

NOTE: This disposition is nonprecedential.

**United States Court of Appeals  
for the Federal Circuit**

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**IN RE: FATIGUE FRACTURE TECHNOLOGY, LLC,**  
*Appellant*

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2020-1759

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Appeal from the United States Patent and Trademark  
Office, Patent Trial and Appeal Board in No. 90/014,120.

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Decided: February 19, 2021

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MEREDITH MARTIN ADDY, AddyHart P.C., Atlanta, GA,  
for appellant. Also represented by BENJAMIN CAPPEL,  
GREGORY B. GULLIVER, ROBERT PATRICK HART, Chicago, IL.

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VA, for appellee Andrew Hirshfeld. Also represented by  
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YASMEEN RASHEED.

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Before LOURIE, DYK, and MOORE, *Circuit Judges*.  
MOORE, *Circuit Judge*.

Fatigue Fracture Technology, LLC (FFT) appeals a Patent Trial and Appeal Board decision affirming an examiner's final rejection of claims 1, 3, 5, and 6 of U.S. Patent No. 7,497,361 during *ex parte* reexamination. Those claims, the Board held, would have been obvious over the combination of Cavallo<sup>1</sup> and Bayliss.<sup>2</sup> We *affirm*.

#### BACKGROUND

The '361 patent is directed to a two-step process for fracturing a connecting rod, which is the rod that connects the crankshaft to the piston in an internal-combustion engine. First, a cyclic force is applied to create fatigue cracks, thereby weakening the rod. Second, a larger "dynamic force" is applied to fracture the weakened rod into two pieces (a cap portion and a rod portion). Claim 1 of the '361 patent<sup>3</sup> (as amended during reexamination) is representative of the process:

1. A process for the fracture separation of a part having a cylindrical bore passing there through into a first portion and a second portion, the cylindrical bore having a central axis, the part having two opposed sides proximate to the intersection of a predetermined fracture plane passing through the cylindrical bore and the part, the process including the steps of:

applying at least one fatigue force to at least one of the first portion and the second portion, said at least one fatigue force being applied to fatigue the part by creating fatigue cracks along said predetermined fracture plane and

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<sup>1</sup> U.S. Patent No. 5,699,947.

<sup>2</sup> U.S. Patent No. 3,155,300.

<sup>3</sup> FFT does not present any separate arguments concerning claims 3, 5, or 6, nor does it dispute the Director's assertion that claim 1 is representative.

weaken the part for fracture of the part into the first portion and the second portion so as to separate the first portion from the second portion substantially along said predetermined fracture plane, said at least one fatigue force being selected from the group consisting of:

i) a longitudinal cyclic force applied to one of the first portion and the second portion relative to the other of the first portion and the second portion, said longitudinal cyclic force being applied in a direction substantially perpendicular to said predetermined fracture plane, and

ii) a lateral cyclic force applied to each of the opposed sides of the part, each of said lateral cyclic forces being applied along a substantially straight line that is substantially parallel to the predetermined fracture plane and substantially perpendicular to the central axis, where at any time instant, each of said lateral cyclic forces being substantially equal in magnitude and acting opposite in direction to one another; and

applying a dynamic force to one of the first portion and the second portion relative to the other of the first portion and the second portion, of the part weakened with fatigue cracks therein, in a direction substantially perpendicular to said predetermined fracture plane and the fatigue cracks, to thus separate the first portion from the second portion via a brittle fracture.

J.A. 131–32.

On April 10, 2018, Navistar, Inc. sought *ex parte* reexamination of claims 1, 3, 5, and 6. An examiner granted

Navistar's request and issued a final rejection, determining that the claims would have been obvious over (1) the combination of Bayliss and Cavallo, and (2) the combination of Bayliss and Brovold.<sup>4</sup> Regarding the first combination, the examiner found that Bayliss discloses applying a pre-stress force and a cyclic fatigue force to fracture a metal bar, and Cavallo discloses applying a pre-loading force and then a parting force to fracture a connecting rod. J.A. 220–21. The examiner also found that a person of ordinary skill in the art (POSITA) would have been motivated to incorporate Cavallo's parting force into Bayliss' process, as Bayliss' pre-stress force and Cavallo's pre-loading force are analogous, and Cavallo indicates that its parting force "maintains the desirable benefit of simplified production of the connecting rod." J.A. 221–22. The examiner later elaborated that a POSITA would have recognized the efficiency gains from combining Bayliss and Cavallo:

As would be readily apparent to one skilled in the art, the application of a final peak stress/force, such as is taught in Cavallo, to a part that has been fatigue-weakened as disclosed in Bayliss, would result in the fracture separation being completed in an efficient manner. In this regard, the magnitude of the final separation force would logically be less than that needed to separate a non-fatigue-weakened part (for example), and the final separation force would require less time to effect the part separation as compared to the time needed to separate the part using only the superimposed fatigue stressing disclosed in Bayliss.

J.A. 102.

FFT appealed both obviousness rejection grounds to the Board. Regarding the rejection based on Bayliss and

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<sup>4</sup> U.S. Patent No. 4,754,906.

