

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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ZHONGSHAN BROAD OCEAN MOTOR CO., LTD.,  
BROAD OCEAN MOTOR LLC, and  
BROAD OCEAN TECHNOLOGIES, LLC,  
Petitioners,

v.

NIDEC MOTOR CORPORATION,  
Patent Owner.

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Case IPR2015-00763  
Patent 7,208,895 B2

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Before BENJAMIN D. M. WOOD, JAMES A. TARTAL, and  
PATRICK M. BOUCHER, *Administrative Patent Judges*.

BOUCHER, *Administrative Patent Judge*.

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

On February 20, 2015, Zhongshan Broad Ocean Motor Co., Ltd., Broad Ocean Motor LLC, and Broad Ocean Technologies, LLC (“Petitioners”) filed a Petition (Paper 3) pursuant to 35 U.S.C. §§ 311–319 to institute an *inter partes* review of claim 9 of U.S. Patent No. 7,208,895 B2 (“the ’895 patent”). Concurrent with their Petition, Petitioners filed a motion to join this proceeding with IPR2014-01122 (“the related proceeding”), which was instituted on January 21, 2015. Paper 4. Nidec Motor Corporation (“Patent Owner”) filed a Preliminary Response (Paper 12, “Prelim. Resp.”) to the Petition on April 21, 2015. Pursuant to our authorization, Petitioners filed a Reply (Paper 13) on April 28, 2015, limited to addressing the joinder issues.

Applying the standard set forth in 35 U.S.C. § 314(a), which requires demonstration of a reasonable likelihood that Petitioners would prevail with respect to at least one challenged claim, we deny the Petition and do not institute an *inter partes* review. Accordingly, we dismiss as moot Petitioners’ motion to join.

## I. BACKGROUND

### A. *The ’895 patent (Ex. 1001)*

The ’895 patent relates to torque control of permanent magnet rotating machines. Ex. 1001, col. 1, ll. 15–17. Figure 1 of the ’895 patent is reproduced below.

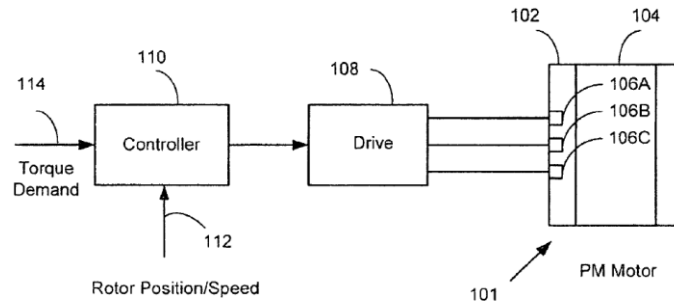


FIG. 1

Figure 1 is a block diagram of a rotating permanent magnet machine system. *Id.* at col. 2, ll. 4–6. Rotating permanent magnet electric machine 101 includes rotor 104 and stator 102, around which energizable phase windings 106A, 106B, and 106C are wound. *Id.* at col. 2, ll. 14–22. Drive 102 receives control inputs from controller 110, which receives rotor position and speed data 112 from sensors coupled to the machine. *Id.* at col. 2, ll. 24–30.

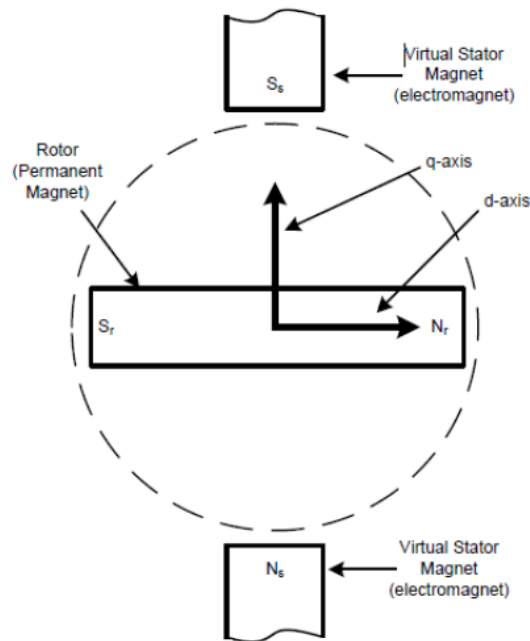
When operated in a torque control mode, input torque demand 114 is provided to a torque scalar that produces a scaled torque demand. *Id.* at col. 2, ll. 63–67. The '895 patent illustrates calculation of the scaled torque demand as the sum of three components: (1) the torque offset, which is the minimum torque required to run the motor without a load; (2) the product of the torque demand and a torque multiplier; and (3) a speed offset, which may be determined from a look-up table containing speed-torque table values for the particular motor being controlled. *Id.* at col. 4, ll. 15–35. “The torque multiplier and the torque offset value are preferably motor-specific parameters which compensate for individual motor characteristics.”

