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Paper 8
Date: June 2, 2020

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

VOLKSWAGEN GROUP OF AMERICA, INC.,
Petitioner,

v.

MICHIGAN MOTOR TECHNOLOGIES LLC,
Patent Owner.

IPR2020-00169
Patent 6,347,680 B1

Before MITCHELL G. WEATHERLY, JAMES A. TARTAL, and SEAN P. O'HANLON, *Administrative Patent Judges*.

O'HANLON, *Administrative Patent Judge*.

DECISION
Granting Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

A. Background

Volkswagen Group of America, Inc. ("Petitioner") filed a Petition for *inter partes* review of claims 1–18 ("the challenged claims") of U.S. Patent No. 6,347,680 B1 (Ex. 1001, "the '680 patent"). Paper 2 ("Pet."), 1. Michigan Motor Technologies LLC ("Patent Owner") filed a Preliminary Response. Paper 7 ("Prelim. Resp.").

Institution of an *inter partes* review is authorized by statute only when "the information presented in the petition . . . and any response . . . shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition." 35 U.S.C. § 314(a) (2018). For the reasons set forth below, upon considering the Petition, Preliminary Response, and evidence of record, we conclude the information presented shows that there is a reasonable likelihood that Petitioner would prevail in establishing the unpatentability of at least one of the challenged claims.

B. Patent Owner's Designation of Counsel

Our rules require a party represented by counsel to "designate a lead counsel and at least one back-up counsel." 37 C.F.R. § 42.10(a) (2019). Patent Owner identifies only Timothy Devlin (as lead counsel) without identifying properly any back-up counsel—although Patent Owner indicates that it will seek to have Robyn T. Williams admitted *pro hac vice*, Patent Owner has not filed any such request. Paper 5, 2–3.

Patent Owner is directed to designate back-up counsel as required by our rules.

C. Real Parties-in-Interest

The statute governing *inter partes* review proceedings sets forth certain requirements for a petition, including that "the petition identif[y] all real parties in interest." 35 U.S.C. § 312(a)(2); *see also* 37 C.F.R. § 42.8(b)(1) (requiring identification of real parties-in-interest in mandatory notices). The Petition identifies Volkswagen Group of America, Inc. and its parent company, Volkswagen Aktiengesellschaft, as real parties-in-interest. Pet. 3. Patent Owner identifies itself as the only real party-in-interest. Paper 5, 2.

D. Related Matters

The parties indicate that the '680 patent is the subject of the following district court proceeding:

> *Michigan Motor Technologies LLC v. Volkswagen AG*, No. 2:19-cv-10485 (E.D. Mich. filed Feb. 18, 2019).

Pet. 3; Paper 5, 2. We note that the '680 patent was also the subject of the following district court proceeding:

> *Michigan Motor Technologies LLC v. Hyundai Motor Company*, No. 2:17-cv-12901 (E.D. Mich. filed Sept. 1, 2017).

The '680 patent is also the subject of a petition for *inter partes* review filed by Petitioner in IPR2020-00161.[1]

[1] Petitioner filed the Petition in this proceeding and the petition in IPR2020-00161 on the same day. In a Notice filed simultaneously with the Petition, Petitioner requests that we consider the Petition in this proceeding prior to considering the petition in IPR2020-00161. Paper 3, 1.

E. The Challenged Patent

The ’680 patent discloses a powertrain controller for drive by wire vehicles—vehicles in which the position of the accelerator pedal is detected without mechanically connecting the accelerator pedal to the throttle valve. Ex. 1001, 1:4–6; *see also* Ex. 1009, 1:21–25 (describing drive by wire systems as being “of the type that the depressed position of an accelerator pedal (the amount of operation of the accelerator pedal) is detected without mechanically connecting the accelerator pedal to a throttle valve, a target drive shaft torque is determined from the position thus detected, and the throttle valve is driven by a motor so as to obtain such a target drive shaft torque”). The ’680 patent acknowledges that known drive by wire control systems choose between multiple powertrain output requests to regulate engine output, but purports to improve upon such known control systems by considering also limitations imposed by other vehicle subsystems. Ex. 1001, 1:7–35. Figure 2 shows a block diagram of an exemplary control system process and is reproduced below:

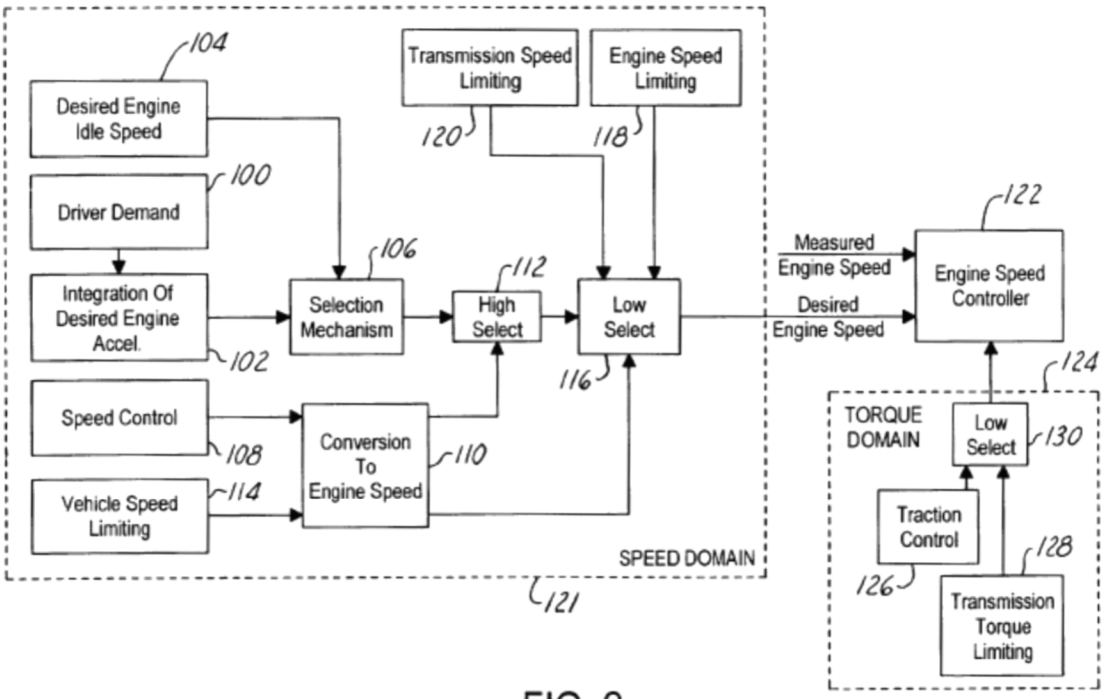


FIG. 2

Figure 2 is a block diagram of a controller process for a vehicle having an internal combustion engine. *Id.* at 2:28–29. In block 100, a driver demanded engine acceleration value is generated in known manner, such as by determining the position of the acceleration pedal. *Id.* at 3:52–54. This value is converted into a desired engine speed value at block 102. *Id.* at 3:57–59. The desired engine speed value is compared to a desired engine idle speed, and the larger value is selected as the target engine speed value at block 106. *Id.* at 3:59–67. If a speed control system is active, a desired speed control system value is generated (block 108), converted into a desired engine speed (block 110), and compared to the driver demanded target speed value to choose the greater value as the engine speed request value (block 112). *Id.* at 4:4–13. The ’680 patent refers to this comparison and selection as “arbitrating.” *See, e.g.*, *id.* at 4:7–10, 7:37–39.

The resulting engine speed request value is compared to the vehicle speed limit value, the engine speed limit value, and, optionally, the transmission speed limit value to choose the least of these values as the desired engine speed value, thereby constraining the engine speed request value (block 116). Ex. 1001, 4:14–26. The '680 patent refers to this comparison and selection as "limiting" the request value. *See, e.g.*, *id.* at 4:14–26, 7:40–43. The engine speed controller uses the desired engine speed value to control the engine speed (block 122). *Id.* at 4:27–33. The engine speed controller may also consider other system constraints, such as torque restraints to prevent wheel slip, to limit further the engine output. *Id.* at 4:33–46.

In other embodiments, the desired engine response can be based on engine speed rather than engine acceleration (*see, e.g.*, Ex. 1001, 4:42–46), and the number of criteria considered in the arbitrating and limiting steps can be varied (*see, e.g.*, *id.* at 6:39–56).

F. The Challenged Claims

Petitioner challenges claims 1–18 of the '680 patent. Pet. 1, 6. Claims 1, 8, 13, and 17 are independent. Claim 1 is illustrative of the challenged claims and is reproduced below:

> 1. An engine output control method for a vehicle having a drive by wire engine system responsive to a desired engine speed signal, the method comprising the steps of:
>
> generating a driver demanded engine speed value corresponding to an operator input;
>
> generating a speed control system engine speed value corresponding to a predetermined speed value to permit vehicle operation at a constant speed by a speed control system;

> arbitrating between said driver demanded engine speed value and said speed control system engine speed value to derive a first desired engine speed value;
>
> limiting said first desired engine speed value by a vehicle speed limit value, engine speed limit value, and transmission speed limit value to generate a second desired engine speed value; and
>
> controlling said engine output as a function of said second desired engine speed value and an actual engine speed value.

