

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

BROAD OCEAN TECHNOLOGIES, LLC,
Petitioner,

v.

NIDEC MOTOR CORPORATION,
Patent Owner.

Case IPR2015-01617
Patent 7,990,092 B2

Before JAMES A. TARTAL, PATRICK M. BOUCHER, and
ROBERT J. WEINSCHENK, *Administrative Patent Judges*.

BOUCHER, *Administrative Patent Judge*.

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

I. INTRODUCTION

A. Background

Broad Ocean Technologies, LLC (“Petitioner”) filed a corrected Petition (Paper 6, “Pet.”) to institute an *inter partes* review of claims 1–13 of U.S. Patent No. 7,990,092 (Ex. 1001, “the ’092 patent”). After consideration of a Preliminary Response (Paper 9) filed by Nidec Motor Corporation (“Patent Owner”), the Board instituted review of claims 7–13. Paper 10 (“Institution Decision” or “Dec.”). The Board confirmed its denial of the Petition with respect to claims 1–6 after Petitioner filed a Request for Rehearing. Paper 16.

During the trial, Patent Owner timely filed a Response (Paper 20, “PO Resp.”), and Petitioner timely filed a Reply (Paper 24, “Reply”). An oral hearing was held on October 5, 2016, and a transcript entered into the record. Paper 30 (“Tr.”).

We have jurisdiction under 35 U.S.C. § 6. This Decision is a Final Written Decision under 35 U.S.C. § 318(a) as to the patentability of the claims on which we instituted trial. Based on the record before us, Petitioner has not shown, by a preponderance of the evidence, that claims 7–13 of the ’092 patent are unpatentable.

B. The ’092 Patent

The ’092 patent “relates to blower motors and controls used in residential heating, ventilation, and air conditioning (HVAC) systems.”

Ex. 1001, col. 1, ll. 21–23. Figure 14 of the '092 patent is reproduced below.

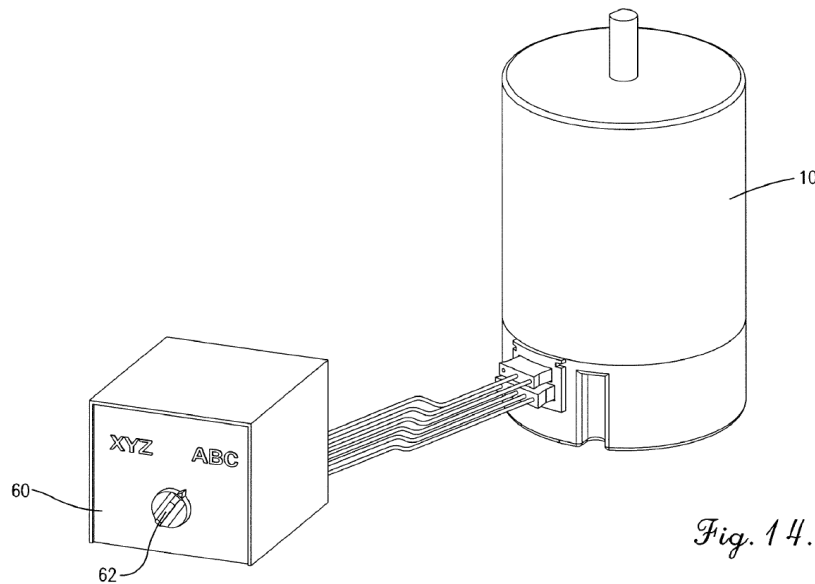


Figure 14 illustrates torque adjustment mechanism 60, which allows one to adjust the torque settings of a motor, such as blower motor assembly 10. *Id.* at col. 15, ll. 27–31. The illustration contemplates two models of HVAC equipment, designated “XYZ” and “ABC,” which the patent uses as examples to illustrate torque adjustment to accommodate both models of equipment in accordance with a state of selector switch 62. *Id.* at col. 15, ll. 37–48. Within this illustration, “[t]he XYZ model may be optimized with a blower motor having a maximum torque capability of 26.1 inch-lbs., and the ABC model may be optimized with a blower model having a maximum torque capability of 28.5 inch-lbs.” *Id.* at col. 15, ll. 39–42. The '092 patent asserts that “[a]s used herein, the term multiple torque settings means two or more torque settings, such as the five torque settings described below,” and

provides the following example of values for a motor having “5 power inputs with the following torque settings,” for a “standard motor,” the “XYZ motor,” and the “ABC motor”:

