelsey Hayes or Drawtite’s unit. Terry explained to us, that if we are able to show that the idea originated here and we can document the date of conception and due diligence toward its pursuit, then if the examiner allows it, the claim would belong to us. It is certainly worth putting the claim in at this time to see what the examiner does with it. If it is not allowed, we have lost nothing. If it is allowed, then Kelsey Hayes and Drawtite would infringe on our patent.

Ex. 2013, 1.

Ms. Albright testifies that patent counsel “explained that including claim 1 (which I referred to as E1 in the letter [Exhibit 2013]) would mean that Steve Zavodny would be added as an inventor.” Ex. 2033 ¶ 125. Claim 1 of the patent application as filed became claim 1 of the issued patent. *See*

e.g., Ex. 1002, 5 (concordance of application claims to issued claims). At the hearing, however, counsel for Patent Owner stated

to make that record clear, . . . E-1 is actually, we believe, claim 64, which is at issue here, and, so, what Ms. Albright was identifying, here, is that *claim 64 was actually invented by Mr. Zavodny*, and if you read through this memorandum, *that's why they added Mr. Zavodny to this invention record here*, as to show the work that he did for the microcontroller, with the input circuit, and the power switching circuit, that's identified in that *claim 64*.

Tr. 40:20–41:2 (emphases added). Counsel's statement is not evidence in this proceeding. It does, however, shed some light on why Mr. Zavodny concluded that only claim 64 and claim 70, dependent from claim 64, were conceived and reduced to practice prior to McGrath. *See* Ex. 2032 ¶¶ 79, 80. Counsel's statement suggests that Mr. Zavodny was not involved with the conception and reduction to practice of claims 1 and 65–67.

The January 28, 1994 date for conception and reduction to practice is based on the Invention Disclosure and letter to counsel included in Exhibit 2005.

The source of evidence to support the July 21, 1994 date is uncertain. Based on Exhibits 2010 and 2011, Ms. Albright states “the microcontroller would not have changed after July 21, 1994.” *See* Ex. 2033 ¶ 87. Ms. Albright also testifies, however, that Exhibits 2010 and 2011 have dates different from July 21, 1994. *Id.* ¶¶ 88, 89; *see also* Ex. 2010 (having an initial date of June 24, 1994 and a revision date of August 31, 1994); Ex. 2011 (having an initial date of June 24, 1994 and a revision date of September 21, 1994).

In sum, we find Ms. Albright's testimony inconsistent and *not* corroborated by the unwitnessed inventor documents on which she relies, as

discussed above in this section of our Decision, and also as discussed above in the section discussing Mr. Zavodny's testimony.

Ms. Albright does *not* refer to any patent filing date as a constructive reduction to practice, as asserted by Patent Owner. *E.g.*, PO Resp. 2 (asserting a constructive reduction to practice of August 1995). Nor is there persuasive documentary or testimonial evidence establishing diligence concerning patent application preparation between January 28, 1994, the date of her letter to patent counsel, and the August 1995 filing of the provisional application.

3. *Declaration of Inventor Bruce Smith (Ex. 2030)*

Mr. Smith's Declaration is 52 pages. He provides a detailed account of the development of the brake controller disclosed and claimed in the '352 patent, and his interaction with the other three inventors in developing this brake controller.

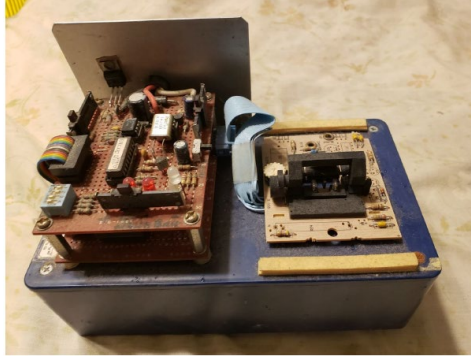
We make the following findings based on Mr. Smith's testimony. Because he is a named inventor, however, facts related to conception and reduction to practice of the claimed invention must be corroborated by evidence independent of information received from Mr. Smith or any co-inventor. *E.g.*, see *Medichem*, 437 F.3d at 1171.

Mr. Smith was hired in 1993 by Tekonsha Engineering Company (which became Cequent Performance Products, Inc., now known as Horizon Global Americas Inc.) as an Electrical Engineer and Manager of New Product Development. Ex. 2030 ¶ 4. Mr. Smith retired from the company in May 2015. *Id.* ¶ 4. Since retirement, Mr. Smith has been employed part-time as a consultant for Horizon Global Americas Inc. *Id.* ¶ 5.

When he started in 1993, Steve Zavodny and Marcia Albright, two of the other named inventors, had already developed a prototype for a

microprocessor based brake controller “built on a blue breadboard.”

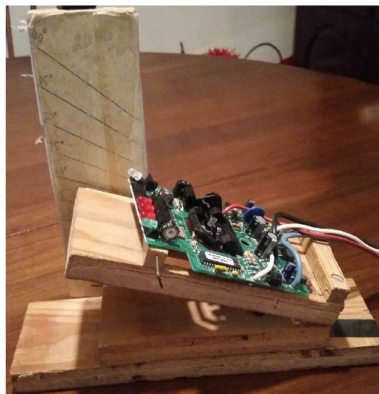
Id. ¶ 28. Exhibit 2003 is a photograph, reproduced below, of the “breadboard” prototype. PO Resp. 6; Ex. 2032 (Zavodny Decl.) ¶ 23.



Photograph of “breadboard” prototype. Ex. 2003.

*a) Invention Development
Conception and Reduction to Practice*

During 1993 to no later than January 28, 1994, Mr. Smith tested a second prototype, the Exhibit 2004 prototype, which was based on a modified “Commander” brake controller. *Id.* ¶ 31. Mr. Smith tested the Exhibit 2004 prototype on a “tilt table” to simulate driving conditions on a workbench. *Id.* ¶ 32. Exhibit 2017, the tilt table used by Mr. Smith (*id.* ¶ 33), is pictured below, in an undated photograph. Mr. Smith testifies that Exhibit 2017 “shows the actual tilt table rig that we used in 1993 with a later PCB [printed circuit board] on it as an example.” *Id.* ¶ 34.



