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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

WESTINGHOUSE AIR BRAKE TECHNOLOGIES CORPORATION,
Petitioner,

v.

SIEMENS MOBILITY, INC.,
Patent Owner.[1]

Case IPR2017-00981
Patent 7,092,801 B2

Before KRISTEN L. DROESCH, MEREDITH C. PETRAVICK, and TIMOTHY J. GOODSON, *Administrative Patent Judges.*

GOODSON, *Administrative Patent Judge.*

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

[1] Patent Owner represents that on June 1, 2008, Siemens Industry, Inc. transferred ownership of the patent at issue to Siemens Mobility, Inc. *See* Paper 39. Siemens Mobility, Inc. is represented by the same counsel that previously represented Siemens Industry, Inc. in this proceeding. *See id.*

I. INTRODUCTION

Petitioner filed a Corrected Petition (Paper 1, "Pet.") requesting *inter partes* review of claims 1, 6, 9, 10, 15, 18, and 19 of U.S. Patent No. 7,092,801 B2 (Ex. 1001, "the '801 patent"). Patent Owner filed a Preliminary Response to the Petition. Paper 10. We instituted an *inter partes* review on all challenged claims and on all asserted grounds:

Reference(s)	Basis	Claims Challenged
RSAC[2]	§ 103	1, 9, 10, 18, and 19
RSAC in view of Sibley[3]	§ 103	6 and 15
Nickles[4] in view of Sibley	§ 103	1, 6, 9, 10, 15, 18, and 19

See Paper 12 ("Dec. on Inst.").

After institution of trial, Patent Owner filed a Patent Owner Response. (Paper 22, "PO Resp."), and Petitioner filed a Reply (Paper 27, "Reply"). In addition to the references cited above, Petitioner relies on the testimony of Dr. Samuel Pullen (*see* Ex. 1002), while Patent Owner relies on testimony from Mr. John Loud (*see* Ex. 2005). Patent Owner filed a motion to exclude certain evidence, which motion we address in Section IV. An oral hearing was held, a transcript of which is included in the record. Paper 41 ("Tr."). Following the hearing, and with our authorization (*see* Paper 36), Petitioner submitted Exhibit 1036 as supplemental information along with a brief paper arguing the relevance of that exhibit, and Patent Owner submitted a brief response. *See* Paper 37; Paper 38.

[2] Railroad Safety Advisory Committee, *Implementation of Positive Train Control Systems*, Ex. 1005.
[3] U.S. Patent No. 4,495,578, issued Jan. 22, 1985, Ex. 1007.
[4] U.S. Patent No. 6,144,901, issued Nov. 7, 2000, Ex. 1006.

We have jurisdiction under 35 U.S.C. § 6. Petitioner bears the burden of proving unpatentability of the challenged claims, and the burden of persuasion never shifts to Patent Owner. *Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015). To prevail, Petitioner must prove unpatentability by a preponderance of the evidence. *See* 35 U.S.C. § 316(e); 37 C.F.R. § 42.1(d). This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons that follow, we determine that Petitioner has shown by a preponderance of the evidence that claims 1, 6, 9, 10, 15, 18, and 19 of the '801 patent are unpatentable. *See* 35 U.S.C. § 316(e).

A. Related Matters

Patent Owner is asserting the '801 patent against Petitioner in *Siemens Industry, Inc. v. Westinghouse Air Brake Tech. Corp.*, Case No. 1-16-cv-00284 in the U.S. District Court for the District of Delaware. Pet. viii; Paper 17, 1. In addition, the parties list the following proceedings before the Board as related matters:

- Case IPR2017-01454, which concerns U.S. Patent No. 6,978,195;
- Case IPR2017-01821, which concerns U.S. Patent No. 7,200,471; and
- Case IPR2017-02104, which concerns U.S. Patent No. 7,078,926.

Paper 14, 2; Paper 17, 1.

B. The '801 Patent

The '801 patent relates to a system and method for controlling a train. Ex. 1001, at [54], [57], 1:17–18. The Background section of the '801 patent discusses known systems for train control and perceived shortcomings of those systems. *See id.* at 1:20–4:7. For example, the '801 patent describes "the Automatic Train Control (ATC) system, [in which] train location

information, speed information, and train control information are continually exchanged between a train cab and computerized wayside controllers in real time . . . ." *Id.* at 2:45–48. "Some ATC systems automatically apply the brakes if a stop signal is passed" or "if a track warrant is about to be exceeded." *Id.* at 2:54–56, 60–62.

The '801 patent describes a transit system that combined the ATC system with "a Positive Train Stop (PTS) system," which "anticipates signaling and will stop or slow the train automatically without operator input." *Id.* at 3:1–6. The PTS "will stop a train before actually going through a stop signal" and "allows for 'civil-speed' and 'temporary construction' speed restrictions." *Id.* at 3:8–11. A drawback of the PTS system and other known automatic train stopping systems, according to the '801 patent, is that they are inefficient because "they assume the worst case scenario." *Id.* at 3:18, 24–25. In particular, "when these systems detect an upcoming stop signal, they will apply the brakes at a distance that assumes the train is traveling downhill on the most steeply graded section of track, and that the train is at the maximum weight." *Id.* at 3:20–24.

The Detailed Description of the '801 patent describes a system with a control module that maintains in its memory restrictions on the train's movement, including "permanent, temporary, and train-based speed restrictions." *Id.* at 10:65–11:2. If the train is in danger of violating a speed limit or other restriction, the system first warns the conductor. *Id.* at 11:14–17. If the conductor fails to take corrective action, "the system 100 automatically implements further corrective action, such as applying a brake penalty." *Id.* at 11:17–20. The control module calculates how much time and distance is needed to stop the train by applying

> the equations of physics, basic train handling principles and train control rules. This time/distance will depend upon factors such as the speed of the train, the weight and length of the train, the grade and amount of curvature of the upcoming track (which are determined using position information from the GPS receiver 130 as an index into the map database 140), braking power, braking ratios, type of brake equipment, aerodynamic drag of the train, etc.

Id. at 11:23–33.

C. Challenged Claims

As noted above, we instituted trial as to claims 1, 6, 9, 10, 15, 18, and 19, which were all of the claims challenged in the Petition. *See* Dec. on Inst. 4, 26. Of these, only claims 1 and 10 are independent claims. Claim 1 is reproduced below:

> 1. A method for controlling a train comprising the steps of:
>
> receiving a speed restriction at a train, the speed restriction including a maximum allowable speed;
>
> determining a position of the train using a positioning system;
>
> determining when a train is in danger of violating the speed restriction based at least in part on a grade of a track on which the train is traveling and at least in part upon the weight of the train;
>
> applying a train brake such that violation of the speed restriction is prevented.

Ex. 1001, 12:60–13:4.

II. CLAIM CONSTRUCTION

In an *inter partes* review, claim terms in an unexpired patent are given their broadest reasonable construction in light of the specification of the patent in which they appear. 37 C.F.R. § 42.100(b); *Cuozzo Speed Techs. LLC v. Lee*, 136 S. Ct. 2131, 2144–46 (2016) (upholding the use of the broadest reasonable interpretation standard). In our Institution Decision, we

determined that resolution of the disputed issues at that stage of the proceeding did not require an express interpretation of any claim term. *See* Dec. on Inst. 5 (citing *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)). After institution, Patent Owner argued that "[c]laim construction . . . remains unnecessary to resolve any disputed issue in this proceeding." PO Resp. 12. Likewise, Petitioner stated at the hearing that there are no claim construction disputes. Tr. 14:16–19.[5] Thus, we determine, as we did in our Institution Decision, that we need not expressly construe any claim terms to resolve the disputed issues.