Ex. 1001, 7:28–46. Independent claims 8, 13, and 17 contain similar recitations as claim 1, with the main differences being whether the claim is directed to a desired engine speed or engine acceleration and the number of criteria used for the arbitrating and limiting steps. These differences are summarized in the table presented below:

Claim	Directed to Speed or Acceleration	Number of Arbitrating Criteria	Number of Limiting Criteria
1	Speed	2	3
8	Speed	3	2
13	Acceleration	2	4
17	Acceleration	4	2

G. Asserted Grounds of Unpatentability

The Petition relies on the following prior art references:

Name	**Reference**	**Exhibit**
Letang	US 6,067,489, issued May 23, 2000	1007
Togai	US 5,400,865, issued Mar. 28, 1995	1009
Yoshioka	US 5,390,637, issued Feb. 21, 1995	1012
Imai	US 4,834,045, issued May 30, 1989	1013

Petitioner asserts the following grounds of unpatentability:

Claim(s) Challenged	35 U.S.C. §	References
1–10, 12–18	103(a)[2]	Togai, Yoshioka, Letang
11	103(a)	Togai, Yoshioka, Letang, Imai

Pet. 6. Petitioner submits a declaration of Mark Ehsani, Ph.D. (Ex. 1003, "the Ehsani Declaration") in support of its contentions. Patent Owner submits a declaration of Russell A. Leonard, Jr., Ph.D. (Ex. 2001) in support of its contentions.

II. ANALYSIS

A. Principles of Law

Petitioner bears the burden of persuasion to prove unpatentability, by a preponderance of the evidence, of the claims challenged in the Petition. 35 U.S.C. § 316(e). This burden never shifts to Patent Owner. *Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015). The Board may authorize an *inter partes* review if we determine that the information presented in the Petition and Patent Owner's Preliminary Response shows that there is a reasonable likelihood that Petitioner will prevail with respect to at least one of the claims challenged in the petition. 35 U.S.C. § 314(a).

A patent claim is unpatentable under 35 U.S.C. § 103(a) if the differences between the claimed subject matter and the prior art are such that

[2] The application resulting in the '680 patent was filed prior to the date when the Leahy-Smith America Invents Act ("AIA"), Pub. L. No. 112–29, 125 Stat. 284 (2011), took effect. Thus, we refer to the pre-AIA version of section 103.

the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) any objective evidence of non-obviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

B. Level of Ordinary Skill in the Art

Petitioner contends that a person having ordinary skill in the art at the time of the invention ("POSA") would have had "a B.S. degree in Mechanical Engineering . . . (or equivalent), as well as at least 2–4 years of academic or industry experience in the relevant field of engine control systems." Pet. 10 (citing Ex. 1003 ¶¶ 44–45).

Patent Owner contends that a person having ordinary skill in the art at the time of the invention is "a person with (1) a B.S. in mechanical engineering or a closely related field with three or more years of experience in either engine systems or engine control systems or (2) at least a M.S. in mechanical engineering." Prelim. Resp. 15 (citing Ex. 2001 ¶ 14.)

Thus, both parties propose substantially similar definitions of the level of ordinary skill in the art, both requiring a bachelor's degree in mechanical engineering or the equivalent with either a few years of industry or academic (such as that required to obtain a master's degree in mechanical engineering) experience. We find Petitioner's description to be more consistent with the problems and solutions disclosed in the '680 patent and prior art of record,

as it is focused on the field of engine control systems. *See* Ex. 1001, 1:4–6 ("The invention relates generally to control systems for internal combustion engines . . . ."); Ex. 1007, 1:4–5 ("The present invention relates to a method for controlling a compression-ignition internal combustion engine."); Ex. 1009, 1:10–14 ("The present invention relates to an engine output control apparatus . . . ."); Ex. 1012, 1:6–8 ("The present invention relates generally to a control apparatus for controlling the number of revolutions of an engine mounted on a vehicle."); Ex. 1013, 1:5–9 ("The present invention relates to an engine control system of a vehicle . . . ."). Accordingly, we adopt Petitioner's definition as our own for purposes of this Decision. *See, e.g.*, *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995).

C. Claim Construction

In an *inter partes* review, claims are construed using the same claim construction standard that would be used to construe the claims in a civil action under 35 U.S.C. § 282(b). 37 C.F.R. § 42.100(b). Thus, we apply the claim construction standard as set forth in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc).

Claim terms are generally given their ordinary and customary meaning as would be understood by one with ordinary skill in the art in the context of the specification, the prosecution history, other claims, and even extrinsic evidence including expert and inventor testimony, dictionaries, and learned treatises, although extrinsic evidence is less significant than the intrinsic record. *Phillips*, 415 F.3d at 1312–17. Usually, the specification is dispositive, and it is the single best guide to the meaning of a disputed term. *Id.* at 1315.

Only those terms that are in controversy need be construed, and only to the extent necessary to resolve the controversy. *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (citing *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

Petitioner contends that "[n]one of the claim terms require specific construction and should receive their plain and ordinary meaning, in the context of the '680 patent specification." Pet. 10 (citing Ex. 1003 ¶ 55). "Patent owner proposes the claim terms be given their plain and ordinary meaning." Prelim. Resp. 16.

Given the lack of dispute, for purposes of this Decision, and based on the record before us, we determine that no express construction of any term is necessary. We note that this determination does not preclude the parties from arguing their proposed constructions of the claims during trial. Indeed, the parties are hereby give notice that claim construction, in general, is an issue to be addressed at trial. A final determination as to claim construction will be made at the close of the proceeding, after any hearing, based on all the evidence of record. The parties are expected to assert all of their claim construction arguments and evidence in the Petition, Patent Owner's Response, Petitioner's Reply, or otherwise during trial, as permitted by our rules.

D. Overview of the Prior Art

1. Togai

Togai discloses an engine output control apparatus for a drive-by-wire vehicle. Ex. 1009, 1:10–14. Figure 1 shows an engine control apparatus and is reproduced below:

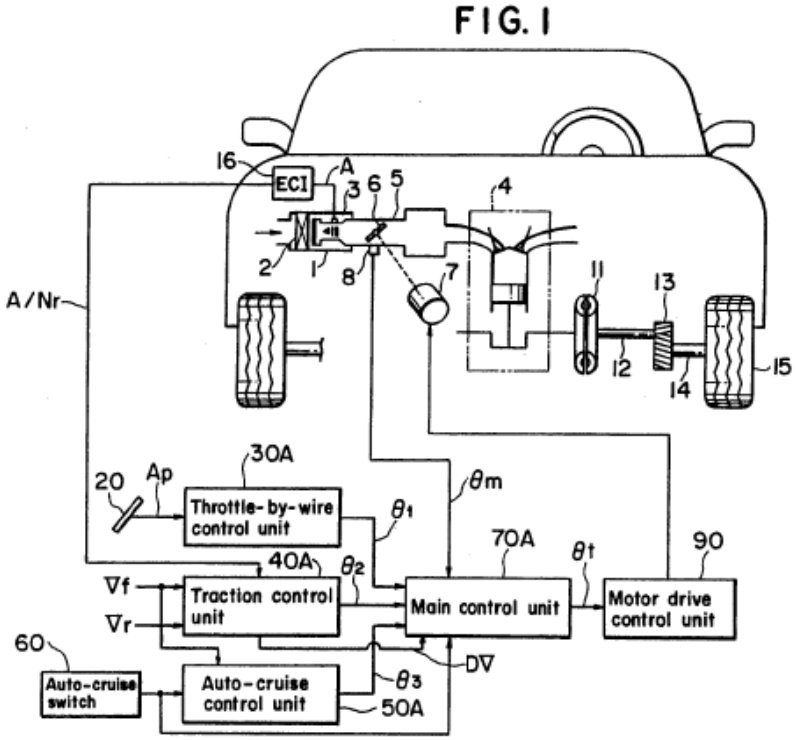


Figure 1 illustrates an engine output control apparatus. *Id.* at 3:46–48. The vehicle includes throttle valve 6, the opening degree θ of which "serves as a direct parameter for controlling the engine output, i.e., as an engine output control amount." *Id.* at 4:57–60.

The control system includes throttle-by-wire control unit 30A that detects the position of the accelerator pedal to determine a first target opening degree θ_1 of the throttle corresponding to the detected pedal position. Ex. 1009, 5:31–40. The control system includes traction control unit 40A that detects a slip of each wheel based on the speeds of the follower

and driven wheels to determine a second target opening degree θ_2 of the throttle corresponding to a position at which the wheel slip will cease. *Id.* at 5:41–51. The control system includes auto-cruise control unit 50A that determines a third target opening degree θ_3 of the throttle corresponding to a position required to allow the vehicle to run at a constant speed. *Id.* at 5:52–62.

