BoxInterferences@uspto.gov
Tel: 571-272-7822

Paper No. 124
Entered: November 30, 2016

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

THOMAS **BECKMANN** and ALEXANDER MASSNER
Junior Party
(Patent No. 7,584,605)

v.

HAREN S. **GANDHI**, JOHN VITO CAVATAIO,
ROBERT HENRY HAMMERLE, and
YISUN CHENG
Senior Party
(Application 12/877,901)

Patent Interference No. 105,822 (HHB)
(Technology Center 1700)

Before RICHARD E. SCHAFER, JOHN G. NEW, and HUNG H. BUI, *Administrative Patent Judges.*

BUI, *Administrative Patent Judge*.

JUDGMENT – 37 C.F.R. § 41.127(a)

In view of our decisions on motions (Papers 114 and 117) and our decision upon remand from the Federal Circuit in *Beckmann v. Gandhi*, 646 Fed. Appx. 950 (Fed. Cir. 2016) (Paper 123), it is:

ORDERED that Junior Party, Beckmann's claims 1–4 (corresponding to Count 1) of Beckmann's involved patent, U.S. Patent No. 7,584,605 will be cancelled pursuant to 35 U.S.C. §135(a);

FURTHER ORDERED that Gandhi's claims 3, 4, 6, and 9 (corresponding to Count 1) of Gandhi's involved application, U.S. Patent Application No. 12/877,901, are finally refused pursuant to 35 USC §135(a);

FURTHER ORDERED that a copy of this judgment be made of record in the files of Beckmann's involved patent, U.S. Patent No. 7,584,605 and Gandhi's involved application, U.S. Patent Application No. 12/877,901;

FURTHER ORDERED that if there is any settlement agreement or related documents which have not been filed, attention is directed to 35 U.S.C. §135(c) and 37 C.F.R. §41.205;

FURTHER ORDERED that a party seeking judicial review timely serve notice on the Director of the United States Patent and Trademark Office (37 C.F.R. §§ 90.1 and 104.2); and

FURTHER ORDERED that attention is directed to *Biogen Idec MA, Inc., v. Japanese Foundation for Cancer Research*, 785 F.3d 648, 654–57 (Fed. Cir. 2015).

cc (e-mail):

Attorneys for Beckmann:

Michael H. Jacobs, Esq.
Vincent J. Galluzzo, Esq.
CROWELL & MORING, LLP
Intellectual Property Group
MJACOBS@CROWELL.COM
VGALLUZZO@CROWELL.COM

Attorneys for Gandhi:

E. Anthony Figg, Esq.
R. Danny Huntington, Esq.
ROTHWELL, FIGG, ERNST & MANBECK, PC
EFIGG@RFEM.COM
DHUNTINGTON@RFEM.COM

BoxInterferences@uspto.gov
Tel: 571-272-7822

Paper No. 123
Entered: November 30, 2016

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

THOMAS **BECKMANN** and ALEXANDER MASSNER
Junior Party
(Patent No. 7,584,605)

v.

HAREN S. **GANDHI**, JOHN VITO CAVATAIO,
ROBERT HENRY HAMMERLE, and
YISUN CHENG
Senior Party
(Application 12/877,901)

Patent Interference No. 105,822 (HHB)
(Technology Center 1700)

Before RICHARD E. SCHAFER, JOHN G. NEW, and HUNG H. BUI,
Administrative Patent Judges.

BUI*, Administrative Patent Judge*.

DECISION – MOTION – 37 C.F.R. §41.125(a)

I. INTRODUCTION

This interference is before us on remand from the Federal Circuit. *See Beckmann v. Gandhi*, 646 Fed. Appx. 950 (Fed. Cir. 2016). The Federal Circuit vacated and remanded the portion of our earlier decisions (Papers 114 and 117) denying Beckmann's motion alleging that Gandhi's claims 3–5, 7, 8, and 10–17 are not supported by a written description ("Beckmann Motion 1"; Paper 30) and granting Gandhi's motion in part alleging that Beckmann's claims 3 and 4 of Beckmann's involved patent ("Beckmann '605") are unpatentable in view of prior art ("Gandhi Motion 1"; Paper 26).

Specifically, the court affirmed (1) our construction of claims 3 and 4 of Beckmann '605 as well as (2) our decisions that claims 3 and 4 of Beckmann '605 are unpatentable over cited prior art as presented in Gandhi Motion 1 (Paper 26). *Beckmann*, 2016 WL 1720502 at 2, 21, 29. In addition, the court agreed with the Board that claims 1 and 2 of Beckmann '605 do not require a "third [exhaust gas] supplying step be *controlled* in terms of exhaust gas composition and duration." *Id*. at 17. However, the court found the Board erred in construing claims 1 and 2 of Beckmann '605 as not requiring the third "supplying" step that is "separate" and "distinct" from the other two exhaust gas supplying steps, i.e., the lean and rich exhaust gas supplying steps. *Id*. at 3. In particular, the court concluded:

> Beckmann's claims 1 and 2 require a third exhaust gas supplying step that is separate and distinct from the other two exhaust gas supplying steps.

Id.