III. OBVIOUSNESS ANALYSIS

A. Legal Standards

In *Graham v. John Deere Co. of Kansas City*, 383 U.S. 1 (1966), the Supreme Court set out a framework for assessing obviousness under § 103 that requires consideration of four factors: (1) the "level of ordinary skill in the pertinent art," (2) the "scope and content of the prior art," (3) the "differences between the prior art and the claims at issue," and (4) "secondary considerations" of nonobviousness such as "commercial success, long felt but unsolved needs, failure of others, etc." *Id.* at 17–18; *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 407 (2007). In this case, the parties did not present any evidence relating to secondary considerations. We discuss the first three *Graham* factors below.

[5] Petitioner included in its Reply a brief section arguing that "the broadest reasonable interpretation of 'speed restriction' must encompass a 'maximum allowable speed.'" Reply 4. Considering that claim 1 itself recites that "the speed restriction includ[es] a maximum allowable speed" (Ex. 1001, 12:62–63), we agree with Petitioner on that point, but we also find no indication that Patent Owner contends otherwise.

B. Level of Ordinary Skill in the Art

In determining the level of skill in the art, we consider the type of problems encountered in the art, the prior art solutions to those problems, the rapidity with which innovations are made, the sophistication of the technology, and the educational level of active workers in the field. *Custom Accessories, Inc. v. Jeffrey-Allan Indus., Inc.*, 807 F.2d 955, 962 (Fed. Cir. 1986); *Orthopedic Equip. Co., Inc. v. United States*, 702 F.2d 1005, 1011 (Fed. Cir. 1983).

In our Institution Decision, we found, based on the record at that time, that

> a person of ordinary skill in the art would have an undergraduate degree in a field of study that involves control systems, in addition to at least three years of experience related to train control. Alternatively, absent academic training related to control systems, a person of ordinary skill in the art would have at least six years of experience related to train control.

Dec. on Inst. 8. Following institution, the parties have indicated their agreement with this definition of the level of ordinary skill in the art. *See* PO Resp. 13; Reply 4. Accordingly, we adopt the definition of the level of ordinary skill in the art set forth in our Institution Decision for the reasons stated therein. *See* Dec. on Inst. 6–8.

C. Obviousness Challenge Based on Nickles and Sibley

Petitioner contends that claims 1, 6, 9, 10, 15, 18, and 19 are unpatentable under 35 U.S.C. § 103(a) as obvious over Nickles and Sibley. Pet. 48–68.[6] Patent Owner disputes those contentions. PO Resp. 47–58.

1. Summary of Nickles

Nickles describes a method of optimizing train operations using a system called "LEADER," Locomotive Engineers Assist Display and Event Recorder. Ex. 1006, 1:13–17. According to Nickles, "LEADER's comprehensive knowledge of the state of the train . . . allow[s] the Railroad to convey and enforce operating policies by programming limits into the LEADER System . . . ." *Id.* at 5:33–40. LEADER is capable of a cruise control mode of operation, in which the control system issues commands to "automatically control the locomotive power and braking systems, the train brake system of each car and ancillary systems which effect train movement." *Id.* at 7:59–67, 8:13–16. In cruise control mode, LEADER can receive and activate commands from a railroad central traffic control center. *Id.* at 8:19–23. "This received information would include impe[n]ding slow orders, speed limit changes, aspects of approaching signals, etc." *Id.* at 8:23–25.

[6] To facilitate review, we discuss the grounds in a different sequence than is presented in the Petition because the Nickles-led ground addresses all challenged claims and it is, in our view, more straightforward than the RSAC-led grounds.

Figure 10 of Nickles is reproduced below:

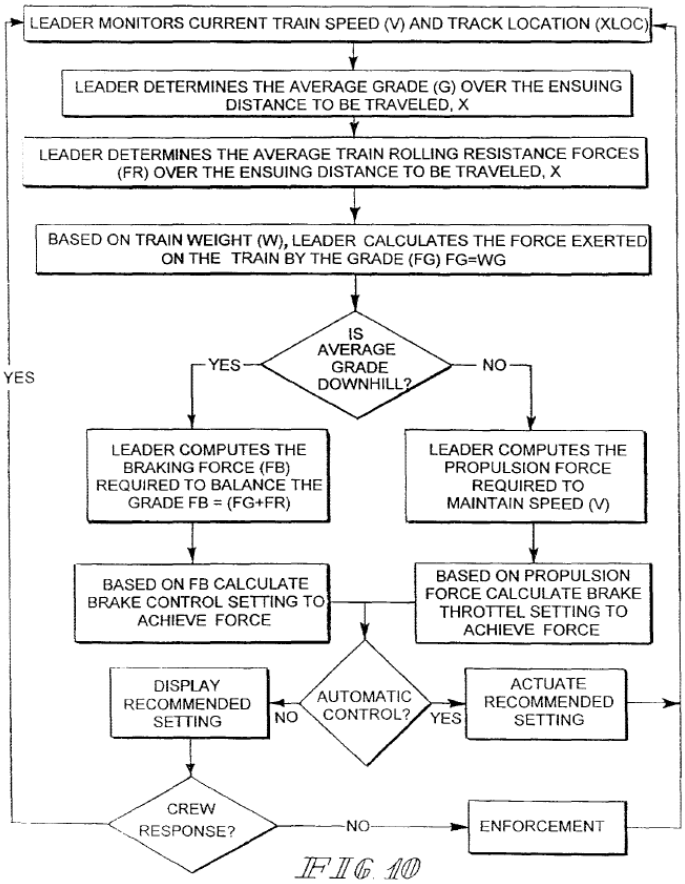

FIG. 10

Figure 10 is a flow chart for optimizing train braking to maintain grade. *Id.* at 13:1–2. In this process, LEADER monitors train speed and track location, and "determines the average grade (G) over the ensuing distance to be traveled, X. . . . Based on train weight (W), LEADER calculates the force exerted on the train by the grade (FG)." *Id.* at 13:4–9. LEADER determines the amount of braking necessary to balance the grade or the propulsion required to maintain speed. *Id.* at 13:9–15. If the train is in automatic control, the settings are actuated. *Id.* at 13:25–27.

2. Summary of Sibley

Sibley describes generating "a speed profile to control a vehicle governor at the transition from a higher to a lower speed limit." Ex. 1007, at

[57]. Sibley explains that automatic train control systems divide the track into blocks. *Id.* at 1:7–9. A problem with known systems is the abrupt change that can occur when a train crosses a block boundary where the speed limit drops to a lower speed limit. *Id.* at 1:40–44. A governor compares actual speed to the speed limit and, when an overspeed condition is detected, the governor may automatically apply the brake. *Id.* at 1:45–55. "Because block length and associated speed limits are calculated based on worst case analyses it is apparent that a higher speed limit could be tolerated at the entering end of a block. . . ." *Id.* at 1:65–68. Sibley aims to improve on this deficiency "by the generation on board the vehicle of a speed limit which transited smoothly from an upper to a lower speed limit." *Id.* at 2:12–15.

