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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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*Ex parte* PAUL ANUZIS and LEONID MOISEEVICH

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Appeal 2017-004167  
Application 13/935,924<sup>1</sup>  
Technology Center 2800

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Before JENNIFER S. BISK, SCOTT E. BAIN, and  
STEVEN M. AMUNDSON, *Administrative Patent Judges*.

BISK, *Administrative Patent Judge*.

DECISION ON APPEAL<sup>2</sup>

Appellants seek our review under 35 U.S.C. § 134(a) of the Examiner's rejection of claims 1, 4–14, and 23. We have jurisdiction under 25 U.S.C. § 6(b). We affirm-in-part.

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<sup>1</sup> Appellants identify the real party in interest as Rolls-Royce, PLC. App. Br. 1.

<sup>2</sup> Throughout this Decision we have considered the Specification filed July 5, 2013 (“Spec.”), the Final Rejection mailed February 22, 2016 (“Final Act.”), the Appeal Brief filed August 22, 2016 (“App. Br.”), the Examiner’s Answer mailed November 18, 2016 (“Ans.”), and the Reply Brief filed January 11, 2017 (“Reply Br.”).

## STATEMENT OF THE CASE

Appellants' invention relates to monitoring rotating blades mounted on a shaft in a gas turbine engine. Spec. ¶ 1.

Claims 1 is illustrative:

1. A method for determining an artifact in a component, the method comprising:
  - a) exciting the component to induce a resonance response;
  - b) calculating real and imaginary components of bi-coherence  $b$  of the resonance response  $pk_0$  and  $qk_0$ , where  $p$  and  $q$  are integers and  $k_0$  is a component resonant frequency;
  - c) determining a position or area of the calculated real and imaginary components in two-dimensional space; and
  - d) determining the presence of the artifact in the component from the position or area of the calculated real and imaginary components.

App. Br. (Claims Appendix, A-1).

## THE REJECTIONS

1. The Examiner rejected claims 6–14 under U.S.C. § 112, ¶ 2 as being indefinite. Final Act. 3–4.

2. The Examiner rejected claims 1, 4, 5, 8–14, and 23 under § 101 as directed to non-statutory subject matter. Final Act. 4–5.

## ANALYSIS

### THE § 101 REJECTION

For purposes of the § 101 rejection, Appellants argue all the claims as a group, focusing on the limitations of claims 1, 9, and 23 only. *See* Appeal Br. 7–17. We select claims 1 and 23 as representative. Claims 4, 5, and 8–14 stand or fall with claim 1. *See* 37 C.F.R. § 41.37(c)(1)(iv).

*Legal Framework*

To be eligible under 35 U.S.C. § 101, the subject matter of an invention must be a “new and useful process, machine, manufacture, or composition of matter, or [a] new and useful improvement thereof.” 35 U.S.C. § 101. We initially note that claims 1, 4, 5, 8–14, and 23 are directed to a method, i.e., a process. Thus, each of the claims is directed to one of the four statutory categories of eligible subject matter.

The Supreme Court has held there are implicit exceptions to the categories of eligible subject matter identified in § 101, including laws of nature, natural phenomena, and abstract ideas. *Alice Corp. Pty. Ltd. v. CLS Bank Int’l*, 134 S. Ct. 2347, 2355 (2014). Further, the Court has “set forth a framework for distinguishing patents that claim laws of nature, natural phenomena, and abstract ideas from those that claim patent-eligible applications of those concepts.” *Id.* (citing *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 566 U.S. 66 (2012)). Under the Supreme Court’s two-step test, we first determine whether the claims are directed to a patent-ineligible concept: laws of nature, natural phenomena, and abstract ideas. *Id.* at 2354–55. If so, we then proceed to the second step and examine the claim’s elements—both individually and as an ordered combination—to determine whether the claim contains an “inventive concept” sufficient to transform the claimed abstract idea into a patent-eligible application. *Id.* at 2357.

*Claims 1, 4, 5, and 8–14*

The Examiner concludes that the claims are directed to an abstract idea because all the limitations “can either be performed using math or as mental processes.” Final Act. 5; Ans. 4–5. The Examiner also finds that the

claims “do not include additional elements sufficient to amount to significantly more” than the abstract idea because “[e]xciting a component to induce a resonance response, rotating a shaft, correcting the artifact in the component” are “well-understood, routine and conventional activities known in the industry” and “[s]ampling response data is directed to an insignificant extra solution activity of data gathering.” Final Act. 5; Ans. 5, 9–10.