	Standard Motor	XYZ Motor	ABC Motor
IN1	100% 30 inch-lbs	100% 26.1 inch-lbs	100% 28.5 inch-lbs
IN2	90% 27 inch-lbs	90% 23.5 inch-lbs	90% 25.7 inch-lbs
IN3	80% 24 inch-lbs	80% 20.9 inch-lbs	80% 22.8 inch-lbs
IN4	70% 21 inch-lbs	70% 18.3 inch-lbs	70% 20.0 inch-lbs
IN5	30% 9 inch-lbs	30% 7.8 inch-lbs	30% 8.6 inch-lbs

Id. at col. 15, l. 49–col. 16, l. 21.

Circuitry such as that shown in Figure 15 of the ’092 patent is used to instruct a motor controller “to change its torque settings by an adjustment factor.” *Id.* at col. 16, ll. 25–29. In one example, the motor controller stores a plurality of “torque or speed tables,” one of which is selected based on an input provided by the torque adjustment mechanism. *Id.* at col. 16, ll. 63–66.

C. Illustrative Claim

Claim 7 of the ’092 patent is illustrative of the claims for which review was instituted:

7. A method of adjusting torque values of an HVAC motor having multiple torque settings and a maximum rated torque value, the method comprising:

selecting an adjustment factor to obtain an adjusted maximum torque value that is less than the maximum rated torque value;

selecting a torque table associated with the adjustment factor, the torque table including alternate torque settings; and
operating the motor at the alternate torque settings.

Ex. 1001, col. 18, ll. 17–27.

D. Instituted Ground of Unpatentability

We instituted trial based on the challenge of claims 7–13 as anticipated under 35 U.S.C. § 102(b) by U.S. Patent Publ. No. 2007/0205732 A1 (“Beifus”). Dec. 22.

E. Related Proceedings

The parties assert that the ’092 patent is the subject of *Nidec Motor Corp. v. Broad Ocean Motor LLC*, 2:15-cv-00443-JRG-RSP (E.D. Tex.). Pet. 1; Paper 7, 2. Patent Owner also identifies *Nidec Motor Corp. v. SNTech, Inc.*, 4:12-cv-00115 (E.D. Mo.) as involving the ’092 patent. Paper 7, 2.

II. ANALYSIS

A. Claim Construction

The Board construes claims of an unexpired patent using the broadest reasonable interpretation in light of the specification of the patent in which they appear. See 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); Office Patent Trial Practice Guide, 77 Fed. Reg. 48,756, 48,766 (Aug. 14, 2012).

In the Institution Decision, we made certain preliminary claim constructions, of which the following are relevant to the claims for which we instituted review. Dec. 7–13.

Claim Term	Preliminary Construction
“motor having multiple torque settings”	a motor that receives multiple discrete pre-set torque demand values, which may be expressed with units that include inch-pounds or percentages of a maximum torque rating or operating torque value
“adjustment factor”	a quantity that defines a quantitative relationship between a maximum rated torque value and an adjusted maximum torque value
“torque table”	includes a torque curve graphically representing a set of torque values in a memory connected to the motor
“adjustment factor . . . selected based on characteristics of an HVAC enclosure”	includes any input to or any setting or adjustable parameter of a motor controller that relate to the air flow/ventilation through the blower motor enclosure or that of the surrounding air ducts or one or more of temperature stratification, humidity, pressure, or combinations thereof

We see no compelling reason to modify these constructions based on the positions of the parties as developed during the trial, and adopt them for this Decision.