Figure 2 is reproduced below:

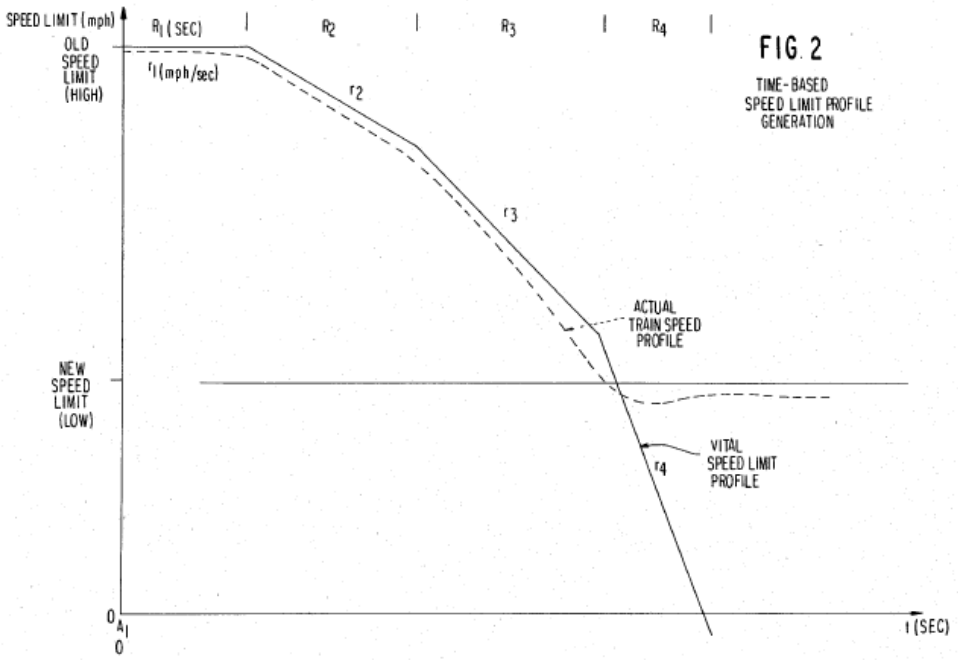

Figure 2 shows a plot of speed or speed limit on the vertical axis versus time on the horizontal axis, with time broken up into segments R_1–R_4. *Id.* at

3:11–22. Each segment is associated with a different speed reduction rate, such that "velocity reduction is minimal in the first segment, and it increases sequentially through the second, third, and fourth segments." *Id.* at 3:22–33.

3. Analysis of Claim 1

a. Whether the Cited Combination Teaches Each Limitation

We are persuaded by Petitioner's contentions that Nickles and Sibley teach every limitation of claim 1.[7] *See* Pet. 57–62. Our findings for each limitation are presented below. We note at the outset that Patent Owner disputes Petitioner's contentions for only the final two limitations.[8]

i. Preamble

Neither party argues that the preamble is limiting, but to the extent it is, we find that Nickles discloses a method of controlling a train. *See* Ex. 1006, 1:13–15, 16:32–34; *see also* Pet. 57.

[7] In Petitioner's arguments concerning claim 1, Sibley plays a backup role, teaching limitations that Petitioner contends are also taught by Nickles. *See* Pet. 59, 61; *see also* Tr. 23:4–16. As outlined below, we find that Nickles alone teaches each of the limitations in claim 1. Accordingly, it is unnecessary for us to determine whether Sibley additionally teaches certain limitations in claim 1.

[8] The scheduling order in this proceeding reminded Patent Owner that "any arguments for patentability not raised in the [Patent Owner Response] will be deemed waived." Paper 8, 3; *see also* 37 C.F.R. § 42.23(a) ("Any material fact not specifically denied may be considered admitted."); *In re Nuvasive, Inc.*, 842 F.3d 1376, 1380–81 (Fed. Cir. 2016) (holding that a patentee waived an argument by presenting it only in the preliminary proceeding and not during the trial, despite the Board cautioning the patentee that arguments not briefed in the response would be deemed waived).

ii. "receiving a speed restriction at a train, the speed restriction including a maximum allowable speed"

We find that Nickles discloses this limitation because it describes that LEADER receives from the central traffic control center information including impending slow orders and speed limit changes. *See* Ex. 1006, 8:22–25; *see also* Pet. 57.

iii. "determining a position of the train using a positioning system"

We find that Nickles discloses this limitation because it describes the use of a Global Positioning System to determine train position. *See* Ex. 1006, 5:8–10; *see also* Pet. 58.

iv. "determining when a train is in danger of violating the speed restriction based at least in part on a grade of a track on which the train is traveling and at least in part upon the weight of the train"

We find persuasive Petitioner's contention that Nickles teaches this limitation to a person of ordinary skill in the art. *See* Pet. 58–61. As Petitioner points out, Nickles discloses "determining train restraint and optimizable operating parameters to adhere to a posted speed restriction." *Id.* at 58 (quoting Ex. 1006, 17:26–28). In Figure 10 and the accompanying description, Nickles discloses taking train weight and track grade into account to maintain speed. *See* Ex. 1006, Fig. 10, 12:54–60, 13:2–13; *see also* Pet. 58–59. Specifically, Nickles explains that "[b]ased on train weight (W), LEADER calculates the force exerted on the train by the grade (FG), FG=WG. If the average grade (G) is downhill, LEADER computes the braking force (FB) required to balance the grade (G)." Ex. 1006, 13:9–11. Nickles further teaches that "LEADER determines the brake control settings

to achieve this brake force" and "[i]f automatic control is selected, then the appropriate settings are actuated." *Id.* at 13:12–13, 13:25–27.

Under automatic control, also referred to as "cruise control mode" (*id.* at 7:65–67), "leader derived settings are used to automatically control the locomotive power and braking systems, the train brake system of each car and ancillary systems which effect train movement." *Id.* at 8:13–16. Among the commands that LEADER can effectuate are slow orders, speed limit changes, and adherance to posted speed restrictions. *See id.* at 8:22–25, 17:26–28. Thus, in cruise control mode, LEADER can automatically apply brakes in order to adhere to a posted speed restriction. In light of these disclosures, in the scenario when a train traveling downhill is operating in cruise control mode to adhere to a speed limit, LEADER conducts a calculation that takes into account track grade and train weight and applies the brakes if necessary to avoid speeding up, which would violate the speed limit. We find persuasive Petitioner's argument that an ordinarily skilled artisan would understand that this capability involves a determination that the train is in danger of violating a speed restriction. *See* Pet. 59 (citing Ex. 1002 ¶ 101); Reply 25.

We have considered Patent Owner's rebuttal arguments concerning this limitation, but we do not find them persuasive. *See* PO Resp. 50–58. Patent Owner argues that Nickles discloses only reactionary speed enforcement, not predictive speed enforcement. PO Resp. 51–52 (citing Ex. 1006, 5:33–39, 5:53–56, 6:63–67, 7:32–38; Ex. 2005 ¶ 99; Ex. 2007, 105:21–107:5, 122:1–16.) Patent Owner acknowledges that Nickles discloses that its system can receive information including impending slow orders, speed limit changes, and speed restriction zones, but Patent Owner

argues that Nickles says nothing about using that information to prevent speed violations from occurring. *Id.* at 52 (citing Ex. 1006, 8:22–25, 8:36–39; Ex. 2005 ¶ 97). According to Patent Owner, "'adhering' to a posted speed restriction is not necessarily the same as preventing violation of one." *Id.* at 53 (citing Ex. 2005 ¶¶ 98–99). Similarly, Patent Owner argues that Nickles' disclosure that its system "accurately provides train speed within designated speed limits" does not require preventing a violation of those speed limits rather than merely retroactively enforcing them. *Id.* at 53–54 (citing Ex. 1006, 1:66–67; Ex. 2007, 134:8–136:5; Ex. 2005 ¶¶ 99–100).