Figure 6 illustrates operation of the engine control system and is reproduced below:

FIG. 6

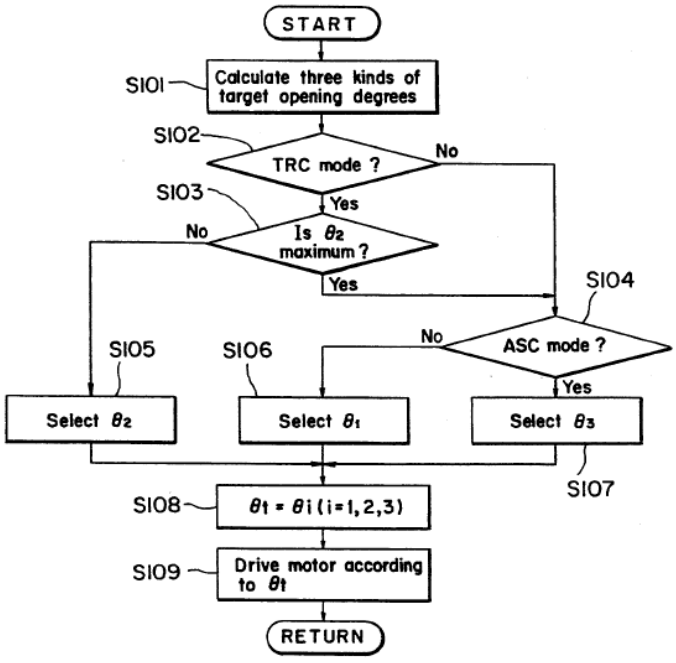


Figure 6 is a flow chart explaining the operation of the control apparatus. Ex. 1009, 3:60–61. Initially, the three target opening degrees θ_1, θ_2, θ_3 of the throttle valve are calculated in step 101. *Id.* at 8:25–27. One of these three target opening degrees is selected by first determining whether the vehicle is operating in traction mode (step 102), which occurs when the traction control unit detects an amount of wheel slip that exceeds a predetermined

value. *Id.* at 9:33–39. If traction mode is established, main control unit 70A compares the values of the three target opening degrees to determine if the traction control target (θ_2) is the largest (step 103) and, if the traction control value is not the largest, the system selects the traction control target value (step 105). *Id.* at 9:40–54. In other words, if the second target opening degree θ_2 is smaller than either of the values of the remaining target opening degrees θ_1, θ_3, the second target opening degree θ_2 is chosen. *Id.* at 9:54–58. This ensures that, if the amount of wheel slip exceeds the predetermined value such that the traction mode is established, the system selects the second target opening degree θ_2, causing the throttle opening degree θ to become smaller to stop the wheel slip. *Id.* at 9:59–64.

If the traction control target value is the largest (step 103) or if the traction control mode is not established (step 102), the system determines whether the vehicle is operating in the auto-cruise mode (step 104), which operates the vehicle at a constant speed. Ex. 1009, 5:54–62, 10:8–11. If the auto-cruise mode is established, the auto-cruise target opening degree (θ_3) is chosen (step 107); if the auto-cruise mode is not established, the accelerator pedal target opening degree (θ_1) is chosen (step 106). *Id.* at 10:12–19.

Once one of the three target opening degrees (θ_1, θ_2, θ_3) has been selected, the main control unit sets the selected value as the target opening degree θ_t (step 108), which serves as an amount of control for the engine output. Ex. 1009, 10:36–40. The throttle is then adjusted to conform to the chosen opening degree (step 109). *Id.* at 10:43–47.

In alternate embodiments, rather than determining targeted degrees of throttle valve opening directly, the system determines the throttle opening degree as a function of a targeted amount of intake air (*see, e.g.*, Ex. 1009,

16:35–38), a targeted engine output torque (*see, e.g.*, *id.* at 22:40–48), or a targeted drive shaft torque (*see, e.g.*, *id.* at 29:6–14).

2. Yoshioka

Yoshioka discloses a control apparatus for controlling the revolution speed of a vehicle engine to prevent the engine from revolving excessively, referred to by Yoshioka as "overrunning." Ex. 1012, 1:6–12. Yoshioka recognizes that, in known engine control systems, fuel supply to the engine is paused when the engine revolves at a speed in excess of a first threshold value to prevent overrunning, and the fuel supply is resumed when the engine speed decreases below a second threshold value. *Id.* at 1:14–45. Yoshioka further recognizes that in such known control systems torsional dampers between the engine drive shaft and the propeller shaft cause iterative rotational displacement between the shafts when the engine is accelerated and decelerated due to the fuel supply being paused and resumed. *Id.* at 2:36–3:57. Yoshioka purports to provide an improved control system that reduces the amount of displacement between the engine drive shaft and the propeller shaft. *Id.* at 3:60–68.

Figure 4 illustrates operation of the engine control system and is reproduced below:

Fig.4

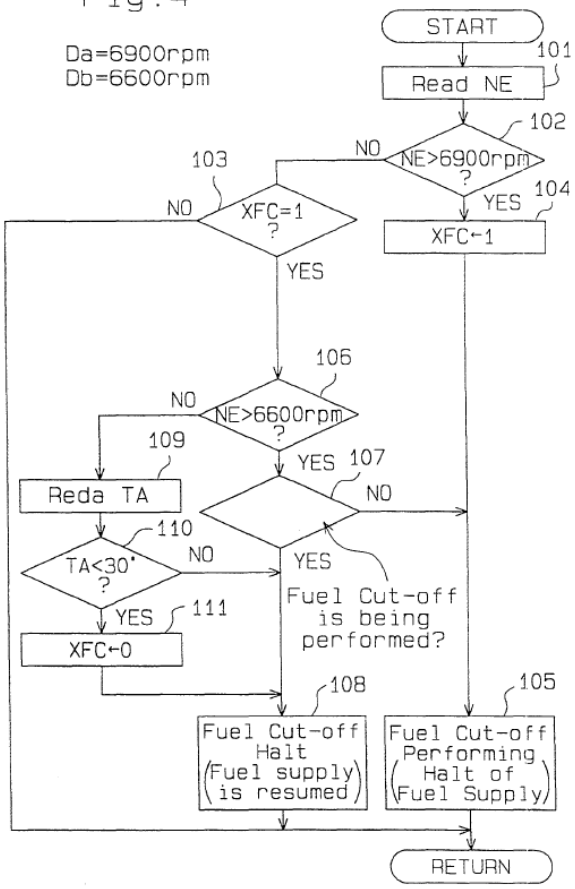


Figure 4 is a flow chart explaining the operation of the control system. Ex. 1012, 7:33–37. The process is initiated by a periodically occurring interrupt request. *Id.* at 7:37–40. The control unit reads the current engine speed (step 101) and determines if it exceeds the first determining value (step 102). *Id.* at 8:1–5. If so, the controller sets the value of flag XFC to 1 (step 104) and causes the fuel supply to the engine to halt (step 105). *Id.* at 8:23–30. The process is repeated at the next interrupt request, and, if the engine speed has decreased below the first determining value (step 102), the control unit determines the status of the flag to be 1 (step 103) and then determines if the current engine speed exceeds a second determining value (step 106). *Id.* at 8:54–62. If so, the control unit determines the fuel flow to

have been stopped (step 107) and then causes the fuel supply to the engine to be resumed (step 108). *Id.* at 8:62–9:4. During the next iteration of the process, the control unit causes the fuel supply to be halted (step 105). *Id.* at 9:26–33. This process of iteratively cycling the fuel supply on and off continues until the engine speed reduces below the second determining value. *Id.* at 9:64–67. This causes the drive shaft of the engine to be kept approximately at the neutral position with respect to the propeller shaft and minimizes the impact of the torsional dampers on the engine speed. *Id.* at 10:38–41, 10:50–59. The flag is set to 0 when the engine speed drops below the second determining value (step 106) and the throttle valve is opened at an angle less than a predetermined value (for example, 30°) (step 110), at which time normal fuel operation resumes (step 108). *Id.* at 10:3–16. Alternatively, the system can operate as a function of vehicle speed rather than engine speed. *Id.* at 13:49–52.

