**APPLICATION NO.** | **FILING DATE** | **FIRST NAMED INVENTOR** | **ATTORNEY DOCKET NO.** | **CONFIRMATION NO.**
--- | --- | --- | --- | ---
95/002,316 | 09/14/2012 | 8173834 | 37491-00RE | 2406

4249 7590 01/28/2016
CAROL WILSON
BP AMERICA INC.
150 West Warrenville Road
MC 200-1W
Naperville, IL 60563

**EXAMINER**
CAMPELL, BRUCE R

**ART UNIT** | **PAPER NUMBER**
--- | ---
3991

**MAIL DATE** | **DELIVERY MODE**
--- | ---
01/28/2016 | PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.
DECISION ON APPEAL

This is a decision on the appeal by the Patent Owner from the Patent Examiner’s final rejection of claims 14–16 and 20 in the above-identified inter partes reexamination of United States Patent 8,173,834 B2. The Board’s jurisdiction for this appeal is under 35 U.S.C. §§ 6(b), 314, and 315. We affirm the Examiner’s rejection.

BACKGROUND

The patent in dispute in this appeal is 8,173,834 B2 (“the ’834 Patent”) which issued May 8, 2012. The real party in interest and


Claims 1, 3–11, 13–16, and 18–20 stand finally rejected by the Examiner. Right of Appeal Notice (“RAN”) (June 14, 2014). Patent Owner appeals from the Examiner’s final rejection of claims 14–16 and 20 (Br. 2) as obvious under 35 U.S.C. § 103(a) (pre-AIA) in view of Tomitaka1 and Broeker.2 RAN 5. We affirm the rejection.

The claimed subject matter of the ’834 Patent is directed to a process for the manufacture of aromatic carboxylic acids. According to the ’834 Patent, purified terephthalic acid (“PTA”) and other aromatic carboxylic acids are “widely used in manufacture of polyesters, commonly by reaction with components comprising ethylene glycol, higher alkylene glycols or combinations thereof, for conversion to fiber, film, containers, bottles and other packaging materials, and molded articles.” ’834 Patent, col. 1, ll. 18–23. The ’834 Patent teaches that PTA had been made in the prior art “by catalytically hydrogenating less pure forms of the acids, such as crude product comprising aromatic carboxylic acid and by-products

---

1 Tomitaka et al., EP 0 962 442, published, Dec. 8, 1999.
generated by liquid phase oxidation of aromatic feedstock.” *Id.* at col. 2, ll. 4–8. After discussing the prior art, the ’834 patent discloses that “none of the processes uses liquid condensed from a high pressure off-gas from a liquid phase oxidation as solvent or other liquid comprising water in the purification of impure aromatic carboxylic acids.” *Id.* at col. 2, ll. 57–61; *see* also col. 3, ll. 24–32. As considered in more detail below, this liquid condensation step is embodied in step (h) of the claimed method.

The ’834 Patent also teaches that the invention provides in some embodiments “separation as reflux a liquid comprising a purification mother liquor remaining after recovery of a purified aromatic carboxylic acid product from a purification reaction solution.” *Id.* at col. 4, ll. 51–54. Step (j) of the claimed invention is directed to this embodiment.

Claim 14 is the only independent claim on appeal and reads as follows:

14. A process for manufacture of aromatic carboxylic acids comprising, in steps,

(a) contacting a feed material comprising at least one substituted aromatic hydrocarbon in which the substituents are oxidizable to carboxylic acid groups and gaseous oxygen in a liquid phase oxidation reaction mixture comprising monocarboxylic acid solvent and water and in the presence of a catalyst composition comprising a heavy metal component in a reaction zone at temperature and pressure effective to maintain a liquid reaction mixture and to form an aromatic carboxylic acid and impurities comprising reaction by-products dissolved or suspended in the liquid phase oxidation reaction
mixture and a high pressure vapor phase that comprises solvent monocarboxylic acid, water, unreacted substituted aromatic hydrocarbon, oxygen gas, and reaction by-products,

(b) recovering from the liquid phase oxidation reaction mixture a solid product comprising aromatic carboxylic acid and impurities comprising reaction by-products;