Patent Owner's characterization of Nickles' system as exclusively reactionary in its enforcement capabilities does not take account of the entirety of Nickles' disclosure. As Petitioner correctly notes, Nickles discloses "looking ahead at the ensuing track profile" and anticipating changing conditions to keep the train within constraint boundaries. *See* Ex. 1006, 11:13–21; Reply 24. Relatedly, Nickles teaches

> [i]f an engineer is moving down a grade that requires a brake application to maintain a safe speed, a sufficient application must be made to ***prevent*** the train from gaining too much speed. . . . Using standard freight train dynamic modeling coupled with measurements and data bases, the LEADER ***predicts*** that brake control settings will be required to maintain the speed or optimize the speed with other forces and fuel usage. Depending upon the mode of operation, the ***predicted*** brake settings can be conveyed to the LEADER display for implementation by the engineer or for control by the LEADER system directly.

Ex. 1006, 12:38–67 (emphases added). We also find credible the testimony of Dr. Pullen that an ordinarily skilled artisan reviewing Nickles "would understand that enforcing speed restrictions and ensuring that a train

operates without violations (i.e., preventing any violation of speed restrictions as opposed to reacting to a violation that has already occurred) was an important feature of the train control systems then in use and development." Ex. 1002 ¶ 102.

To support its characterization of Nickles as solely reactive and not predictive, Patent Owner points to Nickles' disclosure that LEADER includes visual or auditory signals to indicate when a speed limit has been exceeded. Ex. 1006, 5:33–39, 6:63–67, 7:32–38. But providing information to the operator is only one of LEADER's disclosed capabilities. *See id.* at 7:59–67. Patent Owner does not adequately account for Nickles' disclosure that LEADER's cruise control mode can automatically control the brake to implement commands without awaiting input from the operator. *See id.* at 7:59–67, 8:14–16, 8:22–25.

As to Patent Owner's assertion that it is possible to adhere to a posted speed restriction without preventing violation of one, even if that is correct, we nevertheless agree with Petitioner that "[o]ne way to adhere to posted speed restrictions is to prevent violation of those restrictions." Reply 23. Thus, based on Nickles' disclosure of "determining train restraint and optimizable operating parameters to adhere to posted speed restriction" (Ex. 1006, 17:26–28) in conjunction with the other teachings summarized above, an ordinarily skilled artisan would understand the reference to disclose the step of determining when a train is in danger of violating a speed restriction, as recited in claim 1.

Patent Owner also argues that Nickles' disclosures in columns 12 and 13 regarding maintaining a train's speed are not germane because they do not concern predictive speed enforcement. PO Resp. 54–56. As to

Petitioner's argument focusing on a train that is maintaining speed while going downhill, thereby avoiding violating a speed limit, Patent Owner responds that this argument "lacks support in the reference" because Figure 10 and the accompanying description "do not mention taking speed restrictions into account." *Id.* at 56. We disagree that Petitioner's scenario lacks support in the reference. As discussed above, Nickles describes LEADER's cruise control mode, adhering to posted speed restrictions, maintaining speed while going downhill, and predicting what brake control settings are needed to maintain speed. Thus, all of the elements of LEADER's operation in Petitioner's proposed scenario are from Nickles' disclosure. It is not necessary for Nickles to describe all of those facets of LEADER in a single figure because in an obviousness analysis, the operative inquiry is what the cited prior art as a whole teaches to a person of ordinary skill in the art. *See In re Gorman*, 933 F.2d 982, 986 (Fed. Cir. 1991); *see also In re Warsaw Orthopedic, Inc.*, 832 F.3d 1327, 1332 (Fed. Cir. 2016) ("When the PTAB examines the scope and content of prior art, . . . it must consider the prior art 'in its entirety, i.e., as a whole.'"). Moreover, Nickles expressly teaches that the grade balancing technique described in columns 12 and 13 can be combined with other train control optimization techniques. *See* Ex. 1006, 13:27–28.

v. "applying a train brake such that violation of the speed restriction is prevented"

We find persuasive Petitioner's contention that Nickles teaches this limitation. *See* Pet. 61. In particular, Nickles teaches that LEADER calculates the required brake force and determines the brake control settings to achieve that brake force. Ex. 1006, 13:2–12. "If automatic control is selected, then the appropriate settings are actuated." *Id.* at 13:25–27; *see*

also id. at 12:60–67 (describing LEADER's ability to predict what brake control settings are necessary to maintain speed and that "the predicted brake settings can be conveyed to the LEADER display for implementation by the engineer or for control by the LEADER system directly."). Patent Owner's rebuttal arguments concerning this limitation are the same as its arguments regarding the preceding limitation, which are unpersuasive for the reasons discussed in the immediately preceding section. *See* PO Resp. 50–58.

b. Reason to Combine

Before delving into motivation to combine Nickles and Sibley, we note that our analysis in Section III.C.3.a. reflects our finding that Nickles teaches each limitation of claim 1. As such, a reason to combine Nickles with Sibley is unnecessary for the Nickles-led obviousness challenge to claim 1. However, Sibley is relied on to teach gradual slowing from one speed to a lower speed as recited in dependent claims 6 and 15. *See infra* § III.C.4. For that reason, we address motivation to combine Nickles and Sibley here.

We find that Petitioner has presented a reason to combine Nickles and Sibley that is supported by rational underpinnings. Specifically, Sibley teaches a speed profile generator that transitions smoothly from old to new speed limits. *See* Ex. 1007, 2:12–15, 3:4–6. We find that Sibley's teaching that known train control systems "could be improved by the generation on board the vehicle of a speed limit which transited smoothly from an upper to a lower speed limit" would have suggested incorporating Sibley's speed profiles into Nickles' control systems to obtain the benefits taught by Sibley. *See* Ex. 1007, 2:12–14; Ex. 1002 ¶¶ 104–107; *see also* Pet. 56–57 (arguing that an ordinarily skilled artisan "who wanted to ensure speed reduction is

done gradually and smoothly would have looked to the generation and implementation of speed profiles in Sibley, and combined these algorithms with the control systems described in Nickles. . . ."). As the Supreme Court has explained, "if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill." *KSR*, 550 U.S. at 416. We credit Dr. Pullen's testimony that an ordinarily skilled artisan would have had an expectation of success in combining Nickles and Sibley in the proposed manner. Ex. 1002 ¶ 107.

In challenging Petitioner's showing on motivation to combine, Patent Owner argues that "Sibley does not predictively enforce speed restrictions" and "is only intended for reactionary braking after a speed restriction has been violated." PO Resp. 49. This argument is unpersuasive because Petitioner does not rely on Sibley as teaching predictive braking. Sibley's role in the proposed combination is its teaching of a speed profile algorithm that provides a smoother, more gradual transition between speeds. *See* Reply 21–22; *see also infra* § III.C.4.