Appellants contend that the claims are directed to “methods for determining an artifact in a component,” which is not an abstract idea. App. Br. 9. According to Appellants, “the claimed calculating real and imaginary components of bi-coherence is not a mathematical algorithm nor is it reasonable to conclude that it can be performed by a mental process.” *Id.* at 10. Instead, Appellants describe the calculating step as an “active method” step. *Id.* Appellants contend that “[w]hen considered as a whole, claims 1, 9 and 23 cannot reasonably be considered to recite an abstract idea.” *Id.* at 10–11 (citing *Enfish*, 822 F.3d at 1335). Appellants argue that, like the claims in *Diamond v. Diehr*, “the present claims allow a more accurate determination of the presence of an artifact in a component that was previously possible” and are, therefore, “an improvement to an existing technological process that results in a patent-eligible application of an abstract idea.” *Id.* at 12–13. Appellants also compare the claims at issue to those found patent-eligible in *Thales Visionix Inc. v. U.S.*, 850 F.3d 1343 (Fed. Cir. 2017).<sup>3</sup>

We agree with the Examiner that claims 1, 4, 5, and 8–14 are directed to patent-ineligible subject matter. The steps of calculating bi-coherence

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<sup>3</sup> *Thales* was decided after the Reply Brief in this case was filed and, therefore, we permit the new argument presented at oral hearing.

components, determining the position of the calculated components in two-dimensional space, and determining, from that position, the presence of the artifact, do not add up to anything more than analyzing information using a mathematical relationship. *See Elec. Power Grp., LLC v. Alstom S.A.*, 830 F.3d 1350, 1354 (Fed. Cir. 2016) (“[W]e have treated analyzing information by steps people go through in their minds, or by mathematical algorithms, without more, as essentially mental processes within the abstract-idea category.”); *see Spec.* ¶ 104 (“[T]he method *may* be realized by programming a computer to run the method steps described in this invention.”) (emphasis added). Moreover, the claims are focused on analyzing information using a particular calculation, but do not make any practical use of the determinations. *Classen Immunotherapies, Inc. v. Biogen IDEC*, 659 F.3d 1057, 1067 (Fed. Cir. 2011) (holding unpatentable a claims that “simply invite[] the reader to determine the content of [existing] knowledge,” but “do not include putting this knowledge to practical use”).

We are not persuaded that these claims are similar to those at issue in *Thales*. In determining that the claims in *Thales* were directed to patent-eligible subject matter, the Federal Circuit focused on the unconventional use of inertial sensors. *Thales*, 850 F.3d at 1349 (“Far from claiming the equations themselves, the claims seek to protect only the application of physics to the unconventional configuration of sensors as disclosed.”). Appellants do not identify any unconventional configuration of sensors or any other equivalent limitation such that the claims are directed to more than using mathematical equations to determine an artifact in a component.

We also agree with the Examiner that the claims are not directed to significantly more than the abstract idea. An inventive concept “cannot be

furnished by the unpatentable law of nature (or natural phenomenon or abstract idea) itself.” *Genetic Techs. Ltd. v. Merial L.L.C.*, 818 F.3d 1369, 1376 (Fed. Cir. 2016); *see also Alice*, 134 S. Ct. at 2355 (explaining that, after determining a claim is directed to a judicial exception, “we then ask, ‘[w]hat else is there in the claims before us?’” (emphasis added, brackets in original) (quoting *Mayo*, 566 U.S. at 78)). Instead, an “inventive concept” is furnished by an element or combination of elements that is recited in the claim *in addition to* the judicial exception and sufficient to ensure the claim as a whole amounts to significantly more than the judicial exception itself. *Alice*, 134 S. Ct. at 2355 (citing *Mayo*, 566 U.S. at 72–73); *see BSG Tech LLC v. BuySeasons, Inc.*, 899 F.3d 1281, 1290 (Fed. Cir. 2018) (explaining that the Supreme Court in *Alice* “only assessed whether the claim limitations *other than the invention’s use of the ineligible concept* to which it was directed were well-understood, routine and conventional,” (emphasis added)).