(c) dissolving or suspending solid product recovered from the liquid phase oxidation reaction mixture comprising aromatic carboxylic acid and impurities comprising reaction by-products in a liquid comprising water, at least a portion of which comprises a condensate liquid condensed according to step (h), to form a purification solution;

(d) contacting the purification solution at elevated temperature and pressure with hydrogen in the presence of a hydrogenation catalyst to form a purification liquid reaction mixture;

(e) recovering from the purification liquid reaction mixture a solid purified product comprising aromatic carboxylic acid with reduced levels of impurities and a liquid purification mother liquor comprising water and minor amounts of oxidized substituted aromatic hydrocarbon, hydrogenated derivatives thereof or combinations thereof;

(f) transferring a high pressure vapor phase from step (a) comprising solvent monocarboxylic acid, water vapor, unreacted feed material, oxygen and by-products of the liquid phase reaction to a separation zone supplied with reflux liquid and capable of separating solvent monocarboxylic acid and water in the high pressure vapor phase;
(g) separating solvent monocarboxylic acid and water in the high pressure vapor phase in the separation zone of elevated temperature and pressure into liquid comprising solvent monocarboxylic acid and lean in water and a high pressure gas substantially free of solvent monocarboxylic acid comprising water, aromatic feed material, by-products of the oxidation step and a minor amount of monocarboxylic acid solvent;

(h) transferring a high pressure gas removed from the separation zone to a condensing zone without treatment to remove organic impurities and transferring heat between the pressurized gas and a heat exchange fluid to condense from the high pressure gas a condensate liquid comprising water substantially free of organic impurities and form a high pressure condensing zone exhaust gas; and

(i) directing at least a portion of the condensate liquid condensed from the pressurized gas in step (h) to step (c); and

(j) directing at least a portion of the purification mother liquor recovered in step (e) to the separation zone such that reflux liquid supplied to the separation zone comprises the purification mother liquor.

REJECTION

Independent claim 14 is directed to a process for the manufacture of aromatic carboxylic acids. The process comprises steps (a) through (j) and includes: 1) oxidation steps in which a substituted aromatic hydrocarbon is subjected to oxidation to produce the aromatic carboxylic acid (step a through c); 2) hydrogenation to purify the product (steps d and e); distillation (steps f and g); and
condensation (steps h and i) in which a high pressure gas produced during distillation is transferred “to a condensation zone without treatment.”

In step (f), the “high pressure vapor phase” produced during oxidation (step a) is subjected, “without treatment,” to distillation.

In step (j), the “liquid purification mother liquor” produced during hydrogenation of step (e) is directed to the separation zone of the distillation step (g). This step is referred to as “recycling” by the Examiner and Patent Owner because water and the other components present in the mother liquor are returned back to the process. RAN 6–7.

In step (i), the condensate of step (h) is directed to the oxidation step (c).

The Examiner found that Tomitaka describes substantially all the steps of the claimed method, but not recycling the “liquid purification mother liquor” to the separation zone of the distillation step (g) as recited in step (j). RAN 6. However, the Examiner found that Broeker describes a process for preparing aromatic carboxylic acids which is similar to Tomitaka’s process. *Id.* In Broeker’s process, the Examiner found that liquid purification mother liquor “is recycled to the high pressure distillation column (col. 15, line 54 – col. 16, line 18; col. 18, lines 53–65).” *Id.* The Examiner stated that the recycling of the mother liquor “has the advantage of eliminating the need to deal with the mother liquor as a waste product requiring treatment, as well as allowing further recovery of product from the
mother liquor.” *Id.* Based on this reasoning, the Examiner concluded that it would have been obvious to one of ordinary skill in the art to modify Tomitaka by “recycling the mother liquor remaining after removal of solid aromatic carboxylic acid product into the distillation column as taught by Broeker.” *Id.* at 7.

Patent Owner contends that the skilled worker would not have routed the mother liquor to the distillation column as claimed because Tomitaka teaches that it would lead to clogging due to the accumulation of solids in the distillation column. Br. 9. In contrast, Patent Owner argues that, to overcome the proclaimed clogging problem, Tomitaka teaches that the mother liquor is first treated to remove impurities, while the claim uses the “liquid purification mother liquor” directly from step (e) with no treatment. *Id.* at 10.