Photograph of “tilt table” test apparatus. Ex. 2017.

Mr. Smith testifies that Exhibit 2017 “is a true and accurate photograph of the tilt table used for the testing describe[d] that I took when preparing my declaration. The photograph accurately shows the tilt table as it looks today, and as it looked in 1993 and prior to January 28, 1994.”

Ex. 2030 ¶ 33. The photograph is undated. Mr. Smith’s testimony describes the table, but not the results or data from testing the prototype.

Mr. Smith testifies that he personally reviewed the Invention Disclosure (*see* Ex. 2005) prepared by Mr. Zavodny, which he signed as a witness. Ex. 2030 ¶ 34.

In his Declaration, Mr. Smith testifies about the substance of the circuits, diagrams, and written description in the Invention Disclosure. *Id.* ¶¶45–83. His testimony is consistent with the testimony of Mr. Zavodny concerning the Invention Disclosure.

Mr. Smith tested the Ex. 2004 prototype and verified that it “worked as it was designed to.” *Id.* ¶ 84. Mr. Smith states that he “did this testing work on a prototype that embodied what is described in the Invention Disclosure prior to 1/25/94.” *Id.* ¶ 89. Mr. Smith provides no testing data for the tests he conducted. Mr. Smith states that the prototype included an input circuit, a power switching circuit, and a current sensing circuit all coupled to a microcontroller. *Id.* ¶ 91. Mr. Smith concludes from this testing that “at least by January 28, 1994 we had a working prototype of what is described in claims 64 and 67.” *Id.*

Development of a product continued according to their “ordinary development practice,” which was “Kumar [Mr. Kulkarni] would keep hand-drawn schematics of the prototype. I would build the prototypes. Kumar would write the software and Kumar would install or program the software code onto the microcontroller. [Mr Smith] would then test the prototypes.”

Ex. 2030 ¶ 98–99. Mr. Smith also created “a CAD versions of prior hand drawn schematics.” *Id.* ¶ 100.

Mr. Smith testifies that he created Exhibit 2006, which is a CAD drawing dated June 24, 1994. *Id.* ¶ 102. He also testifies on circumstances surrounding the creation of Exhibit 2006. *Id.* ¶¶ 101–107. Mr. Smith testifies that Exhibit 2006 “likely” was completed on July 20, 1994, but at least by August, 4, 1994. *Id.* ¶¶ 107–108.

Mr. Smith identifies four different dates for conception and reduction to practice of the challenged claims, which are summarized in the chart below, and further explained after the chart.

July 21, 1994	“conceived . . . and reduced [claims 1, 64–67, and 70] to practice” (<i>id.</i> ¶ 119)
July 27, 1994	production version . . . finalized” (<i>id.</i> ¶ 128)
August 4, 1994	“conceived and reduced to practice . . . a working prototype” (<i>id.</i> ¶ 121)
August 31, 1994	(prototype “worked as described” (<i>id.</i> ¶ 120)

Mr. Smith testifies about the substantive content of Exhibit 2006. *Id.* ¶¶ 109–1118. He concludes “Exhibit 2006 shows all limitations recited in claims 1, 64–67, and 70, and further confirms that the inventors had conceived the inventions recited in those claims and reduced them to practice by no later than *July 21, 1994*.” *Id.* ¶ 119 (emphasis added).

Mr. Smith then states that “at least by *August 31, 1994*, I tested a prototype of Exhibit 2006 and it worked as described by claims 1, 64–67, and 70.” *Id.* ¶ 120 (emphasis added).

In the next paragraph, he states that “by *August 4, 1994*, we had already conceived of and reduced to practice the features of the Sentinel brake controller, chosen the microcontroller, narrowed down which accelerometer we would use, developed a software algorithm, and built a working prototype.” Ex. 2030 ¶ 121 (emphasis added).

Mr. Smith, like Ms. Albright, testifies about assignment of part numbers and Exhibit 2009. *Id.* ¶ 128–137. Here, he identifies a fourth date for finalizing a production version of the prototype, July 27, 1994. *Id.* ¶ 128.

Mr. Smith does not explain the difference between the July 21 development (“conceived . . . and reduced [claims 1, 64–67, and 70] to practice”(*id.* ¶ 119)), July 27 development (production version . . . finalized” (*id.* ¶ 128)), August 4 development (“conceived and reduced to practice . . . a working prototype” (*id.* ¶ 121)) and the August 31 development (prototype “worked as described” (*id.* ¶ 120)). We recognize that all these dates are prior to the September 27, 1994 critical date of McGrath. The numerous different dates of what the inventors did and when they did it, however, affects the credibility of testimony regarding conception and reduction to practice.

Mr. Smith also discusses development of a “dual-sided PCB.” *Id.* ¶¶ 162–164 (citing Ex. 2020). He states that by comparing Exhibit 2020 (a circuit diagram) and Exhibit 2012 he determines that Exhibit 2020, Rev. D, dated January 30, 1995 “would have been considered a commercial production design and would have been tested and used for that production.” *Id.* ¶ 164.

Mr. Smith also refers to Exhibit 2022, which he testifies is a “commercial product and date code sticker.” *Id.* ¶ 167. Exhibit 2022 is reproduced below.