Moreover, notwithstanding Appellants’ contention that the claims allow a more accurate determination of a parameter, the analysis of *Alice*’s step two is not an evaluation of novelty or nonobviousness, but rather, a search for “an element or combination of elements that is ‘sufficient to ensure that the patent in practice amounts to significantly more than a patent upon the [ineligible concept] itself.’” *Alice*, 134 S. Ct. at 2355 (quoting *Mayo*, 566 U.S. at 72–73). The question in the second step is not whether the claimed invention is novel, but rather whether the implementation of the abstract idea involves “more than performance of ‘well-understood, routine, [and] conventional activities previously known to the industry.’” *Content*

*Extraction & Transmission LLC v. Wells Fargo Bank*, 776 F.3d 1343, 1347–48 (Fed. Cir. 2014) (quoting *Alice*, 134 S. Ct. at 2359).

Because claims 1, 4, 5, and 8–14 recite no *additional* elements beyond the abstract idea, these claims fail to add significantly more to the abstract idea. Even to the extent that computer processing is implied, such use of computers is merely as tools to compare and report information, which simply implements the abstract idea. See *BSG Tech*, 899 F.3d at 1286; *Gottschalk v. Benson*, 409 U.S. 63, 67 (1972) (explaining that the claimed steps could easily “be carried out in existing computers long in use, no new machinery being necessary”).

#### *Claim 23*

We do not, however, sustain the Examiner’s rejection of claim 23. Unlike claims 1, 4, 5, and 8–14, claim 23 includes an additional step of “correcting the artifact in the component.” This is a concrete, physical step as compared with the other steps involving data gathering and calculations and, as such, transforms the claimed subject matter from an abstract mathematical determination to a physical application of that determination. Claim 23, therefore, is not an abstract idea. See *Classen Immunotherapies*, 659 F.3d at (holding patent-eligible claims that include “the physical step of immunization” because they “are directed to a specific, tangible application”). Accordingly, we do not sustain the rejection of claim 23 under 35 U.S.C. § 101.

#### *Conclusion*

Under § 101, the Examiner did not err in rejecting claims 1, 4, 5, and 8–14, but erred in rejecting claim 23.

### THE § 112 REJECTIONS

The Examiner rejects claim 6 as indefinite, finding it “unclear how a rotation-periodic signal intersects the natural frequency range of the blade.” Final Act. 3–4. Because the Specification states that “rotation-periodic signals are conventionally known as order components,” the Examiner asks “[s]hould claim 6 be amended to recite *a frequency* of ‘an order related component’ (rotation-periodic signal) of a shaft *intersecting* with the ‘natural *frequency*’ range of a blade (similar to claim 9, step a-5)?” Ans. 3.

Appellants argue that “one of ordinary skill in the art of harmonics would clearly recognize that an order related component is a signal that could intersect with a natural frequency in the frequency-speed domain.” App. Br. 5–6 (citing Spec. Fig. 1, ¶¶ 2, 7). According to Appellants, the Specification “discloses how rotary components generate rotation-periodic signals, *i.e.*, order components, which are periodic with respect to shaft rotation and have a frequency related to the angular velocity of the shaft and engine speed.” Reply 4 (citing Spec ¶ 2).

We agree with Appellants that a person of ordinary skill in the art would understand from the Specification that when the claims refer to “an order related component of the shaft” in the context of intersecting with the natural frequency range of the blade, they refer to the frequency of the periodic signal with respect to shaft rotation. *See* Spec ¶ 2 (“As the angular speed of rotation increases typically the order components similarly increase in frequency.”).

The Examiner further rejects claim 9 as indefinite “because steps 1–5 do not support step a.” Final Act. 4. According to the Examiner, “the claims do not recite ‘*component(s) is/are mounted on a shaft* in a gas turbine

engine’ to clearly define the metes and bounds of the claimed step of exciting the component to induce a resonance response.” Ans. 2.

Appellants argue that the Specification “describes how this application is directed to methods for monitoring *components mounted on a shaft* in a gas turbine engine that generates signals which are periodic with respect to shaft rotation” and “one of ordinary skill in the art of aerospace engineering and harmonics would be able to understand the metes and bounds of claim 9 when read in light of the specification.” App. Br. 5; Reply 3 (citing Spec ¶¶ 1–2).

We agree with Appellants that claim 9 is sufficiently clear that the recited component in step a is mounted on a shaft. This is especially true in light of other claim language such as in step 1—“components of a shaft” and in step 2—“vibration modes of at least one article functionally mounted to the shaft.”

We, therefore, do not sustain the Examiner’s rejection of claims 6–14 under U.S.C. § 112, ¶ 2 as being indefinite.

#### DECISION

We affirm the Examiner’s decision to reject claims 1, 4, 5, 8–14.

We reverse the Examiner’s decision to reject claim 23.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv). *See* 37 C.F.R. § 41.50(f).

AFFIRMED-IN-PART