Patent Owner acknowledges that Broeker teaches that “returning a mother liquor from a separation apparatus to a separation unit (i.e., distillation column) allows for the recycle of intermediates and byproducts in the mother liquor to the oxidation reactor, and that such a system reduces waste treatment costs, (Broeker at col 18, lines 57-65).” *Id.* at 12. See step (j) of claim 14. However, Patent Owner contends that Broker “requires the additional equipment of a catalytic oxidation unit, or equivalent, to do so” prior to condensing the high pressure gas from the distillation step. *Id.* at 12–13. See step (f) of claim 14 which requires that the high pressure gas be used “without treatment.”
In other words, Patent Owner contends that, when the mother liquor is recycled to the distillation column as in step (j) of claim 14, Broeker teaches that the high pressure gas produced during distillation step (g) must be treated to remove impurities prior to condensation in contrast to step (h) of claim 14 which uses the gas without treatment.

The principal issue in this rejection is therefore would it have been obvious to one of ordinary skill in the art to modify Tomitaka, including utilizing the high pressure gas from the distillation column with no treatment prior to condensation (step h of the claimed method), by recycling the mother liquor into the distillation column, as described by Broeker (i.e., step j of the claimed method). Patent Owner also provided evidence of nonobviousness to establish that the modifications would not have been obvious to one of ordinary skill in the art.

Discussion

Step (g) of claim 14 involves “separating solvent monocarboxylic acid and water” into the solvent and a “high pressure gas.” In step (h) of the claim, the high pressure gas is transferred “to a condensing zone without treatment to remove organic impurities.” According to Patent Owner, Broeker requires treatment of the high pressure gas. Br. 10. However, Patent Owner’s contention is not supported by a preponderance of the evidence in this record.

Broeker specifically teaches:

Significantly, the gas exiting the separation apparatus is still at a high pressure and is, therefore, a valuable source
of energy. While this offgas from the separation apparatus can be sent to a means for recovering energy, e.g. an expander, it is preferable to first remove corrosive and/or combustible byproduct materials from the high pressure offgas before it is directed to an expander or other means for energy recovery. While any means for removing combustible materials from the offgas is suitable, for example, a thermal oxidizer, a preferred method is to use a catalytic oxidation apparatus wherein the offgas is contacted with a suitable catalytic material at high temperature and high pressure in the presence of air or other source of molecular oxygen, and the corrosive and combustible byproduct materials in the offgas are catalytically oxidized to environmentally compatible materials. Such a catalytic oxidation unit can reduce or eliminate through oxidation, any residual oxidation reaction solvent present in the offgas, and it can oxidize a byproduct such as methyl bromide. However, in the method of this invention, the separation apparatus used removes most of the reaction solvent from the reaction offgas. Thus, the offgas entering the offgas catalytic oxidation unit has a low level of reaction solvent so the load on the catalytic oxidation unit is small.

Broeker, col. 13, l. 66 to col. 14, l. 22 (emphasis added).

This passage teaches that is preferable to treat the high pressure gas to remove corrosive and combustible materials, but it does not state that such treatment is required as asserted by Patent Owner. In an attempt to support their contention, Patent Owner relies on a declaration by Thomas M. Bartos, Ph.D., a co-inventor of Broeker (hereinafter, “Bartos Decl.”; executed on December 6, 2013).

Dr. Bartos testified in his declaration:

Broeker discloses the impurities from the gaseous effluent stream from the distillation column 20 must be removed by a catalytic oxidation unit or equivalent, and
preferably before the stream is directed to an expander or other energy recovery means. (Broeker at col. 14, lines 1–10).

Bartos Decl. ¶ 55.

The disputed passage from Broeker (see above) reads: “While this offgas can be sent to a means for recovering energy, e.g. an expander, it is preferable to first remove corrosive and/or combustible byproduct materials from the high pressure offgas before it is directed to an expander or other recovery means.” Broeker, col. 14, ll. 1-3 (emphasis added). There is no disclosure in this sentence, or the disclosure that follows it, that the byproducts, if not first removed prior to being directed to the expander, are removed in another step and that they “must be removed.” To the contrary, the sentences indicates that sending the offgas to an expander directly is a viable, even though it is a less preferred, alternative. Consequently, the testimony by Dr. Bartos on this point is not persuasive.