With respect to the construction of “torque table,” Patent Owner asserts:

If the Board’s construction means that the table need not be in any particular format in the memory, but the table must still store the alternative torque values required by the claim “in a memory connected to the motor,” then Patent Owner accepts this interpretation for the purposes of this proceeding. However, if the Board’s construction including reference to “a torque curve graphically representing a set of torque values” does not require the torque values shown on the curve to be stored in memory, it is erroneous.

PO Resp. 9. We agree with Patent Owner’s position, namely that “[t]he broadest reasonable interpretation of ‘table’ still must require the torque values to be stored in the table.” *Id.* As Patent Owner points out, “[t]he only intrinsic evidence available in this proceeding demonstrates a ‘torque table’ stores alternative torque settings.” *Id.* In particular, the ’092 patent consistently uses “table” to refer to discrete data that are stored in a memory, such as in the “speed tables” described as alternatives to “torque tables.” *See* Ex. 1001, col. 11, ll. 5–24, col. 16, ll. 63–66 (“Instead of adjusting the torque as described above, the motor controller 18 could store a plurality of different torque or speed tables and select one of the torque/speed tables based on an input provided by the torque adjustment mechanism.”). This

aspect of the construction of “torque table” is reflected in its reference to including a graphical representation of “a set” of torque values in a memory connected to a motor.

B. Beifus

Beifus relates to “methods and approaches used to control the operating characteristics of an electrically commutated motor [(‘ECM’)], specifically, emulating operation of an induction motor.” Ex. 1007 ¶ 1. To emulate the induction motor when the ECM is used, a desired operating torque is received, induction-motor operating characteristics stored within the ECM are accessed, and a new torque demand is calculated “if a speed associated with the desired operating torque is greater than the breakdown speed of the induction motor.” *Id.* at ¶ 4. When the speed is between the breakdown speed and the no-load speed, “the torque is scaled by a factor less than one, that is calculated using breakdown speed, no load speed and [a] shape description number.” *Id.* at ¶ 32. For example, for a “shape description number” n , Beifus discloses that a new torque demand may be calculated as

$$\text{Desired Operating Torque} \times \left[1 - \frac{(\text{i. m. operating speed} - \text{i. m. breakdown speed})^n}{(\text{i. m. no load speed} - \text{i. m. breakdown speed})^n} \right],$$

with “i.m.” indicating the “induction motor” values. *Id.* at ¶ 35. Petitioner identifies the coefficient of the “Desired Operating Torque” in this expression as corresponding to the “adjustment factor” recited in the claims of the ’092 patent. Pet. 30, 35–36.

Figure 6 of Beifus is reproduced below.

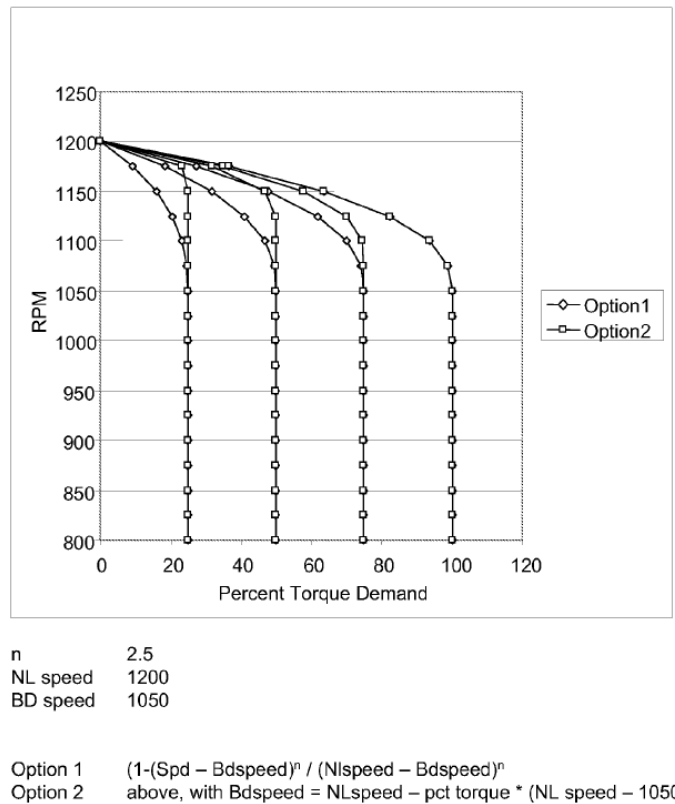


FIG. 6

Beifus states that Figure 6 “is a chart illustrating an induction motor speed-torque curve that is programmed into a memory of an ECM.” Ex. 1007 ¶ 11. Because “[a] claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference,” the dispositive issue in this proceeding is well defined: does Figure 6 (and related disclosure) of Beifus teach “selecting a torque table associated with the adjustment factor, the torque table including