3. Letang

Letang discloses a method for controlling a compression-ignition internal combustion engine. Ex. 1007, 1:4–5. Letang provides a control system with a single electronic control unit to integrate the various functions of engine and cooling fan control. *Id.* at 4:29–37. Figure 1 shows a block diagram of an exemplary integrated control system and is reproduced below:

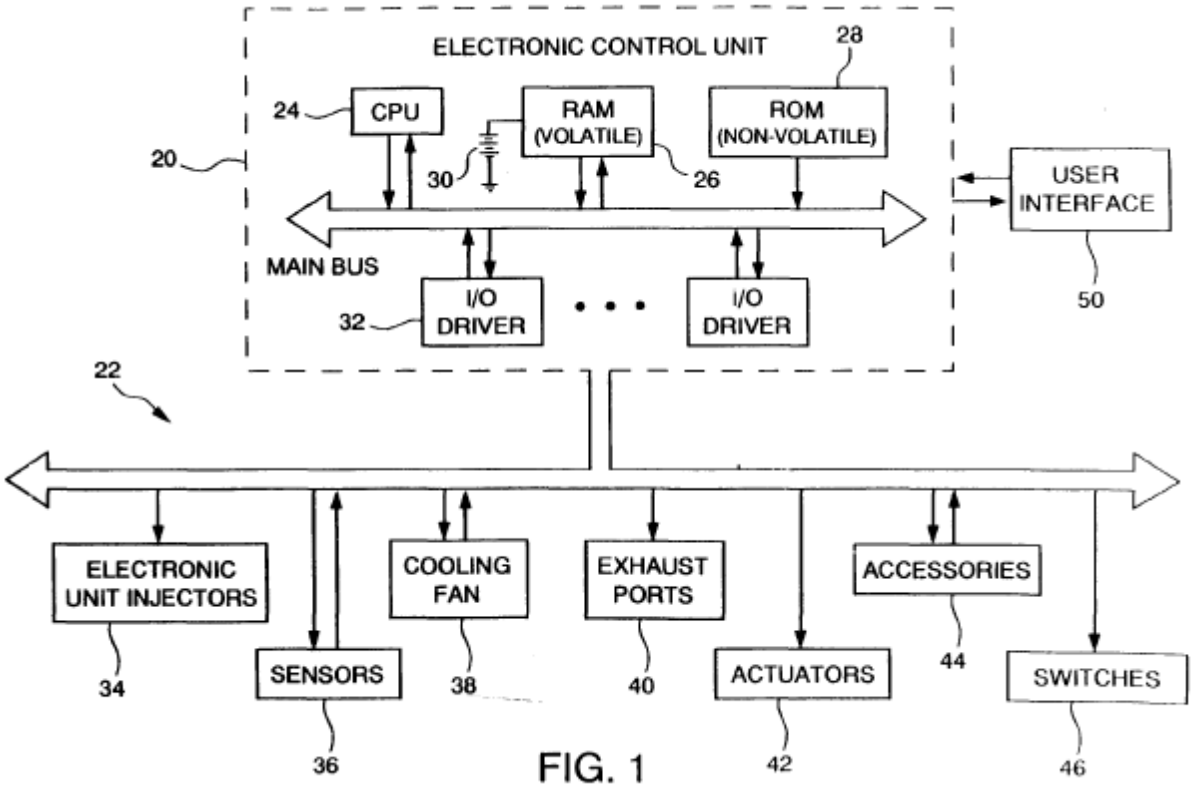


FIG. 1

Figure 1 is a block diagram of an integrated control system for a compression-ignition internal combustion engine. *Id.* at 5:21–23. Letang's control system includes electronic control unit 20 in communication with typical engine componentry, such as a plurality of sensors 36. *Id.* at 5:66–6:2, 6:26–34. One aspect of the control system controls engine output torque. *Id.* at 4:55–58; *see also id.* at 4:6–9 (explaining that systems such as the transmission can be protected by limiting the engine output torque). This control method is illustrated in Figure 6a, which is reproduced below:

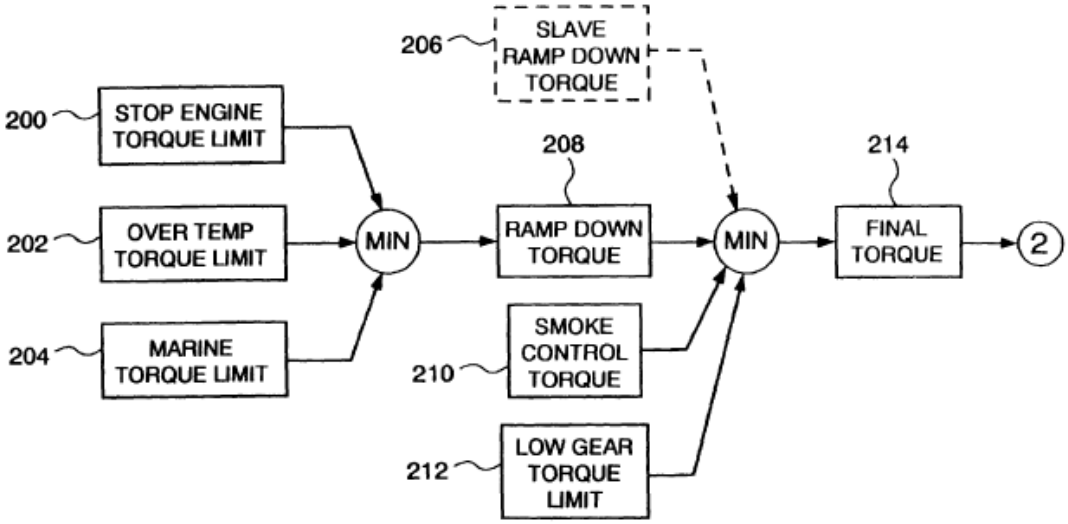


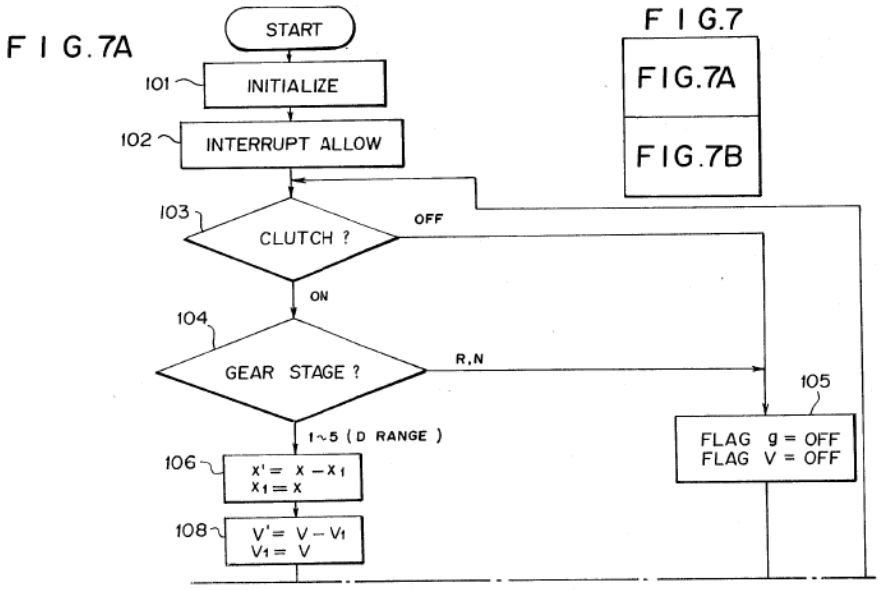
FIG. 6a

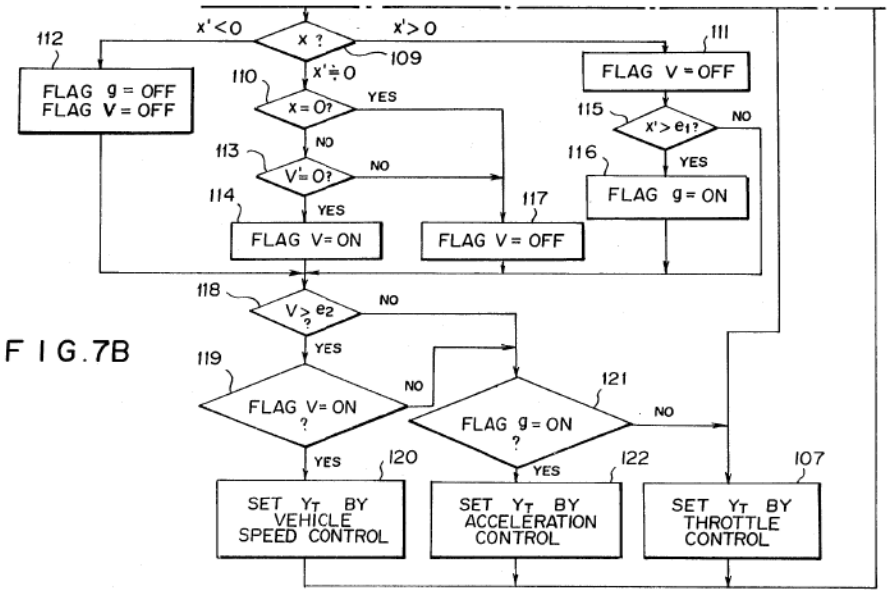
Figure 6a is a block diagram illustrating the method for engine output torque control. *Id.* at 5:39–42. Initially, the system sets the rampdown torque 208 by choosing the minimum value among stop engine torque limit 200 (a ramping function of time that decreases the allowable torque over a preset time interval), over temp torque limit 202 (which decreases the allowable engine torque as a function of engine oil temperature or engine coolant temperature), and marine torque limit 204 (a limit based on engine rotational speed and the rated torque capacity of a particular engine rating). *Id.* at 15:50–16:13. Final torque 214 is set by choosing the minimum value among the rampdown torque, slave ramp down torque 206 (similar to the rampdown torque and calculated by a slave electronic control unit, if present), smoke control torque 210 (a function of air manifold pressure in an effort to reduce particulate emissions), and low gear torque limit 212 (set according to the rated torque capacity of the transmission and driveline components to limit engine torque when mechanical torque multiplication is greatest). *Id.* at

16:21–34, 16:43–49. Alternatively, the final torque will be set to zero if the engine is being shut down for idle shutdown, a stop engine condition has terminated, or if the engine is overboosted, which can occur when alternative fuels are used. *Id.* at 16:35–42. Once the final torque is established, the amount of fuel required to deliver that torque is determined and the engine is controlled accordingly. *Id.* at 16:53–57.