Ex. 2022

Mr. Smith states the sticker stating “09-95” means a product “assembled” in September 1995. The sticker also refers to “U.S. Patent 5,058,960” and “OTHER PATENTS PENDING.” *See* Ex. 2022. U.S. Patent 5,058,960 issued on October 22, 1991. *See* Ex. 3001. It was assigned to Patent Owner’s predecessor, Tekonsha Engineering Company. *Id.* It discloses that a “freely-flexing cantilever-type inertial sensor is suspended from one end so that its other end may move in response to inertial forces, for example, as a result of braking in a towing vehicle.” *Id.*, Abstract. There is nothing in Exhibit 2022 that relates the product shown to the invention disclosed and claimed in the ’352 patent.

b) The Patent Application

Mr. Smith testifies about the patent application process, and discusses the substance of a letter and its enclosures from Ms. Albright to patent counsel on June 19, 2001. Ex. 2030 ¶¶ 151–159 (discussing Ex. 2012); *see also id.* ¶¶ 171–178. Mr. Smith concludes that the letter to counsel dated June 19, 2001, which is Exhibit 2012, “confirms that our designs shown in Exhibits 2006 and 2010 worked as intended and described in claims 1, 64–

67, and 70.” *Id.* at ¶ 159. We disagree. Exhibit 2012 includes a marketing brochure, a parts, list, and schematic drawings. *See* Ex. 2012. It is not probative evidence that the device described “worked as intended.” It is not probative evidence that Exhibit 2012 includes all the elements and functions “described in claims 1, 64–67, and 70.”

Mr. Smith concludes and summarizes his Declaration testimony in paragraphs 179–182 in testimony that is verbatim with Ms. Albright’s testimony. *Compare* Ex. 2030 ¶¶ 179–182 *with* Ex. 2033 ¶¶ 131–134. In these paragraphs, Mr. Smith also provides the same inconsistencies for claims 64 and 70 as discussed above in our consideration of Ms. Albright’s testimony.

In sum, we find Mr. Smith’s testimony inconsistent and *not* corroborated by the unwitnessed inventor documents on which he relies, as discussed above in this section of our Decision, and also as discussed above in the sections discussing Mr. Zavodny’s and Ms. Smith’s testimony.

4. *Declaration of Inventor Chandrakumar Kulkarni (Ex. 2031)*

Mr. Kulkarni’s Declaration is 25 pages. Like the Declarations of the other inventors, he provides a detailed account of the development of the brake controller disclosed and claimed in the ’352 patent, and his interaction with the other three inventors in developing this brake controller. He reviews much of the same evidence as the other inventors, and reaches the same conclusions as the other inventors.

We make the following findings based on Mr. Kulkarni’s testimony. Because he is a named inventor, however, facts related to conception and reduction to practice of the claimed invention must be corroborated by evidence independent of information received from Mr. Kulkarni or any co-inventor. *E.g., see Medichem*, 437 F.3d at 1171.

Mr. Kulkarni began consulting with Tekonsha Engineering in 1994. Ex. 2031 ¶ 4. He became a full-time employee of Tekonsha in 2000. *Id.* He started his career at Tekonsha as a senior electrical engineer and now is the technology manager. *Id.* From 1994 to 2000, Mr. Kulkarni was responsible for software programming and electrical design for Tekonsha brake controllers. *Id.* ¶ 5.

The first product Mr. Kulkarni worked on was the Sentinel microcontroller-based brake controller, which Mr. Kulkarni states “led to the ‘352 patent.” *Id.* ¶ 6.

Mr. Kulkarni states that his Declaration testimony refers to claim 1, but that his statements “equally correspond to the circuits and functionality recited in claims 64–67 and 70.” *Id.* at ¶ 21.

*a) Invention Development
Conception and Reduction to Practice*

Mr. Kulkarni states that before June 24, 1994, the development team switched to a Toshiba microcontroller. Mr. Kulkarni developed the software code for the controller and worked with Bruce Smith in developing the hardware for the brake controller. Ex. 2031 ¶¶ 26–29. Mr. Kulkarni described this “group’s standard practice” for developing brake controllers:

Bruce [Smith] and I would build the prototype circuitry, and I would write the software. I would install or mask the software code onto the microcontroller. Bruce would build the physical prototype.

Bruce would then test the prototypes by simulating braking events, acceleration, deceleration, and short-circuit conditions. If any alterations were needed, Bruce and I would meet to go over and implement them.

Id. ¶¶ 30–31. Mr. Smith then made CAD drawings of the circuits, Ms. Albright approved the design, and printed circuit boards were ordered.

Id. ¶¶ 32–33.

Mr. Kulkarni testifies consistently with the other inventors about the timing and substance of the various exhibits discussed by the other inventors, and reaches conclusions consistent with the other inventors about conception and reduction to practice. *See id.* ¶¶ 37–82. He concludes that “[b]y mid-August 1995, we had started to make units of the Sentinel for commercialization, as shown by the initial production date in the upper-right corner of Exhibit 2012.” *Id.* ¶ 80. This “confirms my memory” that we had a working product “completed well before August 14, 1995.” *Id.* ¶ 81.

Mr. Kulkarni also discusses a dual-sided PCB. *Id.* ¶ 83. This dual-sided PCB functioned the same as the single-sided PCB’s but required more complex circuitry. *Id.* Mr. Kulkarni testifies that Exhibit 2020 shows “a later version” of our dual-sided PCB. *Id.* ¶ 84. Exhibit 2020 includes a revision block that shows Revision A created sometime before December 12, 1994; Revision B created on December 12, 1994; Revision C created on December 28, 1994; and “Revision D created on January 30, 1994 [sic].” *Id.* In fact, Exhibit 2020 shows a revision D date of “January 30, 1995.” *See* Ex. 2020 (emphasis added). Mr. Kulkarni states that Revisions A–D “were modifying the wiring and refining the circuitry for this dual-sided PCB. The functionality of the input circuit, power switching circuit, current sensing circuit, and display circuit did not change.” Ex. 2031 ¶ 84.

Mr. Kulkarni concludes from his analysis that Exhibit 2020, Revision D of January 30, 1995 “would have been considered a commercial production design and would have been tested and used for that production.” *Id.* ¶ 85.