alternate torque settings,” as recited in independent claim 7? *See Verdegaal Bros. v. Union Oil Co. of Cal.*, 814 F.2d 628, 631 (Fed. Cir. 1987).

Figure 6 is described in Beifus as follows:

FIG. 6 is a chart 250 illustrating a specific embodiment of an induction motor speed-torque curve. ***Chart 250 is illustrative of key characteristic points of an induction motor speed-torque curve that might be stored, for example, within a memory of an ECM control circuit.*** These key characteristic points include, for example, breakdown speed, no-load or synchronous speed, and a shape description number that controls the shape of the curve between the two speeds. In one embodiment, this shape description number is the “n” referred to above. In the embodiment, when the motor speed is between the breakdown speed and the no-load speed, the torque is scaled by a factor less than one, that is calculated by the formula above using the shape description number, the breakdown speed, and the no-load speed. At the same time, the allowed rate of change of the motor torque is reduced, in order to guarantee dynamic stability.

Ex. 1007 ¶ 36 (emphasis added). The parties disagree on how this disclosure would be understood by one of skill in the art, particularly whether the emphasized sentence teaches that the torque values shown in Figure 6 are stored in the memory of the ECM control circuit.

Petitioner contends that a “straightforward standard English grammar construction” requires that the restrictive clause “that might be stored . . . within a memory of an ECM control circuit” limits the closest possible antecedent in the sentence, i.e., “an induction motor speed-torque curve.” Reply 9–10 (citing William Strunk Jr. & E.B. White, *The Elements of Style* 29 (4th ed. 2000)). That is, Petitioner reads the disputed sentence such that

the restrictive clause is part of the object of the relevant prepositional phrase. Petitioner thereby reasons that the “induction motor speed-torque curve” is stored in memory, and, therefore, the individual RPM-torque values shown as diamonds and squares in Figure 6 are stored:

JUDGE BOUCHER: Yeah. So is it your contention that Beifus is disclosing storing those individual RPM torque values in memory?

MR. MEYER: Yes, the torque curves.

Tr. 7:22–25; *see* Reply 10. Petitioner bolsters its position by observing that the summary description of Figure 6 in Beifus asserts that “FIG. 6 is a chart illustrating ***an induction motor speed-torque curve that is programmed into a memory of an ECM.***” Reply 10 (quoting Ex. 1007 ¶ 11) (emphasis by Petitioner). Petitioner understands this statement to say that “it is the ‘induction motor speed-torque curve’ (which would of course include the key characteristic points) that might be stored, for example, within the ECM memory.” *Id.*

Patent Owner reads the disputed sentence of paragraph 36 with a more narrow scope for the prepositional phrase, associating only “of an induction motor speed-torque curve” with the “key characteristic points,” so that the restrictive clause “that might be stored . . . within a memory of an ECM control circuit” further limits the “key characteristic points” (rather than limiting the “induction motor speed-torque curve”). *See* PO Resp. 15. Under this reading, because the “key characteristic points” are not torque

values, Beifus fails to disclose a “torque table” consistent with the construction advanced by Petitioner and adopted herein, because the torque values themselves are not stored “in a memory connected to the motor.”

Mindful that Petitioner bears the burden of proving a proposition of unpatentability, we determine that Patent Owner’s position is the more persuasive. *See* 35 U.S.C. § 316(e).