4. Imai

Imai discloses a control system for controlling an engine output. Ex. 1013, 1:5–9. Figures 7A and 7B illustrate operation of the control system and are reproduced below:





F I G.7B

Figures 7A and 7B are a flow chart explaining the selection of an engine control mode. *Id.* at 6:51–55. Imai's system controls throttle position under one of three modes: a throttle control mode in which the throttle valve opening is set based on the position of the accelerator pedal, a speed control mode in which the throttle valve opening is controlled based on a target value for vehicle speed, and an acceleration mode in which the throttle valve opening is controlled based on a target value for vehicle acceleration. Ex. 1013, 3:61–4:7. In the throttle control mode, engine output can be readily controlled by the action of the accelerator pedal to thereby provide driver comfort. *Id.* at 5:1–4. In the vehicle speed control mode, control action has a stable response against external disturbances, such as resistance to the running operation, and the time for reaching the desired vehicle speed is substantially constant. *Id.* at 5:38–46. In the acceleration control mode, control action has an intermediate response between the throttle control and vehicle speed control modes to provide both stability and response to user input. *Id.* at 6:13–17.

The operating mode is chosen based on the vehicle running conditions. Ex. 1013, 4:5–7, 6:51–55. If the vehicle is in reverse or neutral, the throttle control mode is selected. *Id.* at 6:66–7:4. If the vehicle is in a driving gear, the control mode is selected based on changes in accelerator pedal position and vehicle speed. *Id.* at 6:63–66, 7:5–47. For example, if the accelerator pedal is engaged at a constant position and the vehicle speed is constant at a value greater than a predetermined value, vehicle speed control mode is selected (*id.* at 7:33–40, Fig. 7B); if the position of the accelerator pedal is increased by an amount greater than a predetermined value and the vehicle speed is less than a predetermined value, the acceleration mode is selected (*id.* at 7:25–31, 44–47, Fig. 7B).

E. Discretion Under 35 U.S.C. § 325(d)

Patent Owner argues that we should not consider Togai because it was of record during examination of the patent application resulting in the '680 patent. Prelim. Resp. 22–23. Petitioner argues that we should not exercise our discretion to deny institution. Pet. 15–19.

1. Legal Framework

Section 325(d) provides that the Director may elect not to institute[3] a proceeding when "the same or substantially the same prior art or arguments previously were presented to the Office." In evaluating whether to exercise our discretion under § 325(d), we weigh the following non-exclusive factors:

> (a) the similarities and material differences between the asserted art and the prior art involved during examination;

[3] The Board institutes trial on behalf of the Director. 37 C.F.R. § 42.4(a).

> (b) the cumulative nature of the asserted art and the prior art evaluated during examination;
>
> (c) the extent to which the asserted art was evaluated during examination, including whether the prior art was the basis for rejection;
>
> (d) the extent of the overlap between the arguments made during examination and the manner in which Petitioner relies on the prior art or Patent Owner distinguishes the prior art;
>
> (e) whether Petitioner has pointed out sufficiently how the Examiner erred in its evaluation of the asserted prior art; and
>
> (f) the extent to which additional evidence and facts presented in the Petition warrant reconsideration of the prior art or arguments.

Becton, Dickinson & Co. v. B. Braun Melsungen AG, IPR2017-01586, Paper 8 at 17–18 (PTAB Dec. 15, 2017) (designated precedential in relevant part). Factors (a), (b), and (d) relate to whether the art and arguments presented in the petition are the same or substantially the same as those previously presented to the Office. *Advanced Bionics, LLC v. Med-El Elektromedizinishe Geräte GmbH,* IPR2019-01469, Paper 6 at 10 (Feb. 13, 2020) (designated precedential). Factors (c), (e), and (f) "relate to whether the petitioner has demonstrated a material error by the Office" in its prior consideration of that art or arguments. *Id.*

> Thus, under § 325(d), the Board uses the following two-part framework: (1) whether the same or substantially the same art previously was presented to the Office or whether the same or substantially the same arguments previously were presented to the Office; and (2) if either condition of [the] first part of the framework is satisfied, whether the petitioner has demonstrated that the Office erred in a manner material to the patentability of [the] challenged claims.

Id. at 8.

2. Background

Petitioner relies on Togai as the base reference in both of its challenges to the '680 patent claims. *See* Pet. 6. The '680 patent discusses Togai in its background section:

> [I]n U.S. Pat. No. 5,400,865, the driver demand is converted to common control variable selected from throttle angle, airflow or torque to control the engine output. The torque-based scheme arbitrates between multiple requests for powertrain output torque. These output torque requests originate from the driver demand, the speed control system, or the traction control system. Only one of these output power requests, however, is chosen by the control system to regulate the engine output torque. The maximum output power request is arbitrated between the speed control system and the driver demand. If the vehicle is equipped with traction control, the output power request is also limited by the output torque request of the traction control system.

Ex. 1001, 1:12–24; Ex. 1002, 6. During prosecution of the patent application resulting in the '680 patent, the Patent Examiner first issued a species-type restriction, the Applicant elected an Examiner-defined species without presenting any arguments, and the Examiner then allowed all pending claims in a first action allowance. Ex. 1002, 73–85. In the Notice of Allowance, the Examiner discussed Togai:

> The reference to Togai et al. (5,400,865) discloses an engine output control that arbitrates between the input signals from the driver demand, speed control, and traction control to regulate the engine output torque. Claims 1-18 are allowed because the prior art neither shows nor teaches that the system further limit[s] the 1st input value by a vehicle speed limit value, engine speed limit value, and transmission speed limit value to generate a second desired engine speed value and

> controlling the engine output as a function of the second value and an actual engine speed value.

Id. at 82.

3. Analysis

Applying the *Advanced Bionics* framework, we first determine whether the same or substantially the same art or arguments were presented previously to the Office. As explained above, Togai is discussed in the '680 patent and was addressed by the Patent Examiner in the Notice of Allowance. Patent Owner argues that "*Togai* is clearly of record and should not be considered" and notes that the Petition applies Togai "as an obviousness reference" rather than "as an anticipatory reference." Prelim. Resp. 22.

Petitioner argues that we should not exercise discretion to deny institution because the *Becton, Dickinson* factors favor institution. Pet. 15–19. Petitioner argues that "[h]ere, Togai is presented in combination with Yoshioka and Letang, which were not considered by the Office" and "Yoshioka and Letang disclose the elements that the Examiner alleged were missing from Togai." *Id.* at 19 (emphases omitted). According to Petitioner, "the combination of Togai, Yoshioka, and Letang does not present the same or substantially similar prior art or arguments applied by the Office, so the Board should not deny institution under § 325(d)." *Id.*

The Petition relies on Togai to disclose a method of controlling engine output, including arbitrating between a driver input and a cruise control input, in the same manner as the Examiner did during prosecution. *See* Pet. 27–35; Ex. 1002, 82. However, the Petition relies on Yoshioka and Letang to teach the limiting values the Examiner found to be missing from

Togai. *See* Pet. 27–35; Ex. 1002, 82. Yoshioka recognizes that, in known engine control systems, fuel supply to the engine is paused when the engine revolves at a speed in excess of a first threshold value to prevent overrunning, and the fuel supply is resumed when the engine speed decreases below a second threshold value. Ex. 1012, 1:14–45. In a similar manner, Yoshioka's control unit reads the current engine speed and determines if it exceeds a first determining value. *Id.* at 8:1–5. If so, the controller causes the fuel supply to the engine to halt. *Id.* at 8:23–30. Letang discloses that, in addition to protecting the vehicle when oil pressure is insufficient, "[i]t is further desirable to protect other vehicle systems and components, such as the transmission, by limiting the engine output torque and output speed under certain operating conditions." Ex. 1007, 3:65–4:9. We find that these teachings of Yoshioka and Letang are not cumulative of the art evaluated by the Examiner during prosecution. *See* Ex. 1002, 82. Although Togai was considered by the Examiner, the *combinations* of references set forth in the Petition were not considered by the Examiner—nor is there record evidence that the teachings of Yoshioka and Letang relied upon in the Petition were considered in any manner during prosecution. Thus, the combinations of references and arguments based thereon as set forth in the Petition are materially different than the Examiner's consideration of Togai alone. Additionally, because the prosecution history indicates that the Examiner allowed the claims in a first Office Action, it appears the Applicant did not present any arguments concerning Togai during prosecution. As noted above, in the background section of the '680 patent, the Applicant summarized Togai in a similar manner as the Examiner and also acknowledged that Togai teaches both

"arbitrat[ing] between the speed control system and the driver demand" to determine a "maximum output power request" and limiting "the output power request . . . by the output torque request of the traction control system." Ex. 1001, 1:20–24.