Because the court reversed our construction of Beckmann's claims 1 and 2, the court vacated our determination that those claims are unpatentable over the cited prior art, and remanded the portion of our decisions (Papers 114 and 117) relating to claims 1 and 2 of Beckmann '605 for further proceedings. *Id.*

Separately, the court concluded "the Board's finding that Gandhi '901

contains an adequate written description of the 'minimizing the oxygen content . . . *prior to* a rich cycle' limitation of claims 5, 8, 11, and 17 is unsupported by substantial evidence" and, based on that conclusion, vacated that finding and remanded for further proceedings. *Id.* at 3, 28–29. In support of that conclusion, the court noted:

> [t]he Board did not consider and analyze whether the '901 application provides an adequate written description of the "prior to" limitation. We therefore vacate its written description decision as to claims 5, 8, 11, and 17.

Id. at 28.

We limit our consideration to the issues of (1) whether the court's construction of claims 1 and 2 of Beckmann '605 changes our determination that: (i) Beckmann failed to rebut the presumption under 37 C.F.R. §41.207(c) that claims 1 and 2 of Beckmann '605 are patentable over prior art cited in Beckmann Motion 2 (Paper 42), including Kinugasa '024 (Ex. 2008), Kinugasa '241 (Ex. 2009) and Binder '499 (Ex. 2010), and (ii) claims 1 and 2 of Beckmann '605 are unpatentable over prior art cited in Gandhi Motion 1 (Paper 26), including Gandhi's grandparent application, US Patent No. 7,332,135 ("Gandhi '135") and Surnilla, U.S. Patent No. 6,604,504 ("Surnilla '504"), an issue that was originally presented in Gandhi Motion 1 (Paper 26) but was not previously addressed by the Board; and (2) whether Beckman has established that Gandhi '901 does not provide adequate written description support for the "prior to" limitation, i.e., "minimizing the oxygen content . . . *prior to* a rich cycle" limitation as recited in claims 5, 8, 11, and 17, as presented in Beckmann Motion 1 (Paper 30). Familiarity with the Federal Circuit's opinion, our earlier opinion (Paper 114) and our earlier opinion on reconsideration (Paper 117) are presumed.

We have re-evaluated the parties' motions in light of the Federal Circuit's

comments and instructions. Based on the court's revised construction of claims 1 and 2 of Beckmann '605, we conclude Beckmann has rebutted the presumption under 37 C.F.R. §41.207(c) that claims 1 and 2 of Beckmann '605 are not unpatentable over prior art cited in Beckmann Motion 2 (Paper 42). However, we conclude Gandhi has established that Beckmann's claims 1 and 2 are unpatentable over prior art cited in Gandhi Motion 1 (Paper 26). In addition, we also conclude Beckmann has not established in Beckmann Motion 1 (Paper 30) that that the written description of Gandhi '901 does not provide adequate written description support for the "prior to" limitation, i.e., "minimizing the oxygen content . . . *prior to* a rich cycle" limitation recited in Gandhi's claims 5, 8, 11, and 17.

II. GANDHI MOTION 1 (PAPER 26) – LACK OF PATENTABILITY OVER PRIOR ART

A.

Claim 1 of Beckmann '605 is reproduced below:

> 1. A method for purifying the exhaust gas from an internal combustion engine having an exhaust-gas purification system including a nitrogen oxide storage catalytic converter and an SCR [selective catalytic reduction] catalytic converter downstream of the nitrogen oxide storage catalytic converter, comprising the steps of:
>
> supplying the nitrogen oxide storage catalytic converter with exhaust gas containing an excess of oxidizing constituents;
>
> supplying the nitrogen oxide storage catalytic converter with exhaust gas containing an excess of reducing constituents; and
>
> supplying the nitrogen oxide storage catalytic converter, between the oxidizing constituents supplying step and the reducing constituents supplying step, with an exhaust gas which has a lower content of oxidizing constituents than in the

> oxidizing constituents supplying step and a lower content of reducing constituents than in the reducing constituents supplying step,
>
> wherein the step between the oxidizing constituents supplying step and the reducing constituents supplying step is terminated at the earliest when the nitrogen oxide storage catalytic converter is predominantly filled by exhaust gas delivered in [the] step between the oxidizing constituents supplying step and the reducing constituents supplying step.

Ex. 1003, 13:15–39.

Beckmann's claim 2 depends from claim 1, and further recites that the nitrogen oxygen storage catalytic converter (a.k.a., lean NO_x trap or lean NO_x absorber) is formed as a parallel arrangement of two lean NO_x traps to operate alternately by the use of a switching device that directs exhaust gas into the lean NO_x traps. Ex. 1003, 14:2–10.

Both claims 1 and 2 of Beckmann '605 recite three steps: (1) supplying . . . exhaust gas containing an excess of oxidizing constituents (i.e., lean exhaust gas); (2) supplying . . . exhaust gas containing an excess of reducing constituents (i.e., rich exhaust gas); and (3) during the period between those two steps, supplying . . . exhaust gas that has a lower content of oxidizing constituents than in the oxidizing step and a lower content of reducing constituents than in the reducing step (e.g., transitional exhaust gas). The intermediate transitional step (i.e., third supplying step) ends at the earliest when the catalytic converter is filled by exhaust gas delivered during that step.

The Federal Circuit construed the third supplying step recited in Beckmann's claims 1 and 2 as "a third exhaust gas supplying step that is separate and distinct from the other two exhaust gas supplying steps," *Beckmann v. Gandhi*, 646 Fed. Appx. 950, 961. We turn to whether Beckmann's claims 1 and 2 would

have been obvious over the cited prior art, including Gandhi ’135, Surnilla ’504 and Schenk.