First, we agree with Patent Owner that the summary description of Beifus’s Figure 6 in paragraph 11 is ambiguous, and insufficient to support a conclusion of anticipation. PO Resp. 16 (“Importantly, the shortened description does not say Fig. 6 is programmed into the memory, rather the ‘speed-torque curve’ is programmed into the memory. This ambiguous statement does not say that the torque values illustrated on the curves of Fig. 6 are programmed into the memory and is insufficient to support a conclusion of anticipation.”) (citing *GSI Technology, Inc. v. Cypress Semiconductor*, Case IPR2014-00121, slip op. at 12, 17 (PTAB Apr. 9, 2015) (Paper 46)). It is not apparent from the summary statement *how* the “induction motor speed-torque curve . . . is programmed into a memory,” and Petitioner insufficiently supports its inference that it *must* be by storage of the torque values themselves. In drawing its inference as to how the statement would be understood by one of skill in the art, Petitioner relies on attorney argument with insufficient supporting evidence. *See, e.g.*, Pet. 26, 36; Reply 10; *In re Pearson*, 494 F.2d 1399, 1405 (CCPA 1974) (unsupported attorney argument in a brief cannot take the place of evidence).

Petitioner insufficiently shows that programming the speed-torque curve into memory by storing parameters that allow for its on-the-fly calculation is not at least equally plausible. *See* PO Resp. 18–20; *see infra*.

Second, we agree with Patent Owner that “Beifus expressly clarifies the ambiguity when Figure 6 is actually described in detail in the specification.” *Id.* at 16. As Patent Owner asserts, “Beifus makes it clear that Figure 6 is a plot of values derived from key characteristics which are motor parameters of the emulated motor.” *Id.* (citing Ex. 1007 ¶ 36; Ex. 2002 ¶¶ 15–16, 31). This understanding of Beifus is confirmed by testimony of Patent Owner’s expert, Mark N. Horenstein, Ph.D. Ex. 2002 ¶¶ 15–16. Dr. Horenstein explains that a person of ordinary skill in the art would understand that the parameters stored in the ECM are key parameters used with the formula reproduced above to describe the torque-speed curve of the induction motor being emulated, namely the no-load speed, breakdown speed, and shape description number n . *Id.* ¶ 15. Dr. Horenstein further testifies that, “although square and diamond symbols appear along the curves in Figure 6, nowhere does Beifus describe the storing of these individual points.” *Id.* ¶ 16. Rather, Dr. Horenstein expresses his opinion that “a person of skill would understand these symbols to be included simply to identify which curve applies to Option 1 and which to Option 2 [i.e., different options for the induction motor breakdown speed], as indicated by the legend to the right of the plots.” *Id.*

Petitioner challenged Dr. Horenstein's opinion at his deposition, in part by comparing a drawing from one of Dr. Horenstein's own patents that included a series of curves with data marked by different symbols:

Q. So if a person of ordinary skill in the art looking at Figure 6 of the Beifus patent sees diamonds and squares, wouldn't they come to an understanding that those are data points?

A. I don't think so. And the reason is that a formula is given that explains how the curves are computed. Figure 19 of [Dr. Horenstein's patent], those are discretely measured points performed by experiment, and there really is no formula that applies to those curves per se, they're just data points that have some scatter relative to each other and they happen to be connected by lines, but those lines do not represent a formula.

Ex. 1013, 54:2–16. We disagree with Petitioner's characterization of this testimony as explaining that “the reason a person of ordinary skill in the art would understand that the diamonds and squares appearing in Figure 19 of [Dr. Horenstein's] patent are data points, as opposed to mere curve identifiers, is because the diamonds and squares are connected by lines.”

Reply 15. Rather, Dr. Horenstein's testimony makes clear that his opinion is grounded in Beifus's disclosure of a *formula* that allows calculation of the illustrated points and that connection of data points *measured by experiment* with lines is incidental.