Therefore, we find that the same or substantially the same art or arguments were not presented previously to the Office. *Compare* Ex. 1002, 82 (identifying claim language not disclosed by the references considered by the Examiner), *with Advanced Bionics*, IPR2019-01469, Paper 6 at 13–19 (determining references not considered during prosecution that petitioner relied on in its petition disclosed substantially the same structure as the references considered during prosecution, and, therefore, were "substantially the same art" as the art considered during prosecution). Having determined that the first part of the *Advanced Bionics* framework is not satisfied, we need not consider the second part of the framework.

For the foregoing reasons, we are not persuaded that we should exercise our discretion under § 325(d) to deny institution and we decline to do so.

F. Asserted Obviousness over Togai, Yoshioka, and Letang

Petitioner argues that claims 1–10 and 12–18 would have been obvious over Togai, Yoshioka, and Letang. Pet. 20–58. In support of its showing, Petitioner relies upon the Ehsani Declaration. *Id.* (citing Ex. 1003). We have reviewed Petitioner's assertions and supporting evidence. For the reasons discussed below, and based on the record before us, we determine that Petitioner demonstrates a reasonable likelihood of

prevailing in showing the challenged claims would have been obvious over the combination of Togai, Yoshioka, and Letang.

1. Claims 1–7

a. Independent Claim 1

Petitioner relies on Togai to disclose methods of controlling engine output substantially as claimed, including arbitrating between a driver input and a cruise control input, but relies on Yoshioka to teach limiting engine output based on engine speed and vehicle speed and Letang to teach limiting engine output based on transmission speed and torque. Pet. 27–35.

i. Preamble

The preamble of claim 1 states "[a]n engine output control method for a vehicle having a drive by wire engine system responsive to a desired engine speed signal." Ex. 1001, 7:28–30. Petitioner argues that Togai discloses such a control method. Pet. 27 (citing Ex. 1003 ¶ 73; Ex. 1009, 4:46–57, 5:28–30, 11:56–65, Fig. 1). Patent Owner does not address this aspect of the Petition.

Togai discloses a vehicle engine including throttle valve 6 the opening degree of which "serves as a direct parameter for controlling the engine output." Ex. 1009, 4:57–60. Togai discloses that the vehicle includes an accelerator pedal that is connected to a throttle-by-wire control unit that "is adapted to set the control amount to be used for the so-called throttle-by-wire control" based on the position of the accelerator pedal. *Id.* at 5:28–40. Thus, to the extent the preamble is limiting, Togai supports Petitioner's contentions.

ii. Generating a Driver Demanded Value

Claim 1 recites "generating a driver demanded engine speed value corresponding to an operator input." Ex. 1001, 7:31–32. Petitioner maps this recitation to the "first target control amount" detected by Togai's throttle-by-wire control unit 30A. Pet. 27–28 (citing Ex. 1003 ¶ 74; Ex. 1009, 5:31–40, 6:23–40, 11:16–23). Patent Owner does not address this aspect of the Petition.

Togai discloses that its control system includes throttle-by-wire control unit 30A that detects the position of the accelerator pedal to determine a first target opening degree θ_1 of the throttle corresponding to the detected pedal position. Ex. 1009, 5:31–40. The opening degree of the throttle valve "serves as a direct parameter for controlling the engine output, i.e., as an engine output control amount." *Id.* at 4:57–60. Thus, Togai supports Petitioner's contentions.

iii. Generating a Speed Control System Demanded Value

Claim 1 recites "generating a speed control system engine speed value corresponding to a predetermined speed value to permit vehicle operation at a constant speed by a speed control system." Ex. 1001, 7:33–36. Petitioner maps this recitation to the "third target control amount" detected by Togai's auto-cruise control unit 50A. Pet. 28 (citing Ex. 1003 ¶ 75; Ex. 1009, 5:52–62, 7:41–60, 12:8–17). Patent Owner does not address this aspect of the Petition.

Togai discloses that its control system includes auto-cruise control unit 50A that determines a third target opening degree θ_3 of the throttle corresponding to a position required to allow the vehicle to run at a constant speed. Ex. 1009, 5:52–62. As noted above, the opening degree of the

throttle valve "serves as a direct parameter for controlling the engine output, i.e., as an engine output control amount." *Id.* at 4:57–60. Thus, Togai supports Petitioner's contentions.

iv. Arbitrating

Claim 1 recites "arbitrating between said driver demanded engine speed value and said speed control system engine speed value to derive a first desired engine speed value." Ex. 1001, 7:37–39. Petitioner maps this recitation to the selection of one of the three target opening degrees θ_1, θ_2, θ_3 by Togai's main control unit 70A. Pet. 29 (citing Ex. 1009, 5:63–6:2, 12:18–28). Petitioner argues that the '680 patent describes this selection as arbitrating. *Id.* (citing Ex. 1003 ¶ 76). Patent Owner does not address this aspect of the Petition.

Togai discloses that "[e]ach of the first, second and third target opening degrees θ_1, θ_2, θ_3 of the throttle determined or obtained by . . . control units 30A, 40A and 50A is transmitted to a main control unit 70A." Ex. 1009, 5:63–66. If Togai's system is not operating in traction control mode or if the traction control target opening degree θ_2 is not the largest value, the main control unit selects as the target opening degree θ_t one of the throttle-by-wire target opening degree θ_1 and auto-cruise target opening degree θ_3 based on whether the vehicle is operating in the auto-cruise mode. *Id.* at 10:8–19, Fig. 6. Thus, Togai supports Petitioner's contentions.

v. Limiting

Claim 1 recites "limiting said first desired engine speed value by a vehicle speed limit value, engine speed limit value, and transmission speed limit value to generate a second desired engine speed value." Ex. 1001,

7:40–43. Petitioner argues that limiting engine speed as recited was well known. Pet. 29 (citing Ex. 1003 ¶ 77). Petitioner argues that "Togai discloses comparing the cruise control output and the driver demand engine speed with a traction control limit (i.e., 'θ_2')" and, therefore, "a POSA would have known advantages of comparing a target engine speed to limitations like the traction control limit disclosed in Togai, for example, to improve vehicle safety and controllability by reducing wheel spin." *Id.* at 30 (citing Ex. 1003 ¶¶ 63–64, 66–78; Ex. 1009, 5:63–6:2, 11:26–27, 12:23–28). Thus, Petitioner argues, "a POSA would have been motivated to include additional engine limits in Togai's system to further improve vehicle and engine operation and performance." *Id.* (citing Ex. 1003 ¶¶ 66, 78).

Petitioner argues that a person having ordinary skill in the art would have looked to Yoshioka, which, Petitioner contends, discloses a drive-by-wire control system that is "configured to reduce engine speed when vehicle speed exceeds a preset value" and "reduc[es] engine speed when engine speed exceeds a 'first determining value.'" Pet. 30 (citing Ex. 1003 ¶¶ 68, 79; Ex. 1012, 10:26–41, 13:49–63). Petitioner argues that it would have been obvious to include Yoshioka's engine speed and vehicle speed limits in Togai's control system because "[p]reventing the engine from exceeding a maximum engine speed protects the engine from damage, and similarly, inhibiting the target engine speed from making the vehicle exceed a maximum vehicle speed improves vehicle safety." *Id.* at 30–31 (citing Ex. 1003 ¶ 79; Ex. 1007, 3:65–4:5; Ex. 1012, 1:8–12); *see also id.* at 21–24. Petitioner argues that a person having ordinary skill in the art would have had a reasonable expectation of success when so modifying Togai's control system because "Togai already regulates engine speed by a traction control

limit" and the modification "would have merely required using data from well-known inputs/sensors that are already included in the engine control system . . . and modifying the program logic of the controller to account for the additional parameters," which, Petitioner contends, "would have been nothing more than the duplication of an existing step and the simple modification of the duplicated step through substitution of known prior art elements." *Id.* at 31 (citing Ex. 1003 ¶¶ 69, 80–81; Ex. 1009, 6:57–62, 9:5–8, 13:20–24, 13:57–60; *KSR*, 550 U.S. at 401); *see also id.* at 24. Petitioner contends that "[a] POSA would have understood to compare these maximum limits (i.e., maximum vehicle speed and maximum engine speed) with the final target engine speed . . . because this target engine speed is the value that should not exceed the maximum limits." *Id.* at 31–32 (citing Ex. 1003 ¶ 81).