Patent Owner further argues that "Sibley's speed profile generator is intended to be used in situations in which train weight and track grade are unknown." PO Resp. 50. To support this assertion, Patent Owner relies on the deposition testimony of Dr. Pullen. *Id.* at 44–45 (citing Ex. 2007, 144:2–145:12). Patent Owner also relies on Mr. Loud's testimony that, because Sibley is intended for uses in which train weight and track grade are unknown, Sibley teaches away from the claimed use of train weight and track grade. *Id.* (citing Ex. 2005 ¶ 82). The evidence cited by Patent Owner

indicates that Sibley does not disclose using train weight or track grade, but Petitioner has shown that Nickles teaches that feature of the challenged claims. *See supra* § III.C.3.iv. Patent Owner does not point to, and we do not find, any disclosure in Sibley indicating that a speed profile gradually transitioning between speeds is incompatible with or unsuitable for systems in which track grade and train weight are known. Accordingly, the evidence does not support Patent Owner's argument that Sibley teaches away from the proposed combination. *See Meiresonne v. Google, Inc.*, 849 F.3d 1379, 1382 (Fed. Cir. 2017) ("A reference that 'merely expresses a general preference for an alternative invention but does not criticize, discredit, or otherwise discourage investigation into' the claimed invention does not teach away.") (quoting *Galderma Labs., L.P. v. Tolmar, Inc.*, 737 F.3d 731, 738 (Fed. Cir. 2013)). Patent Owner does not persuade us that incorporating Sibley's teachings of gradually transitioning between speeds into Nickles' system as Petitioner proposes would have been beyond the level of ordinary skill in the art or otherwise nonobvious. *See KSR*, 550 U.S. at 416.

For the foregoing reasons, we find that an ordinarily skilled artisan would have been motivated to combine Nickles and Sibley as Petitioner proposes.

c. Conclusion Regarding Claim 1

In view of our findings above concerning the individual *Graham* factors on which the parties have presented evidence and argument, we determine that Petitioner has shown by a preponderance of the evidence that claim 1 would have been obvious to a person of ordinary skill in the art based on the combination of Nickles and Sibley.

4. Analysis of Claims 6, 9, 10, 15, 18, and 19

Petitioner explains how the limitations of claims 6, 9, 10, 15, 18, and 19 are taught by Nickles and Sibley. *See* Pet. 62–68. Patent Owner does not present any argument to these claims separate from the arguments discussed above regarding claim 1.[9] *See* PO Resp. 47–58; *see also supra* n.7.

We are persuaded by Petitioner's contentions. In particular, with respect to dependent claim 6, we find that Nickles teaches automatic braking to comply with impending slow orders or speed limit changes. *See* Ex. 1006, 8:13–25, 13:2–25, 17:26–28; *see also id.* at 11:13–21 (describing conducting calculations and optimizations not only for the present location of the train but also looking ahead and anticipating changing conditions to keep the train within constraint boundaries); Ex. 1002 ¶ 103; Pet. 62. Sibley teaches a speed profile that smoothly and gradually transitions from an upper to a lower speed limit. *See* Ex. 1007, 2:12–15; Pet. 62–63. Thus, we find that Nickles and Sibley together teach to a person of ordinary skill in the art the subject matter of claim 6. As discussed above in Section III.C.3.b., we also find that Petitioner has articulated an adequate reason to combine Nickles and Sibley.

We find that Nickles teaches the subject matter of claim 9 because it discloses determining position using GPS. *See* Ex. 1006, 5:8–10, 9:40–43, Fig. 2; Pet. 63–64.

Claim 10 recites an apparatus for controlling a train having a processor configured to carry out steps that are substantially the same as the

[9] Patent Owner quotes limitations present in dependent claims 6 and 15, but makes no separate argument based on those additional limitations. *See* PO Resp. 47–48.

methods steps recited in claim 1. *See* Ex. 1001, 13:26–45. For the reasons discussed in Section III.C.3, we find that Nickles teaches a processor configured to carry out those steps. We further find that Nickles teaches the remaining limitations of claim 10, including a positioning system (Ex. 1006, 5:8–10, 9:40–43, Fig. 2), a receiver (*id.* at 8:22–25, 8:36–42, Fig. 2), and a brake interface (*id.* at 10:8–9). *See* Pet. 64–67.

Claim 15 recites similar subject matter as claim 6. *See* Ex. 1001, 14:10–17. For the same reasons discussed above in connection with claim 6, we find that Nickles and Sibley together teach the subject matter of claim 15 and that Petitioner has shown a sufficient reason to combine those references.

Claim 18 recites similar subject matter as claim 9. *See* Ex. 1001, 14:23–24. For the same reasons discussed above in connection with claim 9, we find that Nickles teaches the subject matter of claim 15.

We find that Nickles teaches the subject matter of claim 19 because it discloses that LEADER can issue a warning to an operator, such as an excessive speed warning, before actuating appropriate settings through automatic control. Ex. 1006, 7:32–38, 13:18–27, 18:31–34; Pet. 68; *see also* Dec. on Inst. 24–25.

After weighing the *Graham* factors on which the parties have presented argument and evidence, we determine that Petitioner has shown by a preponderance of the evidence that claims 6, 9, 10, 15, 18, and 19 would have been obvious to a person of ordinary skill in the art based on the combination of Nickles and Sibley.

D. Obviousness Challenges Led by RSAC

Petitioner contends that claims 1, 9, 10, 18, and 19 are unpatentable under 35 U.S.C. § 103(a) as obvious over RSAC. Pet. 21–39. Petitioner contends that claims 6 and 15 would have been obvious based on the combination of RSAC and Sibley. *Id.* at 39–48. Patent Owner disputes those contentions. *See* PO Resp. 24–47.

1. Summary of RSAC

RSAC is a report to the Federal Railroad Administrator describing "the status of efforts to develop, test, demonstrate and deploy Positive Train Control (PTC) systems." Ex. 1005, vii. RSAC summarizes technological developments relating to PTC functions. *See id.* at 19–34. RSAC describes the operation and features of many PTC systems, including the Positive Train Separation ("PTS") system (*id.* at 24–25, C-1 to C-4), TrainGuard (*id.* at 29), and Incremental Train Control System ("ITCS") (*id.* at 25–26).

The PTS system includes an on-board computer that "contained a track database and performed data processing to monitor location, calculate breaking curves, calculate speed, receive authority limits, and apply the brakes if the authority or speed limits were projected to be exceeded." *Id.* at 24. In the PTS system, "[t]he algorithm that determines safe breaking distance is instrumental to maintaining present levels of productivity. This algorithm incorporates detailed consist data and track profile data to improve the accuracy of the calculation and so keep required headways to a minimum." *Id.* at C-3.

TrainGuard also included an on-board computer with "a track database that includes track curvature, grade, interlockings, signals, crossings, and civil speed restrictions." *Id.* at 29. If the engineer does not

acknowledge alerts announcing impending overspeed conditions and other possible dangers, the computer initiates an automatic brake application. *Id.*

In ITCS, an on-board computer stores a database of track curvature, gradients, civil speed limits, speed restrictions, and other information. *Id.* at 26. The computer "continuously calculates braking distances to targets, monitors current speed and upcoming speeds, and initiates a full-service brake application if the maximum authorized speed is violated, or, the train is not properly slowed for an upcoming speed restriction." *Id.*

Petitioner argues that RSAC qualifies as prior art to the '801 patent under pre-AIA § 102(a) due to its public accessibility by at least July 2001. Pet. 22–23. Petitioner's evidence of public accessibility includes information from the Internet Archive and circumstantial evidence relating to when RSAC was prepared and sent to Congress. *Id.* (citing Ex. 1015–1025, 1027). Patent Owner does not challenge RSAC's status as prior art. *See* Tr. 31:15–18.[10] We find that Petitioner has presented sufficient evidence to establish that RSAC qualifies as prior art.