B.

Gandhi, as the movant, bears the burden of proving by a preponderance of the evidence that claims 1 and 2 of Beckmann ‘605 are unpatentable over prior art. 37 C.F.R. §§ 41.121(b) and 41.208(b); *see also Bosies v. Benedict*, 27 F.3d 539, 541–42 (Fed. Cir. 1994).

C.

Obviousness is determined on the basis of underlying factual inquiries, including: (1) the scope and content of the prior art; (2) differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) secondary considerations of nonobviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). A patent claim is unpatentable under 35 U.S.C. § 103 if “*the differences* between the claimed subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007) (emphasis added). However, a conclusion of obviousness “cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006).

D.

Gandhi contends that (1) Beckmann’s claim 1 is unpatentable under 35 U.S.C. § 103(a) as obvious over Gandhi ’135 and Surnilla ’504, and (2) Beckmann’s claim 2 is unpatentable under 35 U.S.C. § 103(a) as obvious over

Gandhi ’135, Surnilla ’504, and Schenk[1] (Exhibit 1006). Gandhi Motion 1, Paper 26, 2–3, 9–12. To support its contention, Gandhi proffers detailed explanations and analyses regarding how each element of claims 1 and 2 of Beckmann ’605 is met or is rendered obvious by Gandhi ’135 and Surnilla ’504, as set forth in the claim charts attached as APPENDIX 3 – Attachment C. Paper 42, 10–11 & APPENDIX 3 (claim charts). Gandhi also relies upon a Declaration of Dr. Michael Harold. Ex. 1001.

Beckmann Claim 1

In particular, Gandhi contends that Gandhi ’135 (Ex. 1005) discloses all elements of Beckmann’s claim 1, except for the third supplying step of a transitional exhaust gas having an intermediate exhaust gas composition. However, such a feature is known in the art as disclosed by Surnilla ’504. As such, the combination of Gandhi ’135 and Surnilla ’504 is said to disclose and render “obvious” the invention of Beckmann’s claim 1. Paper 26, 2–3, 9–11.

Gandhi ’135 discloses a method of purifying an exhaust gas using a lean NO_x trap (i.e., lean NO_x absorber or nitrogen oxide storage catalytic converter of Beckmann’s claims 1 and 2) and SCR catalyst located downstream of the lean NO_x trap. Ex. 1005, Abstract, Fig. 2 (as reproduced below).

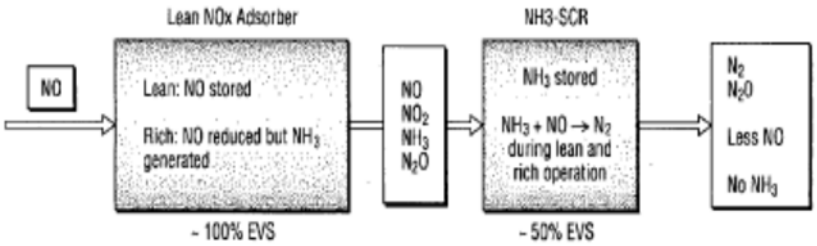


Fig. 2

[1] Schenk et al., “High Efficiency NO_x and PM Exhaust Emission Control for Heavy-Duty On-Highway Diesel Engines,” *SAE Technical Paper Series*, SAE 2001-01-1351, published March 5, 2001, and presented at SAE World Congress on March 5–8, 2001 (Ex. 1006).

Gandhi ’135 further discloses: (1) supplying the lean NO_x trap with a lean exhaust gas (i.e., exhaust gas containing an excess of oxidizing constituents) to trap NOx (Ex. 1005, 5:31–33); (2) supplying the lean NO_x trap with a rich exhaust gas (i.e., an exhaust gas containing an excess of reducing constituents) to purge NOx from the trap (Ex. 1005, 5:34–39); (3) cyclical lean and rich operations, and transitioning there between as reproduced in Fig. 1a below. (Ex. 1005, 1:38–43, 1:66–2:2).

As shown in Gandhi’s Figure 1a, the transition from lean to rich conditions is illustrated below:

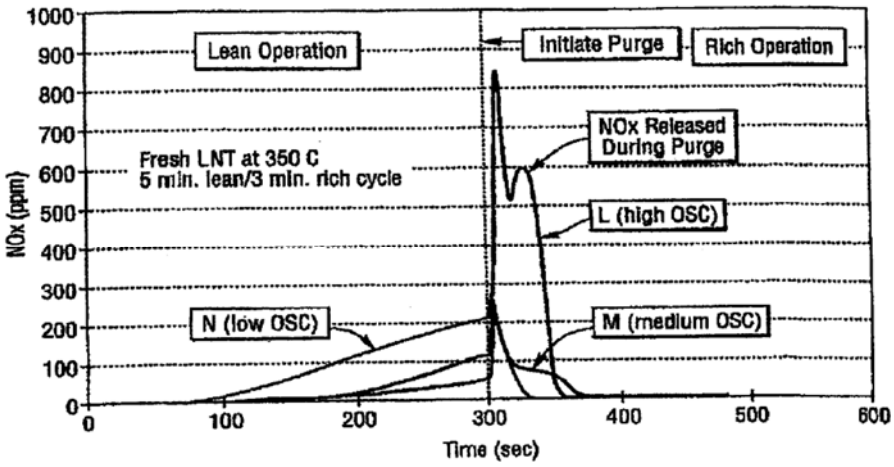


Fig. 1a

Ex. 1005, p. 3.