Between January 30 and August 14, 1995, Mr. Kulkarni states the development team “would have been diligently working to create the commercial product and implement mass production, which included packaging, instruction manuals, and using an outside vendor to install software on the microcontrollers. *Id.* ¶¶ 86–87.

Mr. Kulkarni summarizes his analysis of the documents and his recollection of events as follows.

By July 21, 1994, the inventors “had designed and conceived of a fully operational brake controller having all of the limitations in claims 1, 64–67, and 70 of the ’352 patent,” and “had a definite and permanent idea of the complete and operative invention” in these claims. Ex. 2031 ¶ 91.

By July 21, 1994, the inventors “constructed functioning prototypes of the brake controller described in Exhibit 2006,” confirmed that it worked “for its intended purpose,” and “reduced to practice the inventions recited in claims 1, 64–67, and 70.” *Id.* at ¶ 92.

b) The Patent Application

Mr. Kulkarni refers to working with patent counsel in “late 1994 to early 1995” and states there were “several revisions of the provisional application.” *Id.* at ¶ 88. Neither these revisions, correspondence from counsel concerning the revisions, nor the final provisional application as filed are of record in this proceeding.

C. Declaration of Dr. John Martens (Ex. 2034)

Dr. Martens testifies that he “reviewed the inventors’ declarations (Exhibits 2030 to 2033) and associated documentation.” Ex. 2034 ¶ 46. He also testifies that he is “familiar with design documents of the type embodied by Exhibits 2005–2006 and 2010–2012, and can understand the schematics and printed circuit board (PCB) layouts of Exhibits 2008, 2020,

and 2021.” *Id.* Dr. Martens also reviewed the software code shown in Exhibit 2014 and understand the high-level functionality that it implements.” *Id.*

Based on his review, Dr. Martens opines that he “believe[s] that Exhibits 2005 through 2019 demonstrate complete conception and actual reduction to practice by inventors Kumar Kulkarni, Bruce Smith, Marcia Albright and Stephen Zavodny of the subject matter of claims 1, 64–67, and 70 of the ‘352 Patent prior to September 27, 1994.” Ex. 2034 ¶ 47; *but see id.* ¶ 70 (limiting this date to being “credible” of an actual reduction to practice); *id.* ¶¶ 71–74 (stating conception and reduction to practice of January 28, 1994 and July 21, 1994).

1. Ex. 2003

Dr. Martens testifies that he “reviewed the photographs of the ‘blue’ board shown in Exhibit 2003 (a brown board mounted atop a blue box, which I understand is referred to as a ‘blue’ breadboard by the inventor(s)).” Dr. Martens then opines that the photographs “show *a board that can be used* to make a functional prototype.” Ex. 2034 ¶ 51 (emphasis added). Dr. Martens also opines that “[t]his type of prototyping board would have been common in 1993.” *Id.* He concludes that “[t]herefore, *I find it credible that the inventors built this prototype in 1993 during their development.*” *Id.* (emphasis added). This conclusion states nothing about the elements and functions of the circuit shown in the breadboard photographs or whether they relate to the challenged claims in the ‘352 patent. Dr. Martens also does not opine that the test results attributed to the Ex. 2003 prototype by the inventors, in fact, established that one or more of the challenged claims resulted in an actual reduction to practice. There is no probative testimony by Dr. Martens, or any probative documents, corroborating the inventor’s

testimony and the unwitnessed inventor documents that the Exhibit 2003 prototype met all the limitations of the claims at issue, and that the Exhibit 2003 prototype would work for its intended purpose. *See, e.g., Medichem*, 437 F.3d at 1169. Dr. Martens’ testimony that, in his opinion, he finds it “credible that the inventors *built this prototype* in 1993” does not prove an actual reduction to practice.

2. *Ex. 2004*

Dr. Martens testifies that he reviewed the photographs of the prototype shown in Exhibit 2004. Ex. 2034 ¶ 52. He opines that “[t]he photographs do show a prototype of a modified Commander brake controller. *Id.* He also opines that “[t]his prototype has a microcontroller and other circuitry modifications.” *Id.* Based on these two observations, he then testifies that he “find[s] it *credible that the inventors built this [Ex. 2004] prototype in 1993 and at least by January 28, 1994.*” *Id.* (emphasis added).

For convenient reference we repeat below the two photographs that comprise Exhibit 2004.



Photographs of “Commander” prototype circuit. Ex. 2004.

Other than mentioning a “microcontroller,” Dr. Martens does not tie the elements or functions of the “Commander” prototype, shown in Exhibit 2004, to the challenged claims. It is not apparent that the Exhibit 2004

prototype includes, for example, a pulse width modulated (“PWM”) control signal and a microcontroller that varies the duty cycle of the PWM signal, as specifically recited in claim 64. Dr. Martens does provide any facts or data to support his opinion that it is “credible that the inventors built this prototype in 1993 and at least by January 28, 1994.” There are no dates indicated on the photographs. We have not been directed to any persuasive evidence, facts, or data establishing why Dr. Marten’s believes the “Commander” prototype was built “in 1993 and at least by January 28, 1994.” *See* 37 C.F.R. § 42.64(a) (“Expert testimony that does not disclose the underlying facts or data on which the opinion is based is entitled to little or no weight.”). We give his opinion testimony on this date no probative weight.

Similar to his testimony regarding the Exhibit 2003 prototype, his testimony regarding the Exhibit 2004 prototype fails to establish an actual reduction to practice. His opinion testimony states nothing about the elements and functions of the circuits shown in the Exhibit 2004 prototype or whether they relate to the challenged claims in the ’352 patent. He does not state what “circuitry modifications” (*see* Ex. 2034 ¶ 52) were made. Knowing when the prototype was “built” does not establish a reduction to practice of the challenged claims.