[10] Petitioner included three copies of RSAC with its Petition and made parallel citations to all three copies in its arguments. *See* Pet. 21 (citing Ex. 1005; Ex. 1017; Ex. 1019). Patent Owner asserts that the version of RSAC in Exhibit 1005 "is incomplete and/or of questionable authenticity as demonstrated by its inclusion of several pages that are wholly or partially illegible or incomprehensible . . . and pages that include random characters . . . interspersed throughout the text." PO Resp. 14 n. 2; *see also* Tr. 31:7–18. Despite these comments, Patent Owner did not move to exclude Exhibit 1005 for lack of authenticity. Petitioner submitted a declaration detailing how Exhibit 1005 was prepared from an archived version of a page on the website of the Federal Railroad Administration. *See* Ex. 1026 ¶¶ 2–40. Patent Owner does not address or call into question the accuracy of that testimony.

2. Analysis of Claim 1

a. RSAC Teaches Each Limitation

We are persuaded by Petitioner's contentions that RSAC teaches every limitation of claim 1. *See* Pet. 27–32. Specifically, we find persuasive Petitioner's undisputed contention that RSAC teaches the "receiving" step because it discloses that in the PTS system, the speed limit is transmitted to the train. *See* Ex. 1005, 24–25, C-1; Pet. 27. We are also persuaded by Petitioner's undisputed contention that RSAC teaches the first "determining" step because it describes that both the PTS and ITCS systems use on-board GPS receivers to monitor the train's location. *See* Ex. 1005, 24, C-1, C-4; Pet. 28.

The parties' arguments focus on the second "determining" step. *See* Pet. 29–31; PO Resp. 25–33; Reply 13–17. After considering these arguments and the evidence cited in support, we find that RSAC discloses this limitation. RSAC describes that in the PTS system, the on-board computer "contained a track database and performed data processing to monitor location, calculate breaking curves, calculate speed, receive authority limits, and apply the brakes ***if the authority or speed limits were projected to be exceeded***." Ex. 1005, 24 (emphasis added). Thus, RSAC discloses "determining when a train is in danger of violating the speed restriction," as recited in the second "determining" step. *See* Ex. 1028, 128:19–21 (testimony of Patent Owner's expert agreeing that this disclosure in RSAC constitutes a predictive enforcement of speed limits).

The second "determining" step also requires that the determination is made "based at least in part on a grade of a track on which the train is traveling and at least in part upon the weight of the train." Ex. 1001,

12:67–13:2. In that regard, RSAC describes that the algorithm used in the PTS system to calculate safe braking distance "incorporates detailed consist data and track profile data to improve the accuracy of the calculation and so keep required headways to a minimum." Ex. 1005, C-3; *see also* Ex. 1002 ¶ 59 (testimony of Dr. Pullen regarding use of train consist data and track profile for braking calculations). We credit Dr. Pullen's testimony that an ordinarily skilled artisan would understand from this disclosure that train weight and track grade are used to determine whether the train is in danger of violating a speed restriction. Ex. 1002 ¶ 92. Dr. Pullen's testimony on this issue is supported by RSAC's disclosure that track profiles and consist databases used by on-board computers in PTS, TrainGuard, and other systems included track grade and train weight. *See id.* ¶¶ 59, 92 (citing Ex. 1005, 29, B-4, C-10 to C-11); *see also* Ex. 2007, 85:15–21 (Dr. Pullen testifying on cross-examination that RSAC does not disclose the algorithm of the braking curve, but it "strongly implies that at a minimum, the consist data and the track profile data listed, elements listed in B-4 are used in the safe braking distance calculation").

Patent Owner argues that RSAC does not specifically disclose the use of track grade and train weight for preventing speed violations. With citation to the testimony of its expert, Mr. Loud, Patent Owner argues that "various types of train consist data and track profile were known at the time, and the RSAC Report is silent as to which of those numerous data, if any, were used in braking algorithms generally, let alone for the specific purpose of preventing speed restriction violations." PO Resp. 28 (citing Ex. 2005 ¶¶ 56–57). This argument is undermined by Mr. Loud's explanation in his cross-examination testimony that curve, grade, and weight are "what I would

probably call dominant contributors" in calculating a braking curve, with other parameters coming into consideration "depend[ing] on how refined you want to get." Ex. 1028, 50:4–14. Mr. Loud also agrees that the '801 patent's background section refers to braking curves "as a generally known concept, and some of the key parameters that affect it being weight and grade." *Id.* at 64:10–12.

Although RSAC does not spell out the specifics of how PTS or other systems utilize track grade or train weight to avoid speed violations, the disclosure of the '801 patent also lacks such granular detail. *See, e.g.*, Ex. 1001, 11:23–26 ("The control module will also calculate the time and/or distance required to stop the train using the equations of physics, basic train handling principles and train control rules."); *see also* Ex. 1028, 63:23–64:3, 65:1–3 (Mr. Loud testifying that the '801 patent does not disclose any particular braking control algorithm). The '801 patent's disclosure does not impart any particular significance to train weight and track grade, instead simply listing them among many factors that influence train braking. *See* Ex. 1001, 4:30–36 ("[A] control module calculates a required stopping distance based on many factors, including but not limited to the length of the train, the number and type of loads and empties, the speed of the train, weight of the train, number of locomotives and the curvature and grade of the track on which the train will be operating as it approaches a track warrant limit."); *id.* at 11:26–32 ("This time/distance [required to stop the train] will depend upon factors such as the speed of the train, the weight and length of the train, the grade and amount of curvature of the upcoming track . . . , braking power braking ratios, type of brake equipment, aerodynamic drag of the train, etc.").

In his deposition, Mr. Loud testified that the ’801 patent did not disclose an equation for predicting a speed violation using train weight and track grade but it “didn’t need it” because an engineer would understand how to do so “using basic physics.” Ex. 1028, 66:11–67:6. The high level of generality in the ’801 patent’s description supports Petitioner’s argument that an ordinarily skilled artisan at the time of the invention would have understood from RSAC’s disclosure how to consider train weight and track grade in determining whether the train is likely to violate a speed restriction. *See Lockwood v. Am. Airlines, Inc.*, 107 F.3d 1565, 1570 (Fed. Cir. 1997) (affirming summary judgment of invalidity despite patentee’s argument that prior art lacked sufficient technical detail because the challenged “patent itself does not disclose the level of detail that [the patentee] would have us require of the prior art”).

Patent Owner also argues that RSAC discloses that the PTS system uses track profile and consist data for braking calculations to stop the train before it moves beyond its movement authorities, not for speed enforcement purposes. *See* PO Resp. 26 (citing Ex. 2005 ¶ 53). Mr. Loud testifies that RSAC “does not similarly disclose using train consist data or track profile data to predictively enforce speed restrictions, nor does it otherwise describe the algorithm used for that purpose.” Ex. 2005 ¶ 53. Yet this criticism is equally applicable to the disclosure of the ’801 patent, which treats speed restrictions as just one of several restrictions that the control module can enforce using the same automatic braking techniques, and which does not describe any algorithm to predictively enforce speed restrictions apart from the list of factors that may be taken into account in calculating train braking generally. *See* Ex. 1001, 10:65–11:2, 11:14–40; Ex. 1028, 63:23–64:3,

65:1–3. According to the ’801 patent, enforcement of speed restrictions simply involves “graduated braking” — that is, “applying brake pressure until the train is in compliance” — rather than “full braking,” which is “applying sufficient brake pressure to stop the train.” Ex. 1001, 11:41–43, 11:54–59.