Gandhi’s Figure 1a shows the lean NO_x trap operating in lean and rich conditions. Ex. 1005, 1:38–39. In particular, the lean NO_x trap functions: (1) to absorb NO_x when the engine is running under lean conditions, and (2) to purge the NO_x absorbed by the lean NO_x trap during the lean cycle, when the engine is running under rich conditions. Ex. 1005, 1:39–52. According to Gandhi ’135, “[t]he reduction caused during the rich cycle purges the lean NO_x [trap], and the lean NO_x [trap] is then immediately available for the next lean NO_x storage/rich NO_x reduction cycle.” *Id*.

Surnilla ’504 discloses the third supplying step of a transitional exhaust gas having an intermediate gas composition. Paper 26, 2:17–22. Specifically, Surnilla ’504 teaches an improvement to the operation of “lean burn” internal combustion engines. Ex. 1007, 1:9–12. Surnilla ’504 notes that prior engine emission control systems used devices such as a three-way catalytic converter to remove and store NO_x from the exhaust generated when the engine runs with a lean air-fuel ratio. Ex. 1007, 1:29–34. Because the storage device becomes filled with NO_x and can no longer remove NO_x from the exhaust, it is necessary to purge the filled device. Ex. 1007, 1: 34–54. Purging is done by transitioning the engine to a stoichiometric or rich air-fuel ratio. Ex. 1007, 1:35–40. The prior emissions systems controlled the air-fuel ratio to cycle between a first air-fuel ratio—lean (storage) conditions—and a second air-fuel ratio—stoichiometric/rich (purging) conditions. Ex. 1007, 1:40–54.

Surnilla ’504 also teaches that it was known that during the transition between storage and purging conditions, there will likely be increased levels of NO_x in the tailpipe emissions. Ex. 1007, 2:6–10. Surnilla’s invention addresses the problem of increased NOx emissions during the transition period. Ex. 1007, 2:32–40. Surnilla’s system sequentially steps the air-fuel mixture between the first and second air-fuel ratios and vice versa. Ex. 1007, 2:43–62. The sequential stepping is said to avoid excessive NO_x emissions during the transitions between the first and second (lean and stoichiometric). Ex. 1007, 2:62–3:2. In the case of embodiments including a NO_x storage device, the air-fuel ratio is set to a value rich compared to the stoichiometric value to purge the NO_x storage trap. Ex. 1007, 3:37–46. Thus, in a preferred embodiment the air-fuel ratio is stepped to a rich-value to begin the NO_x purge. Ex. 1007, 3:46–50. Upon completion of the purge event, the air-fuel ratio is returned, “in a ‘step’ fashion, to a stoichiometric air-fuel ratio.” Ex. 1007, 3:55–58. As further noted by Surnilla ’504, the stepping method

is preferably employed when transitioning from a lean air-fuel ratio to an enriched air-fuel ratio suitable for purging NO_x stored in the NO_x trap 34 (Figure 1). Ex. 1007, 6:8–12; Fig. 1. The sequence of stepped enrichment of the air-fuel ratio submitted to the NO_x trap 34 from a "lean" value of 18 to a "rich" value of 12 is illustrated in Figure 4. Ex. 1007, 6:16–20. The stoichiometric value is said to be 14.65. Ex. 1007, 4:56–61. We reproduce Surnilla's Figure 4 below.

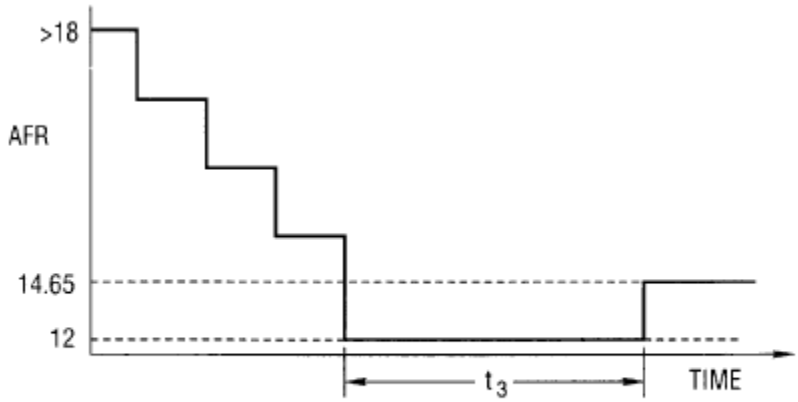


Fig. 4

For the reasons detailed above, we find that Surnilla '504 teaches, as separate and distinct steps

> supplying the nitrogen oxide storage catalytic converter, between the oxidizing constituents supplying step and the reducing constituents supplying step, with an exhaust gas which has a lower content of oxidizing constituents than in the oxidizing constituents supplying step and a lower content of reducing constituents than in the reducing constituents supplying step.