Patent Owner contends that if the mother liquor is not treated prior to being recycled to the distillation column, then the high pressure gas from the column must be treated prior to condensation, a step excluded by step (h) of claim 14. Br. 14. Once again, Patent Owner relies on the testimony of Dr. Bartos:

As a co-inventor of Broeker, it is my experience that neither my co-inventors nor myself considered it possible to eliminate treatment of both the overhead gaseous effluent, in Broeker, and the treatment of the purification “mother liquor" as in the Tomitaka Publication …

Bartos Decl. ¶ 53.
In my opinion, a person having ordinary skill in the art could have no expectation that both these steps could be removed while maintaining a condensate liquid of sufficient purity from the overhead gas from the separation zone, to be used in purifying the aromatic carboxylic acid product. One of ordinary skill in the art would expect that removing the catalytic oxidation unit of Broeker or the purification steps in the Tomitaka Publication would render a mother liquor stream too high in impurities for the purification process to accommodate.

_Id._ at ¶ 54.

Dr. Bartos does not provide adequate factual basis for this opinion. In contrast, as admitted by Patent Owner, Broeker teaches recycling the mother liquor, without treatment, to the distillation column:

Mother liquor from separation apparatus 180 which comprises water, dissolved and suspended purified terephthalic acid, and various intermediate and by-product compounds, is recycled to the top of high pressure distillation column 20 through pipe 200. Return of mother liquor from separation apparatus 180 to high pressure distillation column 20 allows for recycle of intermediates and by-products in the mother liquor to the oxidation reactor . . .

_Broeker, col. 18, ll. 53–60. While Broeker teaches subjecting the high pressure offgas to treatment, Broeker teaches this as preferable and therefore not necessary.

We have considered another declaration provided by Patent Owner, executed by Xi Li, Ph.D., which also says that it would not be obvious to omit the catalytic oxidation unit of Broeker when recycling mother liquor. _First Li Decl. ¶ 55–59_ (executed January 26, 2013).
Dr. Li, as does Dr. Bartos, testified the skilled worker would have been motivated to retain the catalytic oxidation reactor from Broeker because of the teaching in paragraph 6 of Tomitaka that “a distillation column in the separation zone ‘may tend to suffer from clogging due to accumulation of the remaining carboxylic acid crystals’ if returning the mother liquor stream to the separation zone as liquid reflux.” First Li Decl. ¶ 56; Bartos Decl. ¶ 51.

Neither Dr. Bartos nor Dr. Li explain how using the catalytic oxidation reactor, when condensate is returned to the column, would alleviate column clogging due to carboxylic acid crystals. As testified by Graham McCartney in a declaration provided by Requester, the purpose of the catalytic oxidation is to remove organic impurities from the high pressure offgas effluent. First McCartney Decl. ¶ 17 (executed February 22, 2013).

Moreover, as stated by Mr. McCartney (id.), Tomitaka teaches that adding condensed water from the condensers avoids “stuffing or clogging of the distillation column.” Tomitaka ¶ 60. Thus, the evidence supports a finding that the skilled worker would have looked to solve any potential clogging problem in the distillation column from recycling the mother liquor “by connecting the distillation column directly to a condensing system as described by Tomitaka.” First McCartney Decl. ¶ 17.

3 Mr. McCartney states that he has been employed as a chemical engineer for over 20 years. First McCartney Decl. ¶ 17. Based on his education and experience, we find that he is qualified to testify as to the matters in his declaration.
Furthermore, there is no persuasive evidence that, if mother liquor is recycled in Tomitaka’s process as described in Broeker, the skilled worker would have found it necessary to treat the high pressure gas from the distillation column prior to condensation. Dr. Li’s testimony that a person having ordinary skill in the art would have had reason to “retain the catalytic oxidation reactor 40, rather than remove it from the process, in light of the known issue in the art that a distillation column in the separation zone ‘may tend to suffer from clogging due to accumulation of the remaining carboxylic acid crystals’ if returning the mother liquor stream to the separation zone as liquid reflux. Tomitaka Publ. at ¶ 6”, and Dr. Bartos’ substantially identical testimony, is insufficient because Broeker teaches the catalytic oxidation unit is preferred and neither Dr. Li nor Dr. Bartos provide evidence that the catalytic oxidation reactor is “interrelated” to the mother liquor recycling. Li. Decl. ¶¶ 55–57; Bartos Decl. ¶ 50.