Dr. Martens also does not opine that the test results attributed to the Ex. 2004 prototype by the inventors, in fact, established that one or more of the challenged claims resulted in an actual reduction to practice. There is no probative testimony by Dr. Martens, or any probative documents, corroborating the inventor’s testimony and the unwitnessed inventor documents that the Exhibit 2004 prototype met all the limitations of the claims at issue, and that the Exhibit 2004 prototype would work for its

intended purpose. *See, e.g., Medichem*, 437 F.3d at 1169. Dr. Martens’ testimony that, in his opinion, he finds it “credible that the inventors *built this prototype* in 1993” does not prove an actual reduction to practice.

3. *Ex. 2005*

Dr. Martens reviewed the Figure 1.4 electrical schematic that is a part of Exhibit 2005 (*see* Ex. 2005, 9), with a handwritten date of “5/20/93”¹⁹ and opines that Figure 1.4 “is similar to the circuits disclosed in the ’352 Patent,” and notes that the Figure 1.4 schematic disclosed in Exhibit 2005, page 9, “is similar to Figs. 2A and 2B of the ’352 Patent (with some labels added).” Ex. 2034 ¶ 48. He concludes that in his “opinion, this shows that the inventors of the ’352 Patent invented what is claimed by claims 64 and 70 of the patent before McGrath was filed.” *Id.* Dr. Martens provides no facts or data explaining how or why he reaches this conclusion. He does not relate the schematic to claims 64 and 70.

4. *Exhibits 2006, 2007, 2010, 2011, 2012*

Dr. Martens testifies that “the schematics of Exhibits 2006, 2010, 2011, and 2012 all closely match the circuits disclosed in the ’352 Patent. In particular, the schematics are similar to Figs. 2A and 2B of the ’352 Patent.” Ex. 2034 ¶¶ 55–60, 63–66. Based on the date in the header of “June 26, 1994,”²⁰ for Exhibit 2006, Dr. Martens states that it includes “components” that are also shown in the *figures* of the ’352 patent. *Id.* at ¶ 56. He does not

¹⁹ This handwritten date was written by inventor Steven Zavodny. *See* Ex. 2032 ¶27(B) (Mr. Zavodny’s Declaration testimony stating that “everything on pages 3–12 of the Invention Disclosure [pages 5–14 of Ex. 2005], including the diagrams/schematics and text, were written by me before January 28, 1994.”

²⁰ The printed date in the header is “6-24-94.” Ex. 2006. Exhibit 2006 includes a revision date of “20 Jul 94.” *Id.*

relate these schematics to the challenged claims, only to the figures in the '352 patent. Relying on Exhibit 2006 and a last revision date of August 4 for the "DEVELOP1.SCH" metadata in Exhibit 2007, Dr. Martens concludes that "[i]n my opinion, this shows that the inventors of the '352 Patent invented what is claimed by claims 1, 64–67, and 70 of the patent before McGrath was filed." *Id.* at ¶ 55. There is no evidence in this proceeding, however, that identifies the substance of what is in the "DEVELOP1.SCH" file. Relying on this file is critical to Dr. Martens opinion.

Exhibit 2007 is a one-page, undated, unwitnessed list of items that identifies the "Name," "Date Modified," "Type," and "Size" of the listed items. Patent Owner's Exhibit List in its Response identifies Exhibit 2007 as "Metadata Printout for Exhs. 2006 and 2008–2010." *See* PO Resp., pg. "v." This exhibit label is not part of Exhibit 2007 and is not evidence in this proceeding. The name of one item listed in Exhibit 2007 is "DEVELOP1.SCH." Exhibit 2007 also shows a "Date Modified" for this item of August 4, 1994. As we discussed above in the context of Exhibit 2006, Counsel for Patent Owner stated at the hearing that this name and date refer to a computer metadata file and its revision date. Tr. 57:24–58:11. We have not been directed to any evidence supporting Counsel's explanation.

Moreover, even if we were to assume that it is a metadata file, there is no evidence linking a metadata file named "DEVELOP1.SCH" to the challenged claims. None of the inventors refer to such a file name. Dr. Martens does not provide any testimony, facts or data as to why or how he opines that Exhibits 2006 and 2007, alone or in combination with other exhibits, prove that then inventors "invented what is claimed by claims 1,

64–67, and 70 of the patent before McGrath was filed.” Ex. 2034 ¶ 55. We give this testimony no probative weight.

5. *Exhibit 2014*

Dr. Martens also reviewed the brake controller source code in Exhibit 2014. Ex. 2034 ¶ 49. Exhibit 2014 is 367 pages. The cover page states the file name of this source code as “File Name: EXEC_A.ASM.” Ex. 2014, 1. This source code was created by Mr. Zavodny. *Id.* at 2 (“Author: Stephen A. Zavodny”); *see also* Ex. 2032 (Zavodny Declaration stating “I completed writing the code in Exhibit 2014 by November 2, 1993. The computer file for the code has metadata that shows the last date the code was modified was November 2, 1993. This is consistent with my memory that I completed the code by that date.”).

Concerning Exhibit 2014, Dr. Martens testifies:

The revision I reviewed included routines that implement certain features, including an interface to an inertial sensor, provision for PWM output (the “switching control signal” disclosed in the ‘352 Patent), and ramp brake control logic. *Generally, the source code in Exhibit 2014 implements key functionality outlined in the block diagram of Exhibit 2005 (p. 6), which was dated January 25, 1994 (i.e., a significant amount of source code was implemented at the time the block diagram was produced).*

Id. (emphasis added). Dr. Martens does not state the revision date of the “revision [he] reviewed.” Dr. Martens does not testify as to whether the substance of the “key functionality” “implements” all the relevant limitations of the challenged claims sufficient to be a conception of the challenged claims.

The only specific example provided by Dr. Martens of the “key functionality” is that:

For example, Exhibit 2014 shows a PWM conversion table in the file named ICNVRSN.TBL at pages 7-9, as indicated by the comment “Inertial Conversion Table... This Table Convertes[sic] the Inertial Sensor Input to PWM %DC).” This conversion table is used to identify the appropriate duty cycle for the PWM signal based on the accelerometer output.