As shown in Surnilla's Figure 4, the exhaust gas supplied to the NO_x storage converter 34 is stepped from a lean value of 18 to a NO_x purging rich value of 12. The intermediate steps have values that are less lean, i.e., have a lower content of oxidizing constituents than the lean value of 18, and are less rich, i.e., have a lower content of reducing constituents than the rich value of 12. As noted above, the

composition of the exhaust with an air-fuel ratio of 12 is said to be suitable for purging NO_x storage converter 34. Ex. 1007, 6:8–20.

In our view, it would have been obvious to incorporate Surnilla's stepped transition technique in the process and system taught by Gandhi '135 to achieve the benefits of reduced NOx emissions during the lean to rich transition as taught by Surnilla '504. According to Dr. Harold's testimony, both Gandhi '135 and Surnilla '504 are directed to reducing NO_x emissions. Ex. 1001, ¶ 34. Gandhi '135 achieves reductions by arranging a lean NO_x trap and SCR catalyst and by alternating lean and rich operations. Ex. 1005, Abstract. Surnilla '504 achieves reductions in NO_x emissions by controlling the transitions from lean to rich in a step-wise manner with steps that are "separate" and "distinct" from the lean and rich operations. Ex. 1007, 2:43–3:5. Thus, one of ordinary skill in the art would have been motivated to implement the known stepping transition disclosed in Surnilla '504 in the system disclosed in Gandhi '135 to further reduce NO_x emissions as of October 25, 2003. Such a combination would have been obvious to a person of ordinary skill in the art as of October 25, 2003 because it is merely the use of a known technique to improve a similar method in a predictable way. Ex. 1001 ¶ 51.

Beckmann argues that it would not have been obvious to modify the Gandhi '135 system by adding Surnilla's stepping technique. Beckmann Opposition 1 (Paper 47), 11–14. According to Beckmann, the composition supplied to Surnilla's NO_x catalytic converter is unknown. Paper 47, 13:1–15. Relying on Dr. Kröcher's testimony, Beckmann argues that, as shown in Surnilla's Figure 1, the exhaust gas passes through unidentified emission control element 32 prior to reaching NO_x trap 34. Paper 47, 14:3–6. Because the device 32 is not identified, one skilled in the art would not have been able to determine the exhaust gas composition supplied to NO_x trap 34 based upon the air-fuel ratios from the engine.

Beckmann also directs us to the cross examination testimony of Gandhi's expert, Dr. Harold. Beckmann represents that Dr. Harold testified to the effect that the content of the exhaust gas leaving Surnilla's emission control device 32 and entering NO_x trap 34, cannot be known without the specific details of device 32. Paper 47, 12:13–14:12.

We are not convinced by Beckmann's argument and relied upon evidence. Notwithstanding the presence or absence of an upstream device, Surnilla '504 expressly ties the stepped lean to rich transition of the engine directly to the character of the exhaust composition (i.e., rich or lean) entering the downstream NO_x trap and the activities within in the NO_x trap:

> In accordance with another feature of the invention, where the invention is used in combination with a downstream device that stores a selected exhaust gas constituent, such as NOx, when the engine's air-fuel ratio is lean and releases previously-stored selected constituent when the engine is operated at an air-fuel ratio at or rich of the stoichiometric air-fuel ratio, the method preferably includes enriching the air-fuel mixture to a third air-fuel mixture supplied to at least one cylinder for a predetermined time, whereupon the trap is purged of stored amounts of the selected constituent. In a preferred embodiment, the air-fuel mixture supplied to the last set of cylinders being stepped from a lean air-fuel ratio to a stoichiometric air-fuel ratio is, instead, immediately stepped to a rich air-fuel ratio to begin the purge event. Where desired, the air-fuel mixture supplied to at least one other set of cylinders, each already operating with a stoichiometric air-fuel ratio, is simultaneously stepped to the rich air-fuel ratio. Upon completion of the purge event, the enriched air-fuel mixture supplied to each enriched set of cylinders is returned, again in a "step" fashion, to a stoichiometric air-fuel ratio.

Ex. 1007, 3:37–57. Surnilla '504 also describes using the stepped engine transition specifically with respect to NO_x trap 34 as shown in Surnilla's Figure 1:

> In accordance with another feature of the invention, the method is preferably also employed when transitioning from a lean engine operating condition to an enriched engine operating condition suitable for "purging" NO_x stored in the trap 34, because of the trap's reduced instantaneous efficiency (i.e., the reduced instantaneous NO_x -absorption rate) and/or a lack of available NO_x-storage capacity in the trap 34 which triggered the need for the purge in the first instance. Still further, the last set of cylinders 18 to be stepped to stoichiometric operation is preferably immediately stepped through stoichiometric operation to rich operation, thereby immediately commencing the purge event, as illustrated in FIG. 4.

Ex. 1007, 6:8–20. Thus, Surnilla '504 teaches that the exhaust gas entering the NO_x trap 34 is lean (i.e. includes an excess of oxidizing constituents) necessary for storing NO_x and is transitioned through intermediate steps to a rich composition (i.e., one that includes an excess of reducing constituents) necessary to purge the NO_x trap. As taught by Surnilla '504, it is the step-wise transition from lean to reach that achieves Surnilla's goal of avoiding increased levels of NO_x emissions from the NO_x trap and in the tailpipe emissions during the lean to rich transition. Ex. 1007, 2:32–40. Thus, notwithstanding the presence of device 32, the exhaust gas provided to NO_x trap 34 is cycled between lean (storage) and rich (purging) values

Beckmann also relies on Dr. Kocher's testimony to argue that there was no motivation to combine Surnilla's teachings with those of Gandhi '135. Beckmann Opposition 1, Paper 47, 14:7–12. According to Beckmann, Surnilla '504 does not suggest that its "complex" transitioning technique would be useful in a system that uses a combination of a lean NOx trap and an SCR catalyst. Beckmann Opposition 1, Paper 47, 14:7–12.