Specifically, it has not been established that failing to treat the high pressure gas would result in clogging of the column when combined with mother liquor recycling. Patent Owner contends that “one of ordinary skill in the art would appreciate that combining the Tomitaka Publication with Broeker – without the catalytic oxidation unit or other mother liquor impurity removal steps – would produce a purification mother liquor stream with concentrations of impurities too high for the use of the mother liquor as a reflux stream” (Br. 14), but does not provide evidence to support this argument. We agree with the Examiner that “neither Li nor Bartos explain . . . what effect
these substances [in the untreated condensed offgas] would have on the properties of the purification mother liquor that would render it unsuitable for recycling directly back to the distillation column.” RAN 17. As already stated, the preferred language in Broeker (and Abrams) indicates that the purification of the high pressure gas before condensation was a dispensable step.

Nonetheless, even if it is correct that the most advantageous configuration is one where recycling the mother liquor to the distillation column is accompanied by a step in which a high press gas prior is returned to a condensation zone after treatment with the catalytic oxidation unit of Broeker, this does not mean that the allegedly less preferred process of omitting the oxidation unit is unobvious. It would have been obvious to modify Tomitaka’s process by recycling the mother liquor to the distillation column as taught by Broeker and further adding condensed water from the offgas to the distillation column, without treatment, based on Tomitaka’s teaching of refluxing water from the condensers back to the distillation column to avoid clogging the column. Tomitaka ¶ 60; First McCartney Decl. ¶ 17. A “finding that prior art as a whole suggests the desirability of a particular combination need not be supported by a finding that the prior art suggests that the combination claimed by the patent applicant is the preferred, or most desirable, combination.” *In re Fulton*, 391 F.3d 1195, 1200 (Fed. Cir. 2004).

Moreover, even if combining such steps has some disadvantages, a teaching that a result would be inferior or less
desirable is not a teaching away unless the use “would render the result inoperable.” *In re ICON Health and Fitness, Inc.*, 496 F.3d 1374, 1381 (Fed. Cir. 2007). “[J]ust because better alternatives exist in the prior art does not mean that an inferior combination is inapt for obviousness purposes.” *In re Mouttet*, 686 F.3d 1322, 1334 (Fed. Cir. 2012). We have not been directed to evidence in this record that one of ordinary skill in the art would have reasonably expected the combination of the two steps as claimed would not work.

Patent Owner contends that Tomitaka teaches away from recycling the mother liquor from step (e) because:

At paragraph 6, the Tomitaka Publication proclaims that it is “problematic ... that the mother liquor separated in the purification step is recycled to the distillation column, wherein the column may tend to suffer from clogging due to accumulation of the remaining carboxylic acid crystals.” This teaching in the Tomitaka Publication, that mother liquor recycle leads to clogging due to the accumulation of solids in the distillation column, stands in stark contrast to the process of the Appealed Claims which teach exactly what the Tomitaka Publication teaches away from . . .

Br. 9.

However, Requester provided evidence that one of ordinary skill in the art would have had reason to recycle the mother liquor. Specifically, Mr. McCartney cited two publications, “Abrams and Jeffery (the references discussed by Tomitaka),” which Mr. McCartney testified “discuss recycling a mother liquor obtained from purifying an aromatic carboxylic acid product as a reflux to the distillation column, emphasize the advantages of doing so, and
provide solutions to the potential problems associated with solids that might otherwise foul the distillation column.” First McCartney Decl. ¶ 10; see also ¶ 9 (citing Tomitaka ¶ 5, which references WO96/11899 (“Abrams”) and WO97/27168 (“Jeffery)). Mr. McCartney also stated:

Jeffery . . . discusses the advantages of “recycling the aqueous mother liquor separated from the purified carboxylic acid.” 11 (Jeffery p. 7 line 28.) Jeffery describes that “a major fraction of the aqueous mother liquor will be recycled to the separation column ... preferably as reflux.” (Id. lines 37-38.) Jeffery explains that the mother liquor can be treated by cooling or evaporation to recover crystals of less pure aromatic carboxylic acid or that the “primary mother liquor recovered from the purification reaction may be recycled to the separation column without cooling . . . to any significant extent although it may be filtered before introduction into the separation column in order to remove any suspended fines." (Id. p. 8 lines 1-9.) Therefore Jeffery, like Abrams, discusses that a mother liquor can be cooled to remove dissolved compounds that might foul a distillation column, but also describes an alternative of recycling the primary mother liquor without cooling.

First McCartney Decl. ¶ 12 (emphasis added). Thus, Mr. McCartney’s testimony about the obviousness of returning the mother liquor to the distillation column has an adequate factual basis.

Patent Owner supplies testimony by Xi Li, Ph.D. that both Abrams and Jeffery also removed impurities through the use of a catalytic combustion unit. Supplemental Li Decl. ¶¶ 54–55 (executed December 3, 2013). However, Abrams has similar disclosure to
Broeker in which it is stated that offgas may be sent directly to an expander, although removal of byproducts first is “preferrable.” Abrams 9:27-33. When there are two ways of utilizing the high pressure gas – either untreated or treated, as in Broeker’s and Abrams’ preferred embodiments – both embodiments would have been obvious to one of ordinary skill in the art, even if one is preferred. See Merck & Co v. Biocraft Laboratories, 874 F.2d 804, 807 (Fed. Cir. 1989)(“all disclosures of the prior art, including unpreferred embodiments, must be considered.”)(quoting In re Lamberti, 545 F.2d 747, 750 (CCPA 1976)). Disclosed examples and preferred embodiments do not constitute a teaching away from a broader disclosure or non-preferred embodiments. In re Susi, 440 F.2d 442, 446 n.3 (CCPA 1971).

In addition, claim 14 recites “directing at least a portion of the purification mother liquor recovered in step (e) to the separation zone such that reflux liquid supplied to the separation zone comprises the purification mother liquor.” Thus, the claim does not require a specific quantity of mother liquor to be directed to the separation zone, so claim 14 allows for the remainder, which could be most of it, to be discarded from the system. Patent Owner has not established that any quantity of mother liquor would result in clogging “due to accumulation of the remaining carboxylic crystals.” Tomitaka ¶ 6. As noted by the Examiner, if clogging were a problem, “it would be obvious to only recycle as much purification mother liquor as the distillation column could accommodate.” RAN 16.
Secondary considerations

Factual considerations that underlie the obviousness inquiry include the scope and content of the prior art, the differences between the prior art and the claimed invention, the level of ordinary skill in the art, and any relevant secondary considerations. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). Relevant secondary considerations include commercial success, long-felt but unsolved needs, failure of others, praise, and unexpected results. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007); *Institut Pasteur & Universite Pierre et Marie Curie v. Focarino*, 738 F.3d 1337, 1344 (Fed. Cir. 2013); *In re Soni*, 54 F.3d 746 (Fed. Cir. 1995). Secondary considerations are “not just a cumulative or confirmatory part of the obviousness calculus but constitute [] independent evidence of nonobviousness . . . [and] enable [] the court to avert the trap of hindsight.” *Leo Pharm. Prods., Ltd. v. Rea*, 726 F.3d 1346, 1358 (Fed. Cir. 2013) (internal quotation marks and citations omitted). “This objective evidence must be ‘considered as part of all the evidence, not just when the decisionmaker remains in doubt after reviewing the art.’” *Transocean Offshore Deepwater Drilling, Inc. v. Maersk Drilling USA, Inc.*, 699 F.3d 1340, 1349 (Fed. Cir. 2012) (internal citations omitted).

Patent Owner contends that objective evidence of nonobviousness supports the patentability of the claims. Br. 15. Patent Owner contends that the practice of the claimed invention has
led to commercial success which resolves a long-felt need in the industry. *Id.* at 15–16. As evidence, Patent Owner relied upon the declaration of Dr. Bartos.