For the same reasons as set forth with respect to the modification based on Yoshioka, Petitioner argues that it would have been obvious to include other engine speed limitations in Togai's control system. Pet. 32 (citing Ex. 1003 ¶¶ 70, 82). Petitioner argues that Letang discloses such a limitation: "Letang discloses that '[i]t is further desirable to protect other vehicle systems and components, such as the transmission, by limiting the engine output torque and output speed under certain operating conditions.'" *Id.* (alteration in original) (emphasis omitted) (quoting Ex. 1007, 4:6–9). Petitioner argues that such engine torque limiting "requires that the engine speed be limited to a speed that protects the transmission." *Id.* (citing Ex. 1003 ¶ 82). Petitioner argues that it would have been obvious to include Letang's transmission speed limit in Togai's control system "because it would protect the transmission from damage." *Id.* at 25–26 (citing Ex. 1003

¶ 70; Ex. 1007, 4:6–9). Petitioner argues that a person having ordinary skill in the art would have had a reasonable expectation of success when so modifying Togai's control system because "including additional limitations merely requires duplication of the traction control limit step already present in Togai and substitution of the desired limitations (here, transmission speed) for the traction control limit" (*id.* at 33 (citing Ex. 1003 ¶¶ 71–72, 84)) and "[a] POSA would have known how to duplicate and modify the existing limits to include other limits in the control system" (*id.* at 26 (citing Ex. 1003 ¶ 71)).

Yoshioka recognizes that, in known engine control systems, fuel supply to the engine is paused when the engine revolves at a speed in excess of a first threshold value to prevent overrunning, and the fuel supply is resumed when the engine speed decreases below a second threshold value. Ex. 1012, 1:14–45. In a similar manner, Yoshioka's control unit reads the current engine speed and determines if it exceeds a first determining value. *Id.* at 8:1–5. If so, the controller causes the fuel supply to the engine to halt. *Id.* at 8:23–30. Yoshioka discloses that the system can operate as a function of vehicle speed rather than engine speed. *Id.* at 13:49–52. Thus, Yoshioka supports Petitioner's contentions. We determine that Petitioner sets forth reasoning have rational underpinnings to explain why a person having ordinary skill in the art would have modified Togai's control system to include the vehicle speed and engine speed limitations taught by Yoshioka.

Letang's control system "control[s] engine output torque [in a manner] which adapts to changing operating conditions and therefore has the ability to protect the engine from various subsystem failures." Ex. 1007, 4:55–58. Letang discloses that, in addition to protecting the vehicle when

oil pressure is insufficient, "[i]t is further desirable to protect other vehicle systems and components, such as the transmission, by limiting the engine output torque and output speed under certain operating conditions." *Id.* at 4:6–9. Thus, Letang supports Petitioner's contentions. We determine that Petitioner sets forth reasoning have rational underpinnings to explain why a person having ordinary skill in the art would have modified Togai's control system to include the engine speed limitation taught by Letang.

Patent Owner acknowledges that "arbitrating between a driver demanded engine speed value and a speed control system engine speed value was known in [the] prior art," but argues that "the nesting and integration of different speed control subsystems into a single, integrated system" was not known and "result[s] in vast performance advantages over the prior art." Prelim. Resp. 18 (citing Ex. 2001 ¶ 30), 25 (same). Patent Owner argues that the Petition relies only on hindsight to combine the teachings of the cited references. *Id.* at 18–20. Patent Owner argues that even if one were to combine the teachings of the references cited in the Petition, the resultant combination would not meet the key claim limitation of arbitrating between driver demanded and speed control system speed values to derive a first desired speed value and then limiting this first desired speed value based on certain criteria to generate a second desired speed value. *Id.* at 20–21, 26–27. Patent Owner argues that a person having ordinary skill in the art would not have combined the cited references because "*Togai* is only concerned with driver demand (throttle), cruise control and traction control, *Yoshioka* is not a drive by wire system and is only concerned with engine overspeeding and *Letang* is expressly designed for diesel engine control." *Id.* at 26 (citing Ex. 2001 ¶ 32); *see also id.* at 23–25.

Patent Owner's arguments fail to persuade us that we should deny institution. Patent Owner makes generalized assertions while failing to address Petitioner's contentions and largely refers to individual reference teachings rather than discussing how a person having ordinary skill in the art would have considered the references' collective teachings. For example, although Patent Owner argues that Yoshioka teaches away from the invention claimed in the '680 patent (*see* Prelim. Resp. 24–25), Patent Owner fails to explain how Yoshioka criticizes, discredits, or otherwise discourages applying its teachings to gasoline-powered engines, and, thus, does not set forth adequately how Yoshioka teaches away from the invention claimed in the '680 patent. *See Depuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 567 F.3d 1314, 1327 (Fed. Cir. 2009) (citing *In re Fulton*, 391 F.3d 1195, 1201 (Fed. Cir. 2004)). Nor did our review identify any such discouragement.

As explained above, Petitioner relies on Togai to disclose arbitrating between the cruise control output and the driver demanded engine speed and limiting the arbitrated value with a traction control limit. *See, e.g.*, Pet. 30. We note that this is consistent with how the '680 patent summarizes the teachings of Togai. *See* Ex. 1001, 1:20–24 ("The maximum output power request is *arbitrated* between the speed control system and the driver demand. If the vehicle is equipped with traction control, the output power request is also *limited* by the output torque request of the traction control system." (emphases added)). Petitioner relies on Yoshioka and Letang to provide explicit teachings of the recited engine speed limit values. Pet. 30–33. Petitioner argues that a person having ordinary skill in the art would have first selected the final target engine speed from among the

accelerator pedal target value and the auto-cruise target value (that is, arbitrating) and then limited the final target engine speed with the limit values taught by Yoshioka and Letang "because this target engine speed is the value that should not exceed the maximum limits." *Id*. at 31–32. Petitioner argues that this modification would be a "basic task[] for a POSA." *Id.* at 24. Petitioner supports its contentions with expert testimony. *See* Ex. 1003 ¶¶ 69, 81. Notably, neither Patent Owner nor Patent Owner's declarant (*see* Ex. 2001 ¶¶ 30–32) address these arguments.

For the foregoing reasons, and on this preliminary record, Petitioner sets forth adequately that the combined references teach the recited limiting step.

vi. Controlling

Claim 1 recites "controlling said engine output as a function of said second desired engine speed value and an actual engine speed value." Ex. 1001, 7:44–46. Petitioner maps the controlling as a function of the second desired engine speed value portion of this recitation to Togai's setting of the target opening degree θ_t to the chosen one of the three target opening degrees θ_1, θ_2, θ_3 by Togai's main control unit 70A. Pet. 34 (citing Ex. 1003 ¶ 85; Ex. 1009, 5:67–6:2). Patent Owner argues that Yoshioka and Letang also disclose this recitation. *Id.* (citing Ex. 1003 ¶ 85; Ex. 1007, 8:17–27; Ex. 1012, 9:45–53). Petitioner maps the controlling as a function of actual engine speed portion of this recitation to Yoshioka's control of its injectors and argues that a person having ordinary skill in the art would have modified Togai's control system to include the actual engine speed value in controlling engine output based on Yoshioka's disclosure and so that the controller would be able to determine whether engine speed must be

increased or decreased. *Id.* at 34–35 (citing Ex. 1003 ¶ 86; Ex. 1009, 1:29–34; Ex. 1012, 7:18–26). Patent Owner does not address this aspect of the Petition.

Togai discloses that, once one of the three target opening degrees (θ_1, θ_2, θ_3) has been selected, the main control unit sets the selected value as the target opening degree θ_t, which serves as an amount of control for the engine output. Ex. 1009, 10:36–40. The throttle is then adjusted to conform to the chosen opening degree. *Id.* at 10:43–47. Yoshioka discloses that "the CPU 24 computes the engine speed (NE), inlet air pressure (PM), inlet air temperature (THA), coolant temperature (THW) and oxygen density in the exhaust gas" and "computes a target value of fuel injection based on the above computed values." Ex. 1012, 7:22–27. We note that, like the '680 patent, Togai discloses using a PID controller, which employs feedback as part of the control process. *See* Ex. 1001, 4:29–33; Ex. 1009, 6:65–7:4, 7:49–57. Thus, Togai and Yoshioka support Petitioner's contentions. We determine that, based on this preliminary record, Petitioner sets forth reasoning with rational underpinnings to explain why a person having ordinary skill in the art would have modified Togai's control system to control engine output as a function of actual engine speed in addition to the desired engine speed value.

vii. Conclusion

Accordingly, for the foregoing reasons and based on this preliminary record, we determine that Petitioner has established a reasonable likelihood of prevailing on its assertion that claim 1 would have been obvious over Togai, Yoshioka, and Letang.

b. Dependent Claims 2–7

Claims 2–7 depend, directly or indirectly, from claim 1. Ex. 1001, 7:47–8:12. The Petition maps these challenged dependent claims to the cited references. Pet. 35–43. Patent Owner does not address separately the arguments and evidence presented for the dependent claims. *See generally* Prelim. Resp. Based on our review of the current record before us, we determine that the information presented in the Petition establishes that there is a reasonable likelihood that Petitioner would prevail in its challenge to claims 2–7.