We are not persuaded by Beckmann's argument. Both the Gandhi '135 and the Surnilla '504 addresses the problem, *inter alia*, of NO_x getting past the NO_x

trap and becoming part of the tailpipe emissions. Ex. 1005, 1:60–2:7; Ex. 1007, 2:32–40. While both documents address this same goal or reducing those emissions, neither's solution is said to totally eliminate NO_x tailpipe emissions. Gandhi '135 says the use of a NO_x trap in conjunction with an SCR-catalyst increases the overall conversion of NO_x from 55% to 80%. Ex. 1005, 6:18–35. Surnilla '504 says the invention is "characterized by *reduced* levels of a selected engine-generated exhaust gas constituent, such as NOx, whereby overall tailpipe emissions of a selected exhaust gas constituent may be advantageously further reduced." Ex. 1007, 2:32–40 (emphasis added). In light of the requirements to minimize NO_x emissions (*see* Ex. 1005, 2:44–47) one having ordinary skill in the art would have had ample reason to incorporate Surnilla's technique of reducing NO_x emissions during the lean to reach transition with Gandhi's technique to maximize NO_x reduction.

Beckmann Claim 2

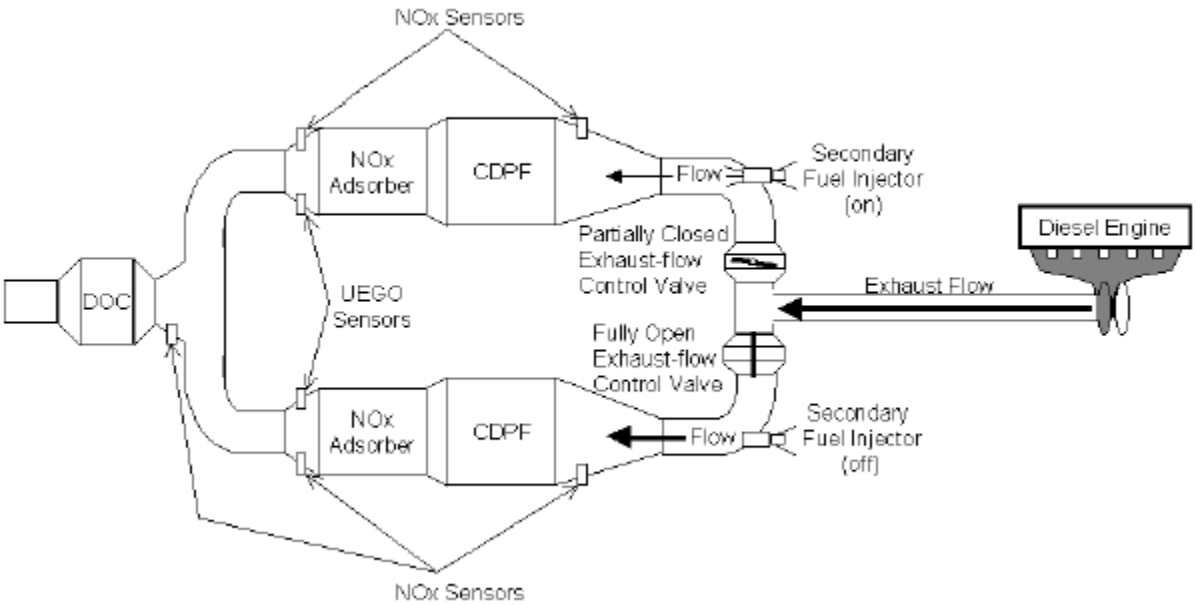
Beckmann's claim 2 depends from claim 1 and adds the additional requirement of a parallel arrangement of two NO_x storage catalytic converters that are operated alternatively by a switching device selective that directs the exhaust gas between the two converters. We reproduce Beckmann's claim 2 in the margin.

Gandhi's motion relies on the combination of Gandhi '135, Surnilla '504 and the Schenk publication (Ex. 1006). Gandhi Motion 1, Paper 26, 11:3–8; 12:3–6. Schenk shows that the system of alternately using two parallel NO_x storage converters and switching between them was a technique known to those working in the art to effectively reduce NO_x emission. Schenk's system is described in the Abstract and shown in Schenk's Figure 1:

> A diesel exhaust emission control system consisting of catalyzed diesel particulate filters and NOx adsorber catalysts arranged in a dual-path configuration was developed and evaluated using a

> 1999-specification 5.9 liter medium-heavy-duty diesel engine. NOx adsorber regeneration was accomplished via a secondary exhaust fuel injection system. *An alternating restriction of the exhaust flow between the two flow paths allowed injection and adsorber regeneration to occur under very low space velocity conditions.* NOx and PM reductions in excess of 90% were observed over a broad range of steady-state operating conditions and over the hot-start HDDE-FTP transient cycle.

Ex. 1006, p. 4 (emphasis added).