*Id.* at col. 4, ll. 20–22. A constant motor torque output with increasing motor speed may be achieved by increasing the value of the demanded torque by the control system as the motor operating speed increases, thereby making the torque lines flatter with speed. *Id.* at col. 4, ll. 39–43.

The scaled torque demand is used to calculate an “IQr demand” using motor-specific torque-to-IQr map data. *Id.* at col. 2, l. 67 – col. 3, l. 3. The IQr demand is concatenated with an “Idr demand” (also referred to as a “dr-axis injection current”) from an Idr injection block into a vector quantity, “IQdr demand.” *Id.* at col. 3, ll. 3–6. The resulting IQdr demand takes into account the torque contribution, if any, of the dr-axis current. *Id.* at col. 3, ll. 10–12.

Petitioners’ witness, Dr. Mark Ehsani, explains that “vector control” provides one method of controlling permanent-magnet synchronous motors, and that “[t]he concept of vector control, which typically uses d and [Q] current components, arises from [a] principle [in which] torque arrives from the interaction of two magnetic fields, one originating from the stator and one originating from the rotor.” Ex. 1007 ¶ 13.

The drawing from page 7 of Dr. Ehsani's Declaration is reproduced below.



The drawing from Dr. Ehsani's Declaration illustrates a rotor, which has a permanent magnet having north and south poles  $N_r$  and  $S_r$ , respectively, and illustrates a stator, which includes electromagnets that result in a virtual stator magnet having north and south poles  $N_s$  and  $S_s$ , respectively. *Id.* at ¶ 15. The  $d$  axis is aligned with the rotor and the  $q$  axis is offset  $90^\circ$  from the  $d$  axis. The motor commutates the winding currents to maintain orthogonality of the  $d$  and  $q$  axes as the rotor turns. *Id.* at ¶ 16.

### *B. Challenged Claim*

The challenged claim, and the independent claim from which the challenged claim depends, are as follows.

9. A permanent magnet rotating machine and controller assembly configured to perform the method of claim 1.

1. A method of controlling a permanent magnet rotating machine, the machine including a stator and a rotor situated to rotate relative to the stator, the stator having a plurality of energizable phase windings situated therein, the method comprising:  
receiving a rotor torque demand; and  
calculating a scaled torque demand from the received torque demand as a function of a speed of the machine to obtain a substantially constant rotor torque over a range of rotor speeds.

#### *C. Asserted Ground of Unpatentability*

Petitioners challenge claim 9 as anticipated under 35 U.S.C. § 102(b) by JP 11-155202, published June 8, 1999 (Ex. 1003, “Hiroyuki”). Pet. 4–5. Petitioners provide an attested English translation of the reference as Exhibit 1005.

#### *D. Related Proceedings*

In addition to IPR2014-01122, the ’895 patent is a subject of *Nidec Motor Corporation v. Broad Ocean Motor LLC et al.*, Civil Action No. 4:13-CV-01895-JCH (E.D. Mo.). Pet. 2–3.

#### *E. Claim Construction*

The Board interprets claims of an unexpired patent using the broadest reasonable construction in light of the specification of the patent in which

they appear. *See* 37 C.F.R. § 42.100(b); *In re Cuozzo Speed Techs., LLC*, 778 F.3d 1271, 1279–82 (Fed. Cir. 2015) (“We conclude that Congress implicitly adopted the broadest reasonable interpretation standard in enacting the AIA”); Office Patent Trial Practice Guide, 77 Fed. Reg. 48,756, 48,766 (Aug. 14, 2012). *see also* Office Patent Trial Practice Guide, 77 Fed. Reg. 48,756, 48,766 (Aug. 14, 2012).

In the related proceeding, the Board construed “scaled torque demand,” which is recited in claim 1, as “torque calculated from the received torque demand based on machine-specific parameters,” noting that scaling is “machine-specific” if it is “based upon parameters of the motor involved.” *Zhongshan Broad Ocean Motor Co., Ltd. Nidec Motor Corporation*, Case No. IPR2014-01122, slip op. at 9 (PTAB Jan. 21, 2015) (Paper 20). The Board also construed “substantially constant rotor torque over a range of rotor speeds,” which is also recited in claim 1, as “requiring that the rotor torque not vary substantially over a range of rotor speeds.” *Id.* at 9–10. Neither party contests these constructions, which we adopt for purposes of this decision.

## II. ANALYSIS

Hiroyuki describes a motor control system that may be used with a permanent magnet motor in an electric vehicle. Ex. 1005 ¶ 2. Hiroyuki expresses an objective of “obtaining a braking force of certain value” under

conditions of varying speed. *Id.* at ¶ 4. Figure 4 of Hiroyuki is reproduced below.