Id. at ¶50. This portion of the code is merely a static table, however. Dr. Martens does not discuss how the code implements the claimed *functionality* of converting inertial sensor input to PWM duty cycles. Instead, we are left to fill in the gaps for a key limitation. *See* Ex. 2005, 3 (“[t]he software in the microcontroller is what really determines how the Brake Control operates”).

We determine that Dr. Martens’ testimony about the software code in Exhibit 2014 does not establish a sufficient relationship with the challenged claims to corroborate any inventor testimony or establish independently that Exhibit 2014 supports a determination of conception of one or more of the challenged claims.

6. *Exhibits 2017, 2018*

Concerning Exhibits 2017 and 2018, Dr. Martens opines that “the tilt table and test box shown in Exhibits 2017 and 2018 would have worked to test the functionality of the brake controller as described by Mr. Smith.” Ex. 2034 ¶ 54. He provides no additional analysis, facts, or data to support this conclusion. Nor does he testify that these exhibits, in fact, establish that a prototype embodying the challenged claims was tested and the tests proved the prototype worked for its intended purpose.

7. *Dr. Martens’ Conclusions*

Based on the documents reviewed and inventor Declarations, Dr. Martens concludes that it is “credible” that “the inventors of the ’352 Patent invented what is claimed by claims 1, 64–67, and 70 of the patent before

McGrath was filed.” Ex. 2034 ¶¶ 69, 70. He also repeats the same conclusions as stated by Ms. Albright and Mr. Smith for dates of conception and reduction to practice of the challenged claims, including the same inconsistent dates for claims 64 and 70. *See d.* ¶¶ 71–74.

We note that Patent Owner concedes that Dr. Martens’ testimony is not offered to corroborate any dates on the inventor-prepared documents. Mot. Excl. 12 (“Petitioner’s argument that Dr. Martens cannot corroborate dates is a red herring—he is not offered to corroborate dates.”).

In sum, we determine that Dr. Martens’ testimony does not corroborate any inventor testimony sufficient to establish conception and reduction to practice prior to the filing date of McGrath.

D. Conclusion on Whether McGrath Remains as a Reference

Applying the rule of reason to the totality of the evidence, including circumstantial evidence, we determine that Patent Owner has not met its burden of proof to antedate McGrath with corroborated, probative evidence.

The following chart summarizes the conclusions of the four inventors (Zavodny, Albright, Smith, and Kulkarni) and of Patent Owner’s expert (Dr. Martens) on the asserted dates of conception and actual reduction to practice in their Declaration testimony.

Witness	Claims	Conception	Reduction to Practice	Cite
Zavodny	64, 70	No testimony	Jan. 28, 1994	Ex. 2032 ¶¶ 79, 80
Albright	64, 70	Jan. 28, 1994	Jan. 28, 1994	Ex. 2033 ¶¶ 131, 132
Albright	1, 64–67, 70	Jul. 21, 1994 ²¹	Jul. 21, 1994	Ex. 2033 ¶¶ 120, 133, 134
Smith	64, 70	Jan. 28, 1994	Jan. 28, 1994	Ex. 2030 ¶¶ 179, 180
Smith	1, 64–67, 70	Jul. 21, 1994 ²²	July 21, 1994	Ex. 2030 ¶¶ 181, 182
Kulkarni	1, 64–67, 70	Jul. 21, 1994	July 21, 1994	Ex. 2031 ¶¶ 91, 92
Martens	64, 70	Jan. 28, 1994	Jan. 28, 1994	Ex. 2034 ¶¶ 71, 72
Martens	1, 64–67, 70	Jul. 21, 1994	July 21, 1994	Ex. 2034 ¶¶ 73, 74

1. Claims 64 and 70

For claims 64 and 70, Patent Owner’s evidence regarding both conception and reduction to practice by January 28, 1994, relies on (1) inventor testimony, (2) Exhibit 2005, the unwitnessed Invention Disclosure sent to patent counsel on January 28, 1994, and (3) undated, unwitnessed photographs of two physical prototypes, Exhibits 2003 and 2004. We also

²¹ Ms. Albright, Mr. Smith, and Dr. Martens testify identically, and inconsistently, for claims 64 and 70. In one paragraph of their Declaration testimony, dealing with claims 64 and 70, they each state January 28, 1994, as the date of conception and reduction to practice. *See* Ex. 2033 ¶¶ 131, 132; Ex. 2030 ¶¶ 179, 180; Ex. 2034 ¶¶ 71, 72. In another paragraph of their Declaration testimony, dealing collectively with claims 1, 64,–67, and 70, they each state July 21, 1994, as the date of conception and reduction to practice. *See* Ex. 2033 ¶¶ 133, 134; Ex. 2030 ¶¶ 181, 182; Ex. 2034 ¶¶ 73, 74.

²² Mr. Smith also testifies, however, that on August 4, 1994 the inventors “conceived and reduced to practice . . . a working prototype” (Ex. 2030 at ¶ 121) and on August 31, 1994 the inventors had a prototype that “worked as described” (*id.* at ¶ 120)

note that Mr. Kulkarni was not involved with this project on January 28, 1994²³.

Concerning conception, the Invention Disclosure represents what inventors Zavodny, Smith, and Albright believed they invented. At best, it represents a conception of what is disclosed in the Invention Disclosure. What is lacking, however, is corroborated, probative evidence that the Invention Disclosure includes all the elements and limitations of claims 64 and 70, for example the functionality of the microprocessor. Dr. Martens' testimony does not fill in this essential information. Thus, we determine that the inventor testimony and related inventor documents are not corroborated or probative to establish conception of the inventions in claims 64 and 70 by January 28, 1994.