2. Claims 8–10

a. Independent Claim 8

Similarly to claim 1, claim 8 recites an engine output control method responsive to a desired engine speed signal. Ex. 1001, 8:13–33. Claim 8 recites a method that arbitrates between a driver demanded vehicle speed value, a speed control system speed value, and a vehicle speed limit value to derive a first desired vehicle speed value that is converted to a first desired engine speed value, which is limited by engine speed and transmission speed limit values to generate a second desired engine speed value, and controls the engine output as a function of the second desired engine speed value and an actual engine speed value. *Id.*

Petitioner maps the recitations of claim 8 to the cited references by, in large part, cross-referencing its contentions regarding claim 1. Pet. 43–46. Petitioner argues that vehicle speed is easily converted to engine speed using the gear ratio (*id.* at 43–44 (citing Ex. 1003 ¶ 102)) and a person having ordinary skill in the art would have done so in order to put the values in the

same units for comparison (*id.* at 42 (citing Ex. 1003 ¶ 97; Ex. 1007, 16:29–32)). Petitioner argues that it would have been obvious to include the vehicle speed limit in the arbitrating step because, "after the driver demand and speed control system value[s] are generated, the order of comparing those items to limiting parameters (e.g., vehicle speed, engine speed, transmission torque limit) makes no functional difference when performing the method." *Id.* at 45 (citing Ex. 1003 ¶ 106); *see also id.* at 39–40 (citing Ex. 1003 ¶ 93). Patent Owner addresses claim 8 by cross-referencing its arguments made regarding claim 1. *See* Prelim. Resp. 26, 27.

For the reasons set forth above regarding claim 1 and Petitioner's arguments regarding claim 8 summarized above, and based on this preliminary record, we determine that Petitioner has established a reasonable likelihood of prevailing on its assertion that claim 8 would have been obvious over Togai, Yoshioka, and Letang.

b. Dependent Claims 9, 10, and 12

Claims 9, 10, and 12 depend, directly or indirectly, from claim 8. Ex. 1001, 8:34–49, 8:58–60. The Petition maps these challenged dependent claims to the cited references. Pet. 35–38, 46. Patent Owner does not address separately the arguments and evidence presented for the dependent claims. *See generally* Prelim. Resp. Based on our review of the current record before us, we determine that the information presented in the Petition establishes that there is a reasonable likelihood that Petitioner would prevail in its challenge to claims 9, 10, and 12.

3. Claims 13–16

a. Independent Claim 13

Claim 13 recites an engine control method that is similar to claim 1, but the method is responsive to a desired engine acceleration signal. Ex. 1001, 8:61–9:15. Claim 13 recites a method that arbitrates between a driver demanded engine acceleration value and a speed control system engine acceleration value to derive a first desired engine acceleration value, which is limited by vehicle speed, engine speed, transmission speed, and traction control limit values to generate a second desired engine acceleration value, and controls the engine output as a function of the second desired engine acceleration value and an actual engine acceleration value. *Id.*

Petitioner maps the recitations of claim 13 to the cited references by, in large part, cross-referencing its contentions regarding claim 1. Pet. 46–49. Petitioner argues that "allow[ing] the driver to control the actual acceleration of the engine, instead of engine speed, . . . is desirable if the driver prefers greater control over vehicle performance." *Id.* at 40 (citing Ex. 1003 ¶ 94). Petitioner argues that the "conversion between acceleration and speed is governed by the fundamental calculus relationship between speed and acceleration: speed is the mathematical integral of acceleration, and, conversely, acceleration is the mathematical derivative of speed," and notes that Togai discloses converting vehicle speed to vehicle acceleration. *Id.* at 41 (citing Ex. 1003 ¶ 95; Ex. 1009, 12:56–58). Petitioner argues that Togai discloses a traction control value in the form of an engine output torque limit. *Id.* at 35 (citing Ex. 1003 ¶ 87; Ex. 1009, 5:41–51, 6:41–7:37, 12:56–13:19, 14:54–57). Patent Owner addresses claim 13 by cross-referencing its arguments made regarding claim 1. *See* Prelim. Resp. 26, 27.

For the reasons set forth above regarding claim 1 and Petitioner's arguments regarding claim 13 summarized above, and based on this preliminary record, we determine that Petitioner has established a reasonable likelihood of prevailing on its assertion that claim 13 would have been obvious over Togai, Yoshioka, and Letang.

b. Dependent Claims 14–16

Claims 14–16 depend directly from claim 13. Ex. 1001, 9:16–38. The Petition maps these challenged dependent claims to the cited references. Pet. 49–53. Patent Owner does not address separately the arguments and evidence presented for the dependent claims. *See generally* Prelim. Resp. Based on our review of the current record before us, we determine that the information presented in the Petition establishes that there is a reasonable likelihood that Petitioner would prevail in its challenge to claims 14–16.

4. Claims 17 and 18

a. Independent Claim 17

Similarly to claim 13, claim 17 recites an engine control method responsive to a desired engine acceleration signal. Ex. 1001, 10:1–30. Claim 17 recites a method that arbitrates between a driver demanded vehicle acceleration value, a speed control system vehicle acceleration value, a vehicle speed limit acceleration value, and a traction control vehicle acceleration value to derive a first desired vehicle acceleration value, which is limited by engine speed and transmission speed limit values to generate a second desired vehicle acceleration value that is converted to a desired engine acceleration value, and controls the engine output as a function of the

desired engine acceleration value and an actual engine acceleration value. *Id.*

Petitioner maps the recitations of claim 17 to the cited references by, in large part, cross-referencing its contentions regarding claim 13. Pet. 53–57. Petitioner argues that "[a] POSA would have understood that the order of comparing limitations (e.g., 'arbitrating' or 'limiting') does not affect the eventual outcome of selecting the vehicle acceleration." *Id.* at 55–56 (citing Ex. 1003 ¶ 165). Petitioner argues that "the '680 patent does not allege any criticality or unexpected result from an order of comparing the operational limitations, and thus the specific order of comparing the limitations is mere design choice" and "it would have been obvious to convert all acceleration units into vehicle acceleration units to enable a proper comparison of these limits." *Id.* at 56 (citing Ex. 1003 ¶ 166). Patent Owner addresses claim 17 by cross-referencing its arguments made regarding claim 1. *See* Prelim. Resp. 26, 27.

For the reasons set forth above regarding claim 1 and Petitioner's arguments regarding claim 17 summarized above, and based on this preliminary record, we determine that Petitioner has established a reasonable likelihood of prevailing on its assertion that claim 17 would have been obvious over Togai, Yoshioka, and Letang.

b. Dependent Claim 18

Claim 18 depends directly from claim 17. Ex. 1001, 10:31–37. The Petition maps this challenged dependent claim to the cited references. Pet. 58. Patent Owner does not address separately the arguments and evidence presented for the dependent claims. *See generally* Prelim. Resp. Based on our review of the current record before us, we determine that the

information presented in the Petition establishes that there is a reasonable likelihood that Petitioner would prevail in its challenge to claim 18.

G. Asserted Obviousness over Togai, Yoshioka, Letang, and Imai

Petitioner argues that claim 11 would have been obvious over Togai, Yoshioka, Letang, and Imai. Pet. 58–61. In support of its showing, Petitioner relies upon the Ehsani Declaration. *Id.* (citing Ex. 1003). We have reviewed Petitioner's assertions and supporting evidence. For the reasons discussed below, and based on the record before us, we determine that Petitioner demonstrates a reasonable likelihood of prevailing in showing the challenged claim would have been obvious over the combination of Togai, Yoshioka, Letang, and Imai.

Claim 11 depends directly from claim 8. Ex. 1001, 8:50–57. The Petition maps this challenged dependent claim to the cited references. Pet. 60–61. Petitioner argues that "Imai calculates an in-neutral driver demand from the pedal setting to control the engine in neutral." *Id.* at 60 (citing Ex. 1003 ¶ 185; Ex. 1013, 6:66–7:4). Petitioner argues that "it would have been obvious to a POSA to modify Togai's system to also control the engine in neutral at least to allow for full driver control over the engine in all operation modes and assist in cold starting of the engine." *Id.* (citing Ex. 1003 ¶ 185); *see also id.* at 58–60 (citing Ex. 1003 ¶¶ 181–182). Petitioner argues that it would have been obvious to arbitrate between the first desired engine speed value, an idle speed value, and an in-neutral driver demanded engine speed value "to enable driver control of the engine speed in neutral." *Id.* at 61 (citing Ex. 1003 ¶ 186). Patent Owner does not address separately the arguments and evidence presented for the dependent

claims. *See generally* Prelim. Resp. Based on our review of the current record before us, we determine that the information presented in the Petition establishes that there is a reasonable likelihood that Petitioner would prevail in its challenge to claim 11.

III. CONCLUSION

For the foregoing reasons, we determine that the information presented establishes a reasonable likelihood that Petitioner would prevail in showing that at least one of the challenged claims is unpatentable. At this preliminary stage, we have not made a final determination with respect to the patentability of the challenged claims or any underlying factual and legal issues.

IV. ORDER

Accordingly, it is:

ORDERED that pursuant to 35 U.S.C. § 314(a), an *inter partes* review of claims 1–18 of the '680 patent is instituted with respect to all grounds set forth in the Petition; and

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

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