Ex. 1006, Figure 1, p. 5. Schenk further teaches that during operation "[one] half of the exhaust system had its exhaust flow restricted to just a small fraction (<5%) of the total flow and operated in a regeneration mode." Ex. 1006, 5, 2nd column.

In our view to employ Schenck's known system and technique for reducing NOx emissions in conjunction with the other known systems and techniques described by Gandhi '135 and Surnilla '504 would have been obvious. The subject matter of Beckmann's claim 2 simply arranges known elements with each preforming its known function and provides no more than would be expected from

the arrangement. *See KSR International Co. v. Teleflex Inc.,* 550 U.S. 398, 417 (2007).

Beckmann argues that its claim 2 requires "that the parallel nitrogen oxide storage catalytic converters 'are operated alternately by switching of a switching device arranged to selectively direct exhaust gas into said elements.'" Beckmann Opposition 1, Paper 47, 15:12–14. According to Beckmann, Schenk (Ex. 1006) does not teach alternate switching because in Schenk's system, while one branch is fully opened, the other is only "partially" blocked. Beckmann argues: "that the disclosed restriction is not a total restriction of the exhaust gas so that the adsorbers are operated alternatively, but rather a partial restriction that requires the exhaust gas to be provided to both NO_x adsorbers at all times." Beckmann Opposition 1, Paper 47, 16:2–4.

We are not convinced by Beckmann's argument. We discern no basis to limit "operated alternately by switching of a switching device arranged to selectively direct exhaust gas into said elements" in the way urged by Beckmann. Beckmann's claim 2 does not expressly require fully blocking the passages. Instead, Beckmann's claim 2 simply recites a parallel arrangement of two lean NO_x traps to operate alternately by the use of a switching device that directs exhaust gas into the lean NO_x traps. Ex. 1003, 14:2–10. In any event, the argument is simply inconsistent with Beckmann's specification which teaches partially blocking one of the parallel systems. Beckmann describes that in the use of a parallel arrangement of two NO_x storage catalytic converters shown schematically in Fig. 3, the exhaust gas can be supplied "substantially" to either of the parallel exhausts:

> The embodiment illustrated in FIG. 3 differs from that shown in FIG. 1 by virtue of the fact that the nitrogen oxide storage catalytic converter 4 is designed as a parallel arrangement of a first nitrogen oxide storage catalytic converter element 4*a* and a second nitrogen oxide storage catalytic converter element 4*b*.

> Furthermore, there is a switching device 6 which enables the exhaust-gas stream supplied to it through the exhaust pipe 3 to be distributed as desired between the nitrogen oxide storage catalytic converter elements 4*a*, 4*b* via the exhaust pipe branches 3*a* and 3*b*. It is preferable for the switching device 6. It is preferable for the switching device 6 to be designed as a switching valve, in such a way that the exhaust gas can be supplied *substantially* either to the first nitrogen oxide storage catalytic converter element 4*a* or to the second nitrogen oxide storage catalytic converter element 4*b*.

Ex. 1003, 10:9–23 (emphasis added). *See also* Ex. 1003, 10:59–11:11 (exhaust gas predominately supplied) and 11:44–50 (exhaust gas primarily supplied). Beckmann's argument is inconsistent with its own specification. In the absence of express claim language requiring total blockage, we conclude that the language of Beckmann's claim 2 requiring the parallel nitrogen oxide storage catalytic converters "are operated alternately by switching of a switching device arranged to selectively direct exhaust gas into said elements" does not require that total blocking of either exhaust path.

We conclude, therefore, that the subject matter of Beckmann's claim 2 would have been obvious over the combined teachings of Gandhi '135, Surnilla '504 and Schenk (Ex. 1006).

For these reasons, we are persuaded that Gandhi has established that Beckmann's claims 1 and 2 are unpatentable under 35 U.S.C. § 103(a) as being obvious over Gandhi '135, Surnilla '504, and Schenk (Ex. 1006).

III. BECKMANN MOTION 2 (PAPER 42) – CROSS-APPLICABILITY OF PRIOR ART

A.

In the decision on motions (Paper 114), we found Beckmann established that Gandhi's claims 3, 4, 6, and 9 are unpatentable under 35 U.S.C. §§ 102(b) and

103(a) based on prior art, including Kinugasa ’024 (Ex. 2008), Kinugasa ’241 (Ex. 2009) and Binder ’499 (Ex. 2010) as presented in Beckmann Motion 2 (Paper 42).[2] Paper 114, 41:21–25. In addition, we also found Beckmann rebutted the presumption under 37 C.F.R. § 41.207(c) that Beckmann’s claims 3 and 4 are not unpatentable over the same prior art asserted against Gandhi’s claims 3, 4, 6, and 9, because the asserted prior art does not teach or suggest a “third [exhaust gas] supplying step” that is controlled in terms of exhaust gas composition and duration, as recited by Beckmann’s claims 3 and 4. Paper 114, 43:25–44:2.

However, we found Beckmann failed to rebut the presumption under 37 C.F.R. § 41.207(c) that Beckmann’s claims 1 and 2 are unpatentable over the same prior art asserted against Gandhi’s claims 3, 4, 6, and 9. As such, we found Beckmann’s claims 1 and 2 are unpatentable over the same cited prior art. Paper 114, 53.

B.