As Mr. Loud testifies, “basic physics” requires that train weight and track grade will affect the deceleration rate. Ex. 1028, 75:15–22. The same basic physics that apply to braking to a complete stop apply to braking to slow down. Thus, we see no reason why an ordinarily skilled artisan would fail to appreciate that train weight and track grade — factors known as “key parameters” (Ex. 1028, 64:11–12) affecting train braking under the “equations of physics [and] basic train handling principles” (Ex. 1001, 11:23–26) — would also impact train braking for the purpose of preventing speed violations.

Turning to the final “applying” step of claim 1, we are persuaded by Petitioner’s contention that RSAC discloses this limitation. *See* Pet. 31–32. RSAC describes that in the PTS system, processing performed by the on-board computer included “apply[ing] the brakes if the authority or speed limits were projected to be exceeded.” Ex. 1005, 24. RSAC further lists PTS, ITCS, TrainGuard, and several other systems as including the feature of predictive braking to comply with speed restrictions in advance. *See id.* at B-5. RSAC describes that in the ITCS system, the On Board Computer (OBC) “continuously calculates braking distances to targets, monitors current speed and upcoming speeds, and initiates a full-service brake application if the maximum authorized speed is violated, or, the train is not properly slowed for an upcoming speed restriction.” *Id.* at 26; *see also id.* at

29 (describing that in TrainGuard, the engineer is required to acknowledge alerts announcing impending overspeed conditions and the OBC initiates an automatic brake application if an alert is not acknowledged or the train is overspeed).

b. Reason to Combine

We further find that Petitioner has presented an adequate reason to combine the various disclosures in RSAC on which it relies for its obviousness challenge. As Petitioner points out, RSAC is a compendium describing the state of the art of positive train control systems and its principle findings included that PTC systems must be interoperable. Pet. 25; Reply 9–10; Ex. 1005, xi. To the extent Petitioner proposes combining aspects of different systems, RSAC's desire for interoperability, as well as a skilled artisan's desire to incorporate beneficial features of other known train control systems, provide reasons for doing so.

While these motivations are somewhat generic, combining high level features of train control systems described in a single reference and intended to be interoperable "does not require a leap of inventiveness." *Boston Scientific Scimed, Inc. v. Cordis Corp.*, 554 F.3d 982, 991 (Fed. Cir. 2009); *see also Paice LLC v. Ford Motor Co.*, 681 Fed.Appx. 904, 917 (Fed. Cir. 2017) (rejecting argument that Board erred in combining elements from optimal and sub-optimal control strategies discussed in two publications, each concerning controlling the performance of a hybrid vehicle, because in the court's view, "the combination of elements from the optimal and sub-optimal embodiments [is] a 'predictable variation' that does not 'require a leap of inventiveness'"). Indeed, the background section of the '801 patent describes that it was known to combine the PTS system with other systems.

See Ex. 1001, 3:1–13. Addressing that disclosure at the hearing, Patent Owner explained that "PTS is an overlay type system which means that it's designed not to replace other type[s] of train control systems. It's designed to be used in addition to, in conjunction with. . . ." Tr. 34:6–8.

In any event, combining RSAC's descriptions of different systems is not essential to Petitioner's challenge. As summarized above, Petitioner's obviousness challenge primarily relies on RSAC's description of the PTS system, with RSAC's descriptions of other systems serving as additional, cumulative evidence that certain features or techniques were known in the art. Based on our findings above, RSAC's descriptions of the PTS system are sufficient to teach each limitation of claim 1 to a person of ordinary skill in the art. An ordinarily skilled artisan would have been motivated to combine the portions of RSAC describing the PTS system because they all relate to a single train control system.

Patent Owner argues that a skilled artisan would not have been motivated to combine PTS with the other systems described in RSAC and would not have had a reasonable expectation of success in doing so, because of their different operating principles and features. PO Resp. 36 (citing Ex. 2005 ¶¶ 103–107, 110–114). In the cited testimony, Mr. Loud testifies that PTS and TrainGuard, for example, "have incongruous approaches to train management" and a skilled artisan would not have sought to combine "a system that lacks centralized office equipment or a communications network with a system that relies on centralized office equipment and a communications network to control it." Ex. 2005 ¶¶ 106–107. Patent Owner's arguments are unpersuasive because they are not responsive to the challenge Petitioner has presented. We do not understand Petitioner's

arguments to be premised on combining communications networks in the manner Mr. Loud suggests. Indeed, as discussed above, Petitioner's challenge does not necessitate combining PTS and TrainGuard at all.

c. Conclusion Regarding Claim 1

Based on our findings above concerning the individual *Graham* factors on which the parties have presented evidence and argument, we determine that Petitioner has shown by a preponderance of the evidence that claim 1 would have been obvious to a person of ordinary skill in the art in view of RSAC's teachings.

3. Analysis of Claims 9, 10, 18, and 19

Petitioner explains how the limitations of claims 9, 10, 18, and 19 are taught by RSAC. *See* Pet. 33–39. Patent Owner does not present argument for these claims separate from its arguments discussed above regarding claim 1.

We are persuaded by Petitioner's contentions. In particular, we find that RSAC teaches the subject matter of claim 9 because it discloses that train position is determined using GPS receivers in the PTS system and other systems. *See* Ex. 1005, 24, 29, C-1, C-4; Pet. 33.

Claim 10 recites an apparatus for controlling a train having a processor configured to carry out steps that are substantially the same as the methods steps recited in claim 1. *See* Ex. 1001, 13:26–45. For the reasons discussed in Section III.D.2, we find that RSAC teaches a processor configured to carry out those steps. We further find that RSAC teaches the remaining limitations of claim 10, including a positioning system (Ex. 1005, 24, 29, C-1, C-4), a receiver (*id.* at C-1), and a brake interface (*id.* at 24). *See* Pet. 33–38.

Claim 18 recites similar subject matter as claim 9. *See* Ex. 1001, 14:23–24. For the same reasons discussed above in connection with claim 9, we find that RSAC teaches the subject matter of claim 15.

We find that RSAC teaches the subject matter of claim 19 because it discloses that the PTS and other systems issue a warning to an operator and automatically apply the brakes if the operator takes no action in response to the warning. Ex. 1005, C-3, 29; Pet. 38–39.

After weighing the *Graham* factors on which the parties have presented argument and evidence, we determine that Petitioner has shown by a preponderance of the evidence that claims 9, 10, 18, and 19 would have been obvious to a person of ordinary skill in the art based on RSAC.

4. Analysis of Claims 6 and 15

We find that RSAC and Sibley together teach to a person of ordinary skill in the art the subject matter of dependent claims 6 and 15. *See* Pet. 46–48. RSAC discloses that the PTS system and several other systems included the feature of predictive braking to comply with a speed restriction in advance. Ex. 1005, B-4; *see also id.* at 27 (describing that in ACSES, the on-board computer will "if necessary, initiate an automatic brake application to prevent entering the speed restriction at a speed above that prescribed"). RSAC describes that "the PTS system enforces speed restrictions of various types. In addition to enforcing track speed, the PTS system enforces speed restrictions associated with track bulletins, track warrants, work authorities, bi-directional movement authority, and train-specific characteristics." *Id.* at C-4. We credit Dr. Pullen's testimony that an ordinarily skilled artisan "would understand that speed restrictions are based on sections of a track, and therefore necessarily include a starting point for the portion of the track

over which the speed restriction applies." Ex. 1002 ¶ 61. Sibley teaches a speed profile that smoothly and gradually transitions from an upper to a lower speed limit. *See* Ex. 1007, 2:12–15, 3:4–6.