Dr. Horenstein's testimony is more persuasive than the testimony of Petitioner's expert, Michael D. Sidman, Ph.D., on the identification of “key characteristic points” disclosed by Beifus. For example, Dr. Sidman

appeared to suggest at his deposition that the entire speed-torque curve of Beifus's Figure 6 is itself a "key characteristic point," but qualified that position when challenged by Patent Owner. *See* Ex. 2001, 23:22–25:15. Nevertheless, Dr. Sidman agrees that (1) a curve can be generated from a mathematical formula and graphed (Ex. 2001, 30:8–11); (2) Beifus's two formulas correspond to the formulas for "Option 1" and "Option 2" shown in Figure 6 (*id.* at 33:12–36:19); (3) operating speed, breakdown speed, no load speed, and shape-description number n are variables used in the formula disclosed by Beifus (*id.* at 22:23–23:10); (4) the calculation disclosed by Beifus could be performed on the fly in a motor controller (*id.* at 47:6–14); and (5) Beifus does not explicitly disclose that any precalculations are performed (*id.* at 43:1–23). These aspects of Dr. Sidman's testimony are consistent with Patent Owner's reading of Beifus.

Third, Patent Owner asserts that "Figure 5 [of Beifus] confirms that the outputs from Beifus's formulas are not simply stored in a memory as a torque curve or in a lookup table." PO Resp. 19 (citing Ex. 2002 ¶¶ 19, 31). Figure 5 of Beifus is reproduced below.

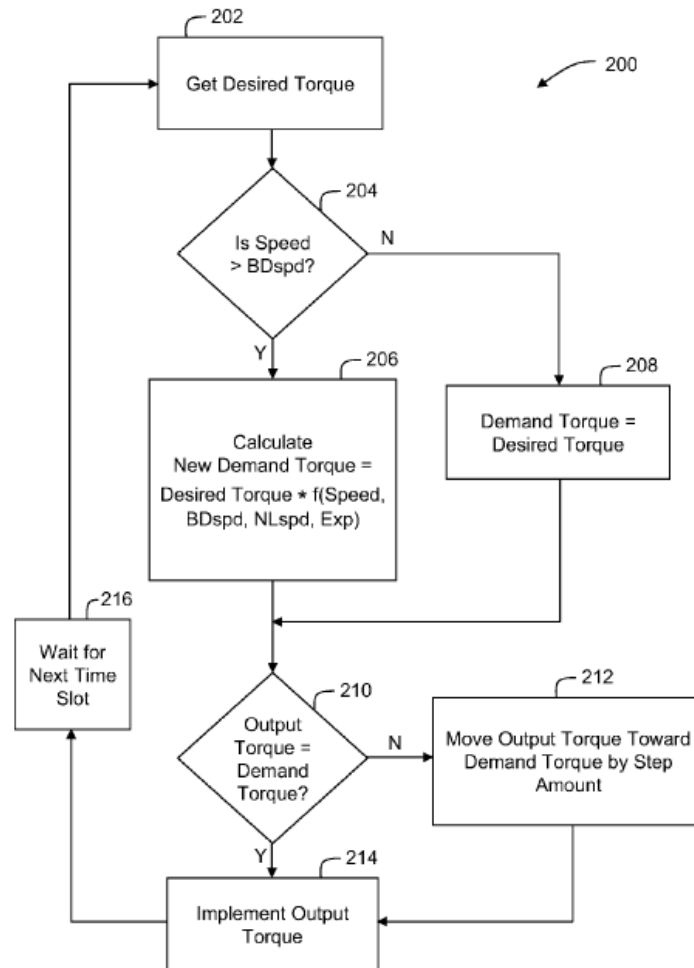


FIG. 5

Figure 5 “is a flowchart illustrating emulation of an induction motor using an ECM.” Ex. 1007 ¶ 10. Patent Owner observes that the steps of Figure 5, including the calculation shown at step 206, “are implemented in ECM control circuit software and the inputs include the motor’s real time operating speed and key characteristic points breakdown speed, no load speed, and shape description number N.” PO Resp. 19–20 (citing Ex. 1007,

Fig. 5; Ex. 2001, 36:23–37:20, 39:16–39:25; Ex. 2002 ¶¶ 18–31). Patent Owner presents the following reasoning:

If, as [Petitioner] contends, each of the potential outputs from Beifus’s formulas were simply stored in a memory in some manner, the *only* input required in the above calculation [i.e., in block 206] would be the motor’s current operating speed. But instead, Beifus Figure 5 on its face requires all inputs, which means it is performing a calculation, not simply looking up the answer. Simply put, Beifus discloses that three key characteristic operating points of the replaced motor are stored in memory, and a formula stored in the ECM calculates new torques based upon those key characteristic operating points and the motor[’]s operating speed.