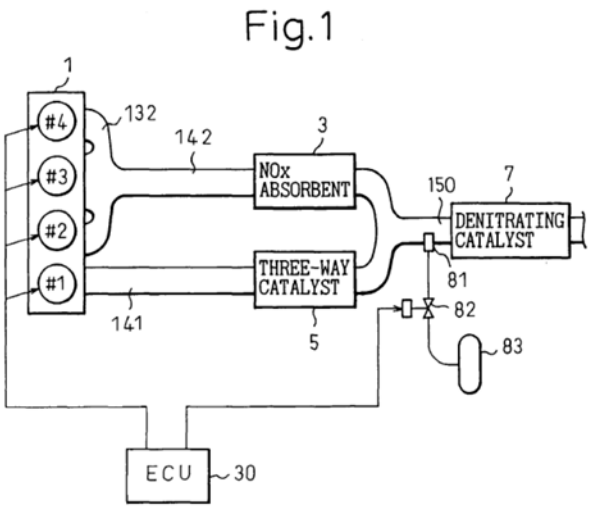
In light of the Federal Circuit’s construction of the third supplying step recited in claims 1 and 2 of Beckmann ’605, i.e., “a third exhaust gas supplying step that is separate and distinct from the lean and rich exhaust gas supplying steps” but that “third [exhaust gas] supplying step [need not] be controlled in terms of exhaust gas composition and duration,” we revisit the issue of whether Beckmann has rebutted the presumption under 37 C.F.R. §41.207(c) that claims 1 and 2 of Beckmann ’605 should be patentable over the same prior art asserted by Beckmann against Gandhi’s claims. We are persuaded by Beckmann’s arguments that the asserted prior art, including Kinugasa ’024 (Ex. 2008), Kinugasa ’241 (Ex. 2009), and Binder ’499 (Ex. 2010) does not anticipate or render obvious claims 1 and 2 of Beckmann ’605. Paper 42, 14:19–15:17.

[2] That decision was not appealed to the Federal Circuit and, as such, remains final.

Kinugasa '241 (Exhibit 2009)

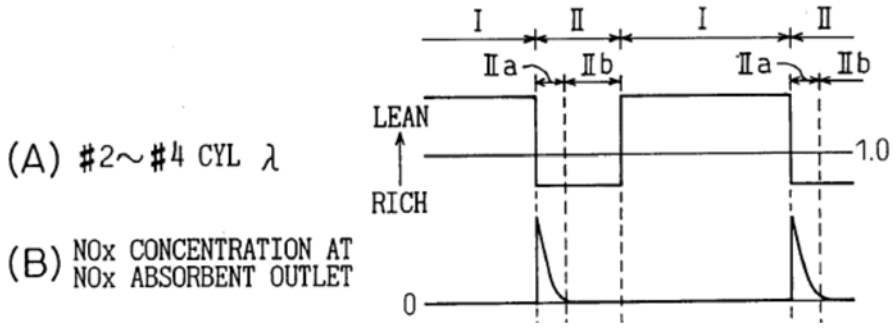
Kinugasa '241 discloses an exhaust gas purification system, shown in Figure 1, for an internal combustion engine capable of removing NO_x in the exhaust gas of a lean burn engine with high efficiency. Ex. 2009, 1:6–12; Ex. 2007 ¶¶ 52–70.

Figure 1 of Kinugasa '241 is reproduced below:



As shown in Figure 1 of Kinugasa '241, the exhaust gas purification system includes in the direction of the exhaust gas flow from engine 1, (1) a NO_x absorbent 3 and (2) a denitrating catalyst 7. The NO_x absorbent 3 is arranged to receive alternate supplies of lean and rich exhaust gases from the engine 1, and is also known as the NO_x catalytic converter of Beckmann's claims 1 and 2. Ex. 2009, 13:28–30, 35–44. The denitrating catalyst 7 is arranged downstream of the NO_x absorbent 3, and is also known as the SCR [selective catalytic reduction] catalytic converter of Beckmann's claims 1 and 2. Ex. 2009, Fig. 1; Ex. 2007 ¶¶ 47–70.

The overall operation of the arrangement of Figure 1 of Kinugasa '241 is illustrated in Figure 3, a relevant portion of which is reproduced below.



As shown in Figure 3 of Kinugasa ’241, the curve (A) illustrates that during time period I, cylinders #2 – #4 of engine 1 produce lean exhaust gas, which is supplied to NO_x absorbent 3 (NO_x catalytic converter), via first exhaust passage 142. Ex. 2009, 13:28–30. When time period I ends and during time period II, cylinders #2 – #4 of engine 1 produce rich exhaust gas NO_x absorbent 3 (NO_x catalytic converter). Ex. 2009, 13:35–40. As illustrated by the curve during time period IIa in section (B) of Figure 3, the transition from lean condition to rich condition causes a NO_x spike at the outlet of NO_x absorbent 3 (NO_x catalytic converter) during the rich mode. Ex. 2009, 13:35–50.

Because a NO_x spike of Kinugasa ’241 occurs during the transition in which the NO_x absorbent 3 (NO_x catalytic converter) transitions from lean to rich condition and during the rich mode, we are persuaded that Kinugasa ’241 does not teach or suggest a third [exhaust gas] supplying step that is separate and distinct from the rich and lean exhaust gas supplying steps, as recited in Beckmann’s claims 1 and 2. Paper 42, 15:7–17.