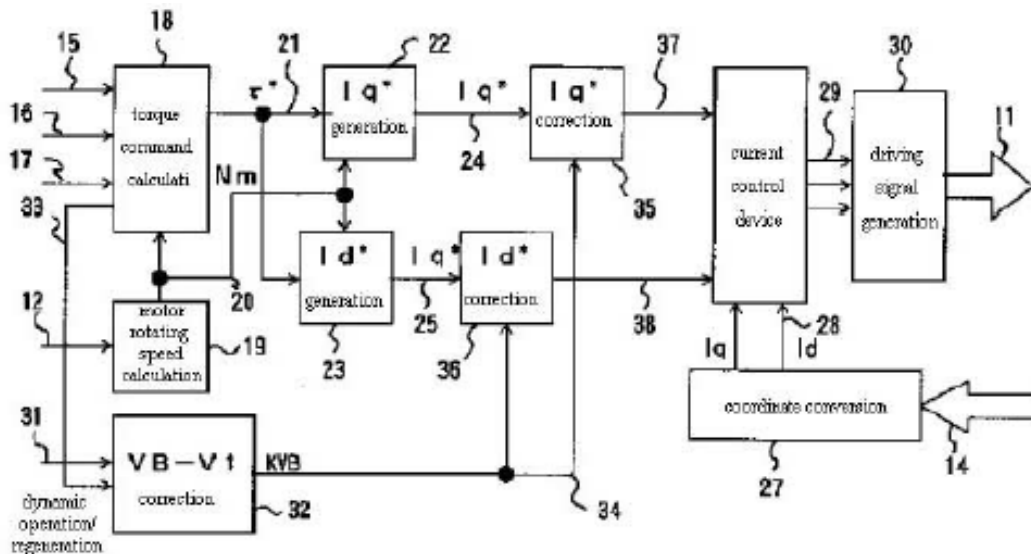


Figure 4 is a control block diagram illustrating an electric vehicle control device. *Id.* at ¶ 18. Torque command calculating device 18 determines torque command 21 based on inputs of accelerating signal 15, brake signal 16, and gear shifting signal 17. *Id.* at ¶ 17. The resulting torque command is received by torque component current generator 22 and magnetic field component current generator 23, both of which also receive signal 20 specifying input motor revolutions. *Id.* Torque component current generator 22 uses these inputs to output torque component current command 24, and magnetic field component current generator 23 uses the same inputs to output magnetic field component current command 25.

Petitioners draw a correspondence between torque command 21 and the “received torque demand” recited in claim 1, and draw a correspondence

between output torque component current command 24 and the calculated “scaled torque demand” recited in claim 1. Pet. 13–19. Petitioners contend that Hiroyuki’s torque component current command 24 is, thus, a “scaled torque demand that is a function of speed.” *Id.* at 19 (citing Ex. 1007 ¶ 55). Petitioners reason that input signal 20 “is ‘machine-specific’ because it is based upon a parameter of the motor involved (i.e., the motor’s rotational speed).” *Id.* at 17. Although Petitioners cite to Dr. Ehsani’s testimony for support, Dr. Ehsani’s expressed opinions are limited. Dr. Ehsani testifies that “[t]he calculated motor revolutions 20 is a representation of the speed of the motor,” but Petitioners have not identified testimony by Dr. Ehsani that motor speed is a machine-specific parameter. *See* Ex. 1007 ¶ 54.

Patent Owner contends that “motor speed is not a ‘machine specific parameter’” because “knowing the instantaneous speed does not characterize the machine.” Prelim. Resp. 20–21. Patent Owner further contends that Petitioners’ treatment of motor speed as a machine-specific parameter renders the phrase “calculating a *scaled* torque demand” (emphasis added) in claim 1 superfluous because the claim already expressly requires that the scaled torque demand be calculated as a function of machine speed. *Id.* at 21.

Patent Owner’s contentions are persuasive. That is, Petitioners’ analysis effectively reads “scaled” out of the claim. “The Patent and Trademark Office (PTO) must consider all claim limitations when determining patentability of an invention over the prior art.” *In re Lowry*, 32

F.3d 1579, 1582 (Fed. Cir. 1994) (citing *In re Gulack*, 703 F.2d 1381, 1385 (Fed. Cir. 1983)).

Accordingly, we conclude that Petitioners have not established a reasonable likelihood of prevailing on their challenge of claim 9. Because we so conclude, we do not reach the joinder issue.

### III. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that the Petition is denied and no *inter partes* review is instituted; and

FURTHER ORDERED that Petitioners' Motion for Joinder (Paper 4) is *dismissed*.

IPR2015-00763  
Patent 7,208,895 B2

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