Id. at 20 (citing Ex. 2002 ¶¶ 18–31).

This reasoning is persuasive. We disagree with Petitioner’s position that Figure 5 cannot reasonably be used to inform an understanding of Figure 6 because “Figure 6 of Beifus represents a separate embodiment from Figure 5.” Reply 6. Petitioner’s arguments that the different drawings can only be considered in isolation is based on casual references to the drawings in Beifus that include its description of Figure 5 as illustrating “one” method for emulating induction motor operation and of Figure 6 as a chart illustrating “a specific” embodiment of an induction motor speed-torque curve. *Id.* at 7. We have reviewed the testimony of Dr. Sidman that Petitioner cites as support for its contention that “[a] person of ordinary skill in the art would therefore understand that Figure 6 is simply a specific embodiment of an induction motor speed-torque curve,” but discern

insufficient unequivocal testimony in support of that contention for us to credit it on that point. *Id.* (citing Ex. 2001, 31:10–36:19).

Fourth, we do not consider Petitioner’s reliance in its Reply on the reasoning of *Kennametal, Inc. v. Ingersoll Cutting Tool Co.*, 780 F.3d 1376 (Fed. Cir. 2015). Petitioner contends that “[u]pon reading Beifus, a person of ordinary skill would immediately recognize that the ECM control circuit could handle the torque values in two ways – storing a set of torque values in a memory or by calculating the torque values ‘on the fly.’” Reply 18. *Kennametal* explains that “a reference can anticipate a claim even if it ‘do[es] not expressly spell out’ all the limitations arranged or combined as in the claim, if a person of skill in the art, reading the reference, would ‘at once envisage’ the claimed arrangement or combination.” *Kennametal* at 1381 (citing *In re Petering*, 301 F.2d 676, 681 (CCPA 1962)).

Petitioner did not raise the *Kennametal* theory of anticipation in its Petition, and the argument based on it in the Reply is, therefore, improper. 37 C.F.R. § 42.23(b) (“A reply may *only* respond to arguments raised in the corresponding opposition, patent owner preliminary response, or patent owner response.”) (emphasis added); *CBS Interactive, Inc. v. Helferich Pat. Lic., LLC*, Case IPR2013-00033, slip op. at 3 (PTAB Aug. 9, 2013) (Paper 79) (“Should there be improper arguments or evidence presented with a reply, the Board, exercising its discretion, may exclude the reply and related evidence in their entirety, or alternatively, decline to consider the improper arguments and/or related evidence.”). Although Patent Owner addressed

this theory in its Response (PO Resp. 21–24), Patent Owner appears to have done so only prophylactically after the theory was raised by Petitioner in redirect examination of Dr. Sidman. *See* PO Resp. 21 (“During Dr. Sidman’s redirect examination by [Petitioner’s] counsel, he was asked the following leading question”) (“The Board should disregard any of this new evidence and argument if [Petitioner] intends to rely on it.”). Because this is a new argument, not raised in the Petition, we do not consider it.

For the foregoing reasons, we conclude that Petitioner has not demonstrated, by a preponderance of the evidence, that Beifus discloses “selecting a torque table associated with the adjustment factor, the torque table including alternate torque settings,” as recited in independent claim 7. Thus, Petitioner has not demonstrated, by a preponderance of the evidence, that claim 7 is anticipated by Beifus, nor has it demonstrated that any of claims 8–13, which depend from claim 7, are anticipated by Beifus.

III. ORDER

It is

ORDERED that, based on a preponderance of the evidence, claims 7–13 of U.S. Patent No. 7,990,092 B2 have not been shown to be unpatentable;

FURTHER ORDERED that, because this is a final written decision, parties to this proceeding seeking judicial review of our decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

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