Dr. Bartos asserts that Patent Owner produces approximately 20% of purified terephthalic acid (PTA) worldwide. *Bartos Decl.* ¶ 61. PTA is an aromatic carboxylic aid. Dr. Bartos states that Patent Owner has two plants located in Zhuhai, China that are owned by BP Zhuhai Chemical Company and which produce PTA. *Id.* at ¶ 62. According to Dr. Bartos, the PTA plant in Zhuhai known as Zhuhai 1 began producing PTA in 2003, before the filing date of the ’834 patent and does not operate using the process of the ’834 patent. *Id.* at ¶¶ 63–64. The PTA plant in Zhuhai known as Zhuhai 2, on the other hand, began producing PTA in 2008. *Id.* at ¶ 64. Dr. Bartos testified that Zhuhai 2 “operates using the process described in the ’834 Patent.” *Id.* Dr. Bartos further testified in his declaration that “the technology described in the ’834 Patent” allows Zhuhai 2 to operate at only 59% of the variable cost of Zhuhai 1. *Id.* at ¶ 65. Dr. Bartos states that the “difference in variable costs has, under the current market, allowed Zhuhai 2 to operate on-line for essentially 100% of the time for the current year,” while the “older technology in Zhuhai 1 has been shut down 39% of the time over the same period due to insufficient profitability.” *Id.* Dr. Bartos concludes that such “improvements described in the ’834 patent” constitute commercial success. *Id.* at ¶ 67.
“For objective evidence to be accorded substantial weight, its proponent must establish a nexus between the evidence and the merits of the claimed invention.” In re GPAC, Inc., 57 F.3d 1573, 1580 (Fed. Cir. 1995). Evidence of commercial success, or other secondary considerations, is only significant if there is a nexus between the claimed invention and the commercial success and must be due to the merits of the claimed invention beyond what was readily available in the prior art. Ormco Corp. v. Align Tech., Inc., 463 F.3d 1299, 1311–1312 (Fed. Cir. 2006). “[I]f the feature that creates the commercial success was known in the prior art, the success is not pertinent.”); J.T. Eaton & Co., Inc. v. Atlantic Paste & Glue Co., 106 F.3d 1563, 1571 (Fed. Cir. 1997) (“[T]he asserted commercial success of the product must be due to the merits of the claimed invention beyond what was readily available in the prior art.”) (citing Richdel, Inc. v. Sunspool Corp., 714 F.2d 1573, 1580 (Fed. Cir. 1983) (Patentee failed to show that “such commercial success as its marketed system enjoyed was due to anything disclosed in the patent in suit which was not readily available in the prior art.”)).

In this case, it has not been established that the increase in profitability described in the Bartos Declaration was due to the merits of the claimed invention. The asserted commercial success is based on a comparison between the performance of a plant that uses the process described in the ’834 patent and one that does not. Dr. Bartos testified that the Zhuhai 2 plant using the ’834 patent technology is on-line 100% of the time, but the Zhuhai 1 plant, which does not use
the technology, is shut down 39% of the time due to insufficient profitability. For this evidence to be persuasive, the asserted profitability must be attributable to the merits of the claimed invention and not a feature which was known in the prior art.

Dr. Bartos did not offer an explanation of the process performed in the Zhuhai 1 plant. An explanation is necessary because the improvement in profitability observed in Zhuhai 2 is with respect to the process practiced in Zhuhai 1. While it must be presumed that the 59% reduction in operating cost obtained in Zhuhai 2 is due to the claimed process, without knowing what process was practiced in Zhuhai 1, it cannot be said that the improvement was due to the merits of the invention, rather than a feature which was known in the prior art. Specifically, Patent Owner acknowledges that the claimed process is similar to the processes described in Tomitaka and Broeker, differing only in that the claim recycle mother liquor to the separation zone (step j) and transfers high pressure gas without treatment to the condensing zone (step h). If Zhuhai 1 operated with a process completely different from that of claim 14, Tomitaka, or Broeker, it cannot be concluded that the success of Zhuhai 2 was due to steps (j) and (h) of claim 14, rather than more generically to the prior art.