Concerning an actual reduction to practice, the inventor testimony asserts that undated, unwitnessed photographs of prototypes in Exhibit 2003 and Exhibit 2004 were tested and worked for their intended purpose. There is, however, a complete absence of corroborating testimonial or documentary evidence of the results of any such testing. There are no contemporaneous documents among the inventors, or to a third party, indicating that the tested prototypes, in fact, worked. Also, there is no probative evidence that the Exhibit 2003 and 2004 prototypes included all the elements and functions of claims 64 and 70. Dr. Martens offers no probative testimony on this issue. Speculative interpretations of the circuit diagrams and other evidence may suggest that the inventors would not seek

²³ "Sometime after January 28, 1994 and prior to June 24, 1994, Tekonsha hired Kumar Kulkarni, another named inventor of the '352 patent, and Steve Zavodny later left the company." Ex. 2033 ¶ 78 (testimony of Ms. Albright).

to obtain a patent on an invention that did not work. Considering the totality of the evidence, however, or more accurately, the lack of such evidence, on reduction to practice of claims 64 and 70 by January 28, 1994, we conclude that Patent Owner has not met its burden of proof on this issue with corroborated, probative evidence.

Thus, the uncorroborated evidence does not establish conception and actual reduction to practice of claims 64 and 70 by January 28, 1994.

2. Claims 1, 64–67, and 70

For claims 1, 64–67, and 70, Patent Owner’s evidence regarding conception and reduction to practice by July 21, 1994, relies primarily on inventor testimony and Exhibits 2006, 2010, and 2011, which are schematic diagrams. *See e.g.*, PO Resp. 47. Patent Owner refers repeatedly to “the July 21, 1994” prototype (*id.* at 26), but in fact, there is no physical prototype or photograph of a physical prototype dated July 21, 1994 to which we have been directed. The July 21, 1994, prototype is “the prototype in [schematic drawing] Exhibit 2006” (*id.* at 47).²⁴

Here again, there is no corroborated, probative evidence that Exhibits 2006, 2010, and 2011 include all the functions recited in claims 1, 64–67, and 70. There is no evidence to which we have been directed that is the software code for the circuits shown in these schematics. Without the software code and an analysis of the software for these circuits, there is no evidence of the functions performed by the circuits. The inventors testify

²⁴ Exhibit 2006 has a revision date of July 20, 1994. Exhibit 2010 has a revision date of August 31, 1994. Exhibit 2011 has a revision date of September 21, 1994. Nonetheless, Patent Owner and the witness testimony each refer to a July 21, 1994 conception and reduction to practice based on this evidence.

about revisions and testing of these circuits, but there is no corroborating testimonial or documentary evidence of the results of any such testing.

There are no contemporaneous documents among the inventors, or to a third party, indicating that the tested prototypes, in fact, worked. Speculative interpretations of the schematic drawings and other evidence may suggest that the inventors would not seek to develop a commercial product for an invention that did not work. There is no probative evidence, however, that any commercial embodiment included all the elements and functions in the challenged claims. Considering the totality of the evidence, however, or more accurately, the lack of such evidence, on conception and reduction to practice of claims 1, 64–67, and 70 by July 21, 1994, we conclude that Patent Owner has not met its burden of proof on these issues.

Thus, the uncorroborated evidence does not establish conception and actual reduction to practice of claims 1, 64–67, and 70 by July 21, 1994.

Because we determine that there has not been sufficient evidence of conception, we need not address diligence. Notwithstanding, even if we assumed conception by September 21, 1994 and a constructive reduction to practice on August 21, 1995,²⁵ Patent Owner offers little explanation of how it was diligently working on reducing the invention to practice. By Patent

²⁵ Patent Owner alleges conception on September 21, 1994 based on the schematic in Exhibit 2011 (notwithstanding prior allegations of conception on January 28, 1994 and July 21, 1994), plus diligence until the filing of the patent application on August 21, 1995. PO Resp. 27–31. We have already mentioned that Patent Owner failed to submit evidence of its alleged constructive reduction to practice when filing the provisional application on August 21, 1995. For purposes of this paragraph, however, we will take the alleged conception and constructive reduction *arguendo*, because even with those dates Patent Owner does not establish the requisite diligence between them.

Owner's own admission, much of this period was spent working on non-inventive portions of the invention, such as designing more efficient PCB layouts, packaging, and writing instruction manuals. PO Resp. 28 (admitting that the "double-sided PCB is not the subject of the '352 Patent and its development did not alter how the circuitry . . . operates"), 29 (discussing other efforts not related to reducing the invention to practice but rather on ancillary matters). Although inventors may work on alternatives and improvements without negating diligence, these actions taken by Patent Owner during this timeframe were immaterial to the claimed subject matter. *Cf. ATI*, 920 F.3d at 1372. In whole, even if we assume Patent Owner's alleged conception date of September 21, 1994, we are offered no further probative evidence of diligence in *reducing the invention to practice* after that date and up until the application filing date.

Reviewing the evidence as a whole, the inventor testimony in this case creates the same "catch-22 of corroboration" as found in *Apator Miitors*, where Patent Owner attempted to corroborate inventor testimony with inventor-created documents, but the inventor-created documents could only provide that corroboration with help from inventor testimony. *See Apator Miitors*, 887 F.3d at 1296. *See also Kolcraft*, 927 F.3d at 1324–1325 (holding that undated drawings and photos of prototypes could not independently corroborate inventor testimony of conception). Similarly, here, for example, the undated, unwitnessed photos of the prototypes (Exs. 2003, 2004, 2022) cannot corroborate the inventors' testimony of an actual reduction to practice. The photos provide no probative evidence that the pictured prototypes worked for their intended purpose.

The facts in this case are distinguishable from those in *ATI* and *REG Synthetic Fuels*.