We also find that Petitioner has presented a sufficient reason why an ordinarily skilled artisan would have combined RSAC and Sibley. Sibley's teaching that known train control systems "could be improved by the generation on board the vehicle of a speed limit which transited smoothly from an upper to a lower speed limit" would have suggested incorporating Sibley's speed profiles into the control systems described in RSAC. *See* Ex. 1007, 2:12–14; Ex. 1002 ¶¶ 95–96; *see also* Pet. 45 (arguing that an ordinarily skilled artisan "who wanted to ensure speed reduction is done gradually and smoothly would have looked to the generation and implementation of speed profiles in Sibley, and combined these algorithms with the control systems described in RSAC . . . ."). The proposed combination uses Sibley's smoothly transitioning speed profile to improve similar train control devices in the same way. *See KSR*, 550 U.S. at 416. We credit Dr. Pullen's testimony that an ordinarily skilled artisan would have had an expectation of success in combining RSAC and Sibley in the proposed manner. Ex. 1002 ¶ 97.

Patent Owner's rebuttal to Petitioner's challenge based on RSAC and Sibley largely echoes the arguments Patent Owner presented against the Nickles and Sibley combination, and are unpersuasive for similar reasons. *See* PO Resp. 38–47; *see also supra* § III.C.3.b. Patent Owner argues that Sibley is a reactive system and is not concerned with predictive enforcement of speed restrictions. *See* PO Resp. 38–44. Patent Owner further argues that Sibley does not disclose using train weight or track grade. *See id.* at 44–47.

These arguments do not respond to the obviousness challenge as Petitioner has framed it. As discussed above, Petitioner has shown that RSAC discloses those features to a person of ordinary skill in the art.

For the foregoing reasons, we determine that Petitioner has shown by a preponderance of the evidence that claims 6 and 15 would have been obvious to a person of ordinary skill in the art based on RSAC and Sibley.

IV. PATENT OWNER'S MOTION TO EXCLUDE

Patent Owner moves to exclude Exhibit 1002, which is the declaration of Dr. Pullen. *See* Paper 28. Patent Owner urges the exclusion of Dr. Pullen's testimony pursuant to Federal Rule of Evidence 702 on the basis that he has insufficient experience specific to train control. *Id.* at 4–9; Paper 33, 2–5. Relatedly, Patent Owner argues that Dr. Pullen's testimony regarding issues to be considered from the perspective of an ordinarily skilled artisan is speculative and therefore inadmissible under Federal Rules of Evidence 402 and 403. Paper 28, 9–10.

Petitioner opposes the motion, arguing that Dr. Pullen has extensive experience in transportation control systems generally, of which train control is a subset, and in recent years has experience specific to train control. Paper 32, 2–3. Petitioner also points to testimony given in another proceeding by Patent Owner's expert, Mr. Loud, explaining that he was qualified to testify as an expert in a trial involving personal watercraft controllers by virtue of his engineering background and his experience with railroad control systems. Paper 37, 1–2 (citing Ex. 1036, 43:6–20). Patent Owner responds that Mr. Loud's testimony regarding his own qualifications in another matter is irrelevant to whether Dr. Pullen is qualified in this proceeding. Paper 38, 1–2.

We are not persuaded that Dr. Pullen's testimony should be excluded. Dr. Pullen's March 2017 declaration states that he has "twenty years of experience in the field of transportation safety and control systems. . . ." Ex. 1002 ¶ 6; *see also id.* ¶¶ 7–16 (describing education and experience related to control systems). Dr. Pullen holds several degrees in Aeronautics, a field of study that involves control systems: an undergraduate degree he received in 1989, a Masters degree he received in 1990, and a Ph.D. he received in 1996. Ex. 1003, 1. Dr. Pullen testified that his experience with "control systems specific to a train on a track . . . started in 2011" (Ex. 2007, 47:14–17), which was well after the date of the invention of the '801 patent. *See* Ex. 1001, (22), (62) (listing a filing date of March 14, 2006 and claiming priority to an application filed on July 2, 2002). Thus, at the time of the claimed invention in the '801 patent, Dr. Pullen had more than the requisite academic training but not the "at least three years of experience related to train control" required by the definition of a person of ordinary skill in the art we have adopted. *See supra* § III.B.

Nevertheless, complete overlap between a witness's technical qualifications and the field of the invention is not necessary for the witness's testimony to be admissible under Federal Rule of Evidence 702. For example, the Federal Circuit has upheld a district court's admission under Rule 702 of the testimony of a witness who lacked experience in the design of the patented invention, but had experience with materials selected for use in the invention. *See SEB S.A. v. Montgomery Ward & Co., Inc.*, 594 F.3d 1360, 1372–73 (Fed. Cir. 2010); *see also* PTAB Trial Practice Guide August 2018 Update at 3 ("There is . . . no requirement of a perfect match between the expert's experience and the relevant field."), *available at*

www.uspto.gov/sites/default/files/documents/2018_Revised_Trial_Practice_Guide.pdf. Dr. Pullen has extensive experience and expertise related to control systems, and some experience in more recent years related to train control. Ex. 1002 ¶¶ 7–16; Ex. 1003; Ex. 2007, 47:14–17. Dr. Pullen's lack of experience specific to trains before 2011 may detract from the weight to be given his testimony on certain matters, but it does not render the entirety of his testimony inadmissible under Rules 702, 402, or 403.

To support its motion, Patent Owner relies heavily on *Sundance, Inc. v. DeMonte Fabricating Ltd.*, 550 F.3d 1356 (Fed. Cir. 2008). *See* Paper 28, 5–6, 9; Paper 33, 2. There, the Federal Circuit reviewed the district court's denial of a motion to exclude a patent lawyer having no relevant technical expertise from testifying in a jury trial. *Sundance*, 550 F.3d at 1361–62. The Federal Circuit held that because the patent attorney "was never offered as a technical expert, and in fact was not qualified as a technical expert, it was an abuse of discretion for the district court to permit him to testify as an expert on the issues of noninfringement or invalidity." *Id.* at 1362. The Federal Circuit further explained:

> The court, in its role as gatekeeper, must exclude expert testimony that is not reliable and specialized, and which invades the province of the jury to find facts and that of the court to make ultimate legal conclusions. Allowing a patent law expert without any technical expertise to testify on the issues of infringement and validity amounts to nothing more than advocacy from the witness stand.

Id. at 1364–65. Here, Dr. Pullen is offered as a technical expert and he has substantial technical expertise related to the field of the '801 patent. Moreover, in this proceeding, fact-finding and legal determinations are carried out by the same panel of administrative patent judges, which

eliminates the concern of invading the jury's province. These distinctions make *Sundance* inapposite as a basis for excluding Dr. Pullen's testimony.

For the foregoing reasons, we deny Patent Owner's motion to exclude Exhibit 1002.

V. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that claims 1, 6, 9, 10, 15, 18, and 19 have been shown to be unpatentable;

FURTHER ORDERED that Patent Owner's Motion to Exclude Exhibit 1002 is denied; and

FURTHER ORDERED that parties to the proceeding seeking judicial review of this Final Decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

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