---

4 For the sake of argument, we have assumed that the asserted profitability is a valid measure of commercial success.
5 Brown & Williamson, 229 F.3d 1120, 1130 (Fed. Cir. 2000) (stating the presumption that commercial success is due to the patented invention applies “if the marketed product embodies the claimed features, and is coextensive with them.”).
process of Tomitaka or Broeker involving, e.g., oxidation, hydrogenation, condensation, and recycling of the mother liquor. Dr. Bartos did not identify the differences between the process practiced in Zhuhai 1 and Zhuhai 2.

Moreover, as noted by the Examiner, “the advantages of recycling mother liquor, as enumerated by Broeker, would lead one to expect cost savings due to increasing the amount of product recovered and decreasing the amount of waste (requiring treatment) produced.” RAN 19. While Dr. Bartos testified that “the technology improvements described in the ‘834 Patent” are responsible for the “commercial success” and “address [the] long-felt need by reducing operating costs in the Zhuhai 2 PTA plant,” he did not provide sufficient evidence that the “success” is due to the claimed combination of recycling and condensing steps, rather than just the recycling of the mother liquor, which had been described in the prior art for its advantages.

Consequently, in view of these deficiencies, we conclude that the evidence of commercial success has little probative weight for the purpose of demonstrating nonobviousness.

Patent Owner’s contention that commercial success resolves a long-felt need in the industry also has little probative weight. Aside from lacking a nexus between the evidence and the merits of the claimed invention as discussed supra, Patent Owner’s reliance on commercial success as a basis for resolving a long-felt need fails to show that the need was a persistent one that was recognized by those
of ordinary skill in the art, which a solution was not known. See In re Gershon, 372 F.2d 535, 538 (CCPA 1967); see also In re Piasecki, 745 F.2d 1468, 1475 (Fed. Cir. 1984)(Patent Owner must present affidavits or other factual evidence of “a failure of others to provide a feasible solution to [a] long-standing problem” and evidence “that experts did not foresee” the solution claimed.) As discussed supra, the prior art teaches that recycling the mother liquor, with or without other steps, was known at the time of the invention.

After considering the evidence of record, including the cited publications and declarations, we conclude that claim 14 would have been obvious to one of ordinary skill in the art at the time of the invention. Claims 15, 16, and 20 were not argued separately and fall with claim 14.

VII. TIME PERIOD FOR RESPONSE

In accordance with 37 C.F.R. § 41.79(a) (1), the “[p]arties to the appeal may file a request for rehearing of the decision within one month of the date of: . . . [t]he original decision of the Board under § 41.77(a).” A request for rehearing must be in compliance with 37 C.F.R. § 41.79(b). Comments in opposition to the request and additional requests for rehearing must be in accordance with 37 C.F.R. § 41.79(c) & (d), respectively. Under 37 C.F.R. § 41.79(e), the times for requesting rehearing under paragraph (a) of this section, for requesting further rehearing under paragraph (d) of this section, and for submitting comments under paragraph (c) of this section may not be extended.

An appeal to the United States Court of Appeals for the Federal Circuit under 35 U.S.C. §§ 141–144 and 315 and 37 C.F.R. § 1.983 for an inter partes reexamination proceeding “commenced” on or after November 2, 2002 may not be taken “until all parties’ rights to
request rehearing have been exhausted, at which time the decision of the Board is final and appealable by any party to the appeal to the Board.” 37 C.F.R. § 41.81. See also MPEP § 2682 (8th ed., Rev. 7, July 2008).

In the event neither party files a request for rehearing within the time provided in 37 C.F.R. § 41.79, and this decision becomes final and appealable under 37 C.F.R. § 41.81, a party seeking judicial review must timely serve notice on the Director of the United States Patent and Trademark Office. See 37 C.F.R. §§ 90.1 and 1.983.

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).

AFFIRMED
Appeal 2015-007881
Reexamination Control 95/002,316
Patent 8,173,834 B2

FOR PATENT OWNER:
Carol Wilson
BP America Inc.
150 West Warrenville Road
MC 200-1W
Naperville, IL 60563

FOR THIRD-PARTY REQUESTER:
Dorothy P. Whelan
INVISTA S.a.r.l.
Fish Richardson, P.C.
P.O. Box 1022
Minneapolis, Minnesota 55440-1022