In *ATI*, the issue was diligence. The inventor Declaration was “accompanied by ‘almost 1300’ pages of documentary records showing the work done and by whom and when, including metadata, document logs, and folder histories.” *ATI*, 920 F.3d at 1370. The inventor testimony also explained corporate procedures that “required” employees “to save their work in a revision-control system called Perforce that maintains metadata.” *Id.*

In this proceeding, we have few substantive records from inventors Smith, Albright, and Kulkarni concerning the development work performed after inventor Zavodny left the company, notwithstanding their testimony of continued testing of various prototypes. Other than conclusory inventor testimony, there is no persuasive evidence that any tested prototype included all the elements and functions included in the challenged claims or that any tested prototype would have worked for its intended purpose.

In *ATI*, there also was “mapping of the RTL Code to the claims.” *ATI*, 920 F.3d at 1372. The only code of record in this proceeding is Exhibit 2014, prepared by Mr. Zavodny. There is no persuasive evidence of mapping the relevant portions of this code to the relevant elements and functions recited in the challenged claims. This lack of evidence is particularly significant based on Mr. Zavodny’s acknowledgement in the Invention Disclosure that “[t]he software in the microcontroller is what really determines how the Brake Control operates.” *See* Ex. 2005, 3.

In *REG Synthetic Fuels*, the issue was conception. The Court held that emails sent to third parties corroborated the inventor’s conception of the claimed invention. *REG Synthetic Fuels*, 841 F.3d at 964 (“Thus, the documentary evidence contained in Exhibits 2011, 2058, and 2061 corroborate Mr. Abhari’s conception of the claimed compositions”). The

Court held that “[t]he act of writing and sending the email is, by itself, probative evidence” on whether the inventor thought he had conceived all the elements and limitations in the challenged claims. *Id.* The Court remanded the case for further fact finding on diligence and reduction to practice. *Id.* at 965.

We also stated that Dr. Martens’ opinion about the significance of Exhibit 2006 schematic had no probative weight because there was no evidence linking a metadata file named “DEVELOP1.SCH” to the challenged claims.

Unlike *ATI* and *REG Synthetic Fuels*, here there was neither conception nor reduction to practice.

Accordingly, applying the rule of reason to the totality of the evidence, McGrath is available as a reference against the challenged claims.

VI. ANALYSIS OF PATENTABILITY

Other than its argument asserting that McGrath is not available as a reference, Patent Owner has not raised any substantive defenses to Petitioner’s allegations of unpatentability. Petitioner still bears the burden of proof on this issue. Based on the arguments and evidence in the Petition, including the testimony of Petitioner’s expert, Dr. Spangler, and our analysis, findings, and conclusions stated in the Decision to Institute, which we adopt as if restated in this Decision, we determine, that a preponderance of the evidence establishes that claims 1, 64–67, and 70 are unpatentable.

VII. MOTION TO EXCLUDE

Petitioner moves to exclude a substantial number of exhibits on a number of different evidentiary grounds. *See* Mot. Excl. We deny the motion as moot.

Our general approach for considering challenges to the admissibility of evidence was outlined in *Corning Inc. v. DSM IP Assets B.V.*, IPR2013-00053, Paper 66, 19 (PTAB May 1, 2014). As stated in *Corning*, similar to a district court in a bench trial, the Board, sitting as a non-jury tribunal with administrative expertise, is well-positioned to determine and assign appropriate weight to evidence presented. *Id.* (citing *Donnelly Garment Co. v. NLRB*, 123 F.2d 215, 224 (8th Cir. 1941) (stating, in the context of reviewing an administrative determination of the National Labor Relations Board based on findings by a Trial Examiner, “We think that experience has demonstrated that in a trial or hearing where no jury is present, more time is ordinarily lost in listening to arguments as to the admissibility of evidence and in considering offers of proof than would be consumed in taking the evidence proffered . . . One who is capable of ruling accurately upon the admissibility of evidence is equally capable of sifting it accurately after it has been received”)).

Moreover, “there is a strong public policy for making all information filed in an administrative proceeding available to the public.” *Liberty Mut. Ins. Co. v. Progressive Cas. Ins. Co.*, CBM2012-00010, slip op. at 40 (PTAB Feb. 24, 2014) (Paper 59). Rather than excluding evidence that is allegedly hearsay, confusing, misleading, untimely, and/or irrelevant, we will simply not rely on it or give it little or no probative weight, as appropriate, in our analysis. “In an *inter partes* review, we regard it as the better course to have a complete record of the evidence to facilitate public access, as well as appellate review.” *Sony Computer Entm’t Am. LLC v. Game Controller Tech. LLC*, IPR2013-00634, slip op. at 31 (PTAB Apr. 14, 2015) (Paper 32); *see also Gnosis S.p.A. v. S. Alabama Med. Sci. Found.*, IPR2013-00118, slip op. at 43 (PTAB June 20, 2014) (Paper 64)

(citing *Donnelly*, 123 F.2d at 224 (“If the record on review contains not only all evidence which was clearly admissible, but also all evidence of doubtful admissibility, the court which is called upon to review the case can usually make an end of it, whereas if evidence was excluded which that court regards as having been admissible, a new trial or rehearing cannot be avoided.”)).

VIII. CONCLUSION²⁶

McGrath is available as a reference, and claims 1, 64–67, and 70 are unpatentable based on the grounds asserted by Petitioner. Petitioner’s Motion to Exclude is denied.

IX. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that claims 1, 64–67, and 70 are not patentable; and

FURTHER ORDERED that Petitioner’s Motion to Exclude is denied.

In summary:

Claims	35 U.S.C. §	Reference(s)/Basis	Claims Shown Unpatentable	Claims Not shown Unpatentable
64–67, 70	102(e)	McGrath	64–67, 70	
1	103(a)	McGrath, Eccleston	1	

²⁶ Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this Decision, we draw Patent Owner’s attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. See 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. See 37 C.F.R. § 42.8(a)(3), (b)(2).

IPR2019-00625
Patent 6,068,352

Overall Outcome			1, 64–67, 70	
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IPR2019-00625
Patent 6,068,352

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