Cavallo, FFT argued that a POSITA would not have been motivated to combine these references because: (1) Bayliss' process is so slow that "[n]o improvement or gain would be expected from applying the teachings of Bayliss, over a period of a few seconds, in a combination of Cavallo's teachings"; (2) "[u]sing Bayliss in view of Cavallo will result in a considerably more expensive fracture process, where [Bayliss requires] cryogenic cooling or a similar technique"; and (3) "each reference independently accomplishes the separation of a part" without "yielding or elongation." J.A. 124–25. FFT further argued that the combination of Bayliss and Cavallo would not satisfy the "fatigue force" limitation because Bayliss does not disclose a "fatigue force" that "does not break the part [b]ut only weaken[s] it." J.A. 125.

The Board rejected FFT's arguments and affirmed the examiner's obviousness rejection based on Bayliss and Cavallo. The Board did not reach the rejection based on Brovold and Bayliss. FFT appeals. We have jurisdiction under 28 U.S.C. § 1295(a)(4)(A).

#### DISCUSSION

We review the Board's ultimate obviousness determination de novo and the factual findings for substantial evidence. *PersonalWeb Techs., LLC v. Apple, Inc.*, 917 F.3d 1376, 1381 (Fed. Cir. 2019). Relevant here, factual findings underlying an obviousness determination include findings as to (1) "the scope and content of the prior art" and (2) "the presence or absence of a motivation to combine or modify with a reasonable expectation of success." *Ariosa Diagnostics v. Verinata Health, Inc.*, 805 F.3d 1359, 1364 (Fed. Cir. 2015).

Regarding the scope and content of the prior art, the Board credited the examiner's findings that (1) Bayliss teaches all of claim 1's limitations except for the application of a final "dynamic force," and (2) Cavallo teaches such a dynamic force. J.A. 6–7. FFT argues that Cavallo and Bayliss, either alone or in combination, lack a fatigue force

that weakens but does not fracture the connecting rod, as required by claim 1. Appellant Br. at 32. FFT reasons that Bayliss teaches a “fatigue to failure” process rather than a “fatigue to weaken” process. *Id.* at 21, 39. The Director responds that “this argument improperly attacks the teachings of Bayliss alone,” rather than the combination of Bayliss and Cavallo. Appellee Br. at 25. We agree with the Director.

Substantial evidence supports the Board’s finding that the combination of Bayliss and Cavallo meets the “fatigue the part . . . and weaken the part for fracture” limitation of claim 1. In this combination, Cavallo’s parting force breaks the connecting rod, not Bayliss’ cyclic fatigue force. And FFT conceded that Bayliss’ fatigue force “would weaken [the rod]” before breaking it. J.A. 55:1–4; *see also* J.A. 53:8–16 (“[Bayliss is] not talking about making little breaks or anything else. I mean I will admit, yes, there [sic] has to be happening because, eventually, the piece breaks . . .”). Thus, because Bayliss’ fatigue force weakens the rod before Cavallo’s parting force breaks it, the combination of Bayliss and Cavallo results in a “fatigue to weaken” process.

Regarding motivation to combine, FFT argues a POSITA would not combine Bayliss and Cavallo because Bayliss’ process is too slow and requires cooling the rod to its brittle/ductile transition temperature. The Director responds that substantial evidence supports the Board’s motivation to combine finding, and Bayliss’ duration and cooling do not undermine that finding. The Director further argues that Bayliss’ process would not necessarily require as much time or cooling as FFT contends.

Substantial evidence supports the Board’s finding that a POSITA would have been motivated to combine Bayliss and Cavallo. Cavallo teaches that reducing the force necessary to fracture a connecting rod is desirable. J.A. 30 at 2:3–9 (disclosing that a high parting force causes “considerable and quick wear” of machinery). And, as already

mentioned, FFT conceded that Bayliss' fatigue force would weaken a connecting rod. Based on this evidence, the Board found that it would have been obvious to combine Bayliss and Cavallo because "one skilled in the art would find it desirable to first weaken a part via fatigue to reduce a required fracture force magnitude." J.A. 9–10.

FFT's arguments regarding Bayliss' duration and cooling do not persuade us that no reasonable fact finder could have arrived at the Board's finding as to motivation to combine. The representative claim does not recite time or temperature limits, so to the extent FFT contends combining Bayliss and Cavallo ventures outside the claim's scope, it is incorrect. Regarding duration, FFT argues, based on the example given in Bayliss, that a skilled artisan would not be motivated to use Bayliss' fracture technique because it could take 17.5 minutes to fracture a part. *Time-to-fracture*, however, is not the same as *time-to-weaken*. Bayliss also discloses altering variables to speed up the process. *See, e.g.*, J.A. 33 at 2:58–59 ("By increasing the frequency of the stress reversals, fracture can be brought about in a much shorter time."). As for cooling, Bayliss discloses that the temperature is not fixed but rather depends on the material being fractured. *Id.* at 1:39–44 ("[T]he zone to be fractured of the bar stock is maintained at a temperature in the region of, but preferably below, the brittle/ductile transition temperature of the metal."). The Director has met its burden: there is substantial evidence for the finding of a motivation to combine in this case.

#### CONCLUSION

Because substantial evidence supports the Board's findings underlying its obviousness determination, we affirm the Board's determination that claims 1, 3, 5, and 6 would have been obvious over Bayliss in view of Cavallo. Because we affirm the Board's determination of obviousness over Bayliss and Cavallo, we need not reach Fatigue's appeal related to the Bayliss and Brovold combination.

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IN RE: FATIGUE FRACTURE TECHNOLOGY

**AFFIRMED**