IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD

Zhongshan Broad Ocean Motor Co., Ltd.; Broad Ocean Motor LLC; and Broad Ocean Technologies, LLC	
Petitioners	**Case IPR2014-01121**
v.	**Patent 7,626,349**
Nidec Motor Corporation	
Patent Owner	

DECLARATION BY GARY BLANK, PH.D

1.   I am Dr. Gary Blank and my residential address is 8N173 Ickenham Lane, Plato Center, IL 60124.

2.   I have been retained as an independent expert consultant in this proceeding before the United States Patent and Trademark Office ("USPTO"), which I understand involves U.S. Patent No. 7,626,349, (Exhibit 1001 or the " '349 patent"). The '349 Patent is assigned to Nidec Motor Corporation ("Nidec"). Although I am being compensated at my regular consulting rate for the time I spend on this matter, no part of my compensation is dependent on the outcome of this proceeding, and I have no other interest in the outcome of this case or the '349 patent.

3.   I understand that the Petitioners seek invalidation claims 1-3, 8-9, 12, 16, and 19 of the '349 patent. I have been retained by Nidec to offer technical

opinions relating to the '349 patent and certain prior-art references relating to its subject matter. My qualifications and opinions are set for the below.

QUALIFICATIONS

4. I have a Ph.D. in Electrical Engineering from the University of Wisconsin-Madison. The subject of my doctoral thesis and my area of focus was Control Systems including motor control.

5. After graduation I worked in industry for Honeywell, Teledyne, and Unisys (Burroughs) in the areas of analysis, design, and the practical aspects of motor control.

6. In 1986, I became a professor of Electrical Engineering and taught and conducted research at Illinois Institute of Technology, Northern Illinois University, Marquette University, and U.C.L.A. I supervised the research of both M.S. and Ph.D. students and taught undergraduate and graduate courses in Controls and Motors. I brought grants from industrial companies into the universities. I published several papers and presented papers at conferences on Controls and Motors. I was a full professor for 12 years.

7. I am now a consultant in industry and I have worked for more than 40 different industrial clients in the area of controls for motors. I am also a part-time professor of Electrical Engineering at Illinois Institute of Technology, Rock Valley College, and Waubonsee College.

8.   In 2014, I was elected by the membership and served as the President of IEEE-USA (Institute of Electrical and Electronics Engineers, Inc., membership 400,000). Appended to the end of my declaration is my current CV, which provides a more complete description of my educational background and experience.

OPINIONS

9.   I have reviewed the '349 patent, its file history, the asserted prior art, the Petition, Patent Owner's Preliminary Response, and the Institution Decision. I have also reviewed the declaration testimony of Dr. Ehsani. Dr. Ehsani provides a basic description of the operation of an electrically commutated motor and control of such a motor utilizing current control in the rotating frame of reference. I see nothing technically inaccurate in that background description and see no need to repeat it here.

10.   I have reviewed Dr. Ehsani's description of one of ordinary skill in the art and generally agree with that description.

CLAIM 1

11.   I understand that the Board has interpreted, and I have been asked to assume, that the claim 1 recitation of "using independent values of Q and d axis currents" requires "the use of Q and d axis current values that are developed independently of each other, without relying on one to derive the other." Each of the challenged claims requires this limitation.

Claim 1 in its entirety states:

> A heating, ventilating and/or air conditioning (HVAC) system comprising a system controller, a motor controller, an air-moving component, and a permanent magnet motor having a stationary assembly, a rotatable assembly in magnetic coupling relation to the stationary assembly, and a shaft coupled to the air-moving component, wherein the motor controller is configured for performing sinewave commutation, using independent values of Q and d axis currents, in response to one or more control signals received from the system controller to produce continuous phase currents in the permanent magnet motor for driving the air-moving component.

(Ex. 1001, cl. 1).

12.   The claim requires that the motor controller "is configured for performing sinewave commutation, using independent values of Q and d axis currents, in response to one or more control signals received from the system controller to produce continuous phase currents in the permanent magnet motor for driving the air-moving component." Given the Board's construction, and read in context of the entire limitation, in response to signals received from the system controller the motor controller must develop quadrature and direct axis currents, Q

and d, without relying on one to derive the other, and use those independently derived currents to create the signals that will drive the motor using sine wave commutation. The motor controller is tasked to drive the motor in response to system demands using vector control to develop sine wave commutated currents that drive the motor. Thus, taken in context, the independent Q and d axis currents must necessarily be the Q and d axis currents the motor controller calculates are required by the system controller demands and that are used to set or produce the continuous phase sine wave commutated currents for the motor. The structure identified by Broad Ocean as meeting this limitation is merely the part of a feedback loop that, at best, represents the instantaneous measured current values of Iq and Id, it is not the demanded value of Iq and Id developed by the motor controller in response to system control signals. Moreover, there is no basis to determine that Iq and Id were developed by the motor controller independently at that point in the system. Indeed, Hideji discloses they were not.

13.   I do not agree that Broad Ocean has identified independent Q and d axis currents in the Hideji reference. Broad Ocean points to the currents coming from the "three-phase/two-phase coordinate conversion part" 36 of Hideji as the alleged independent Q and d axis currents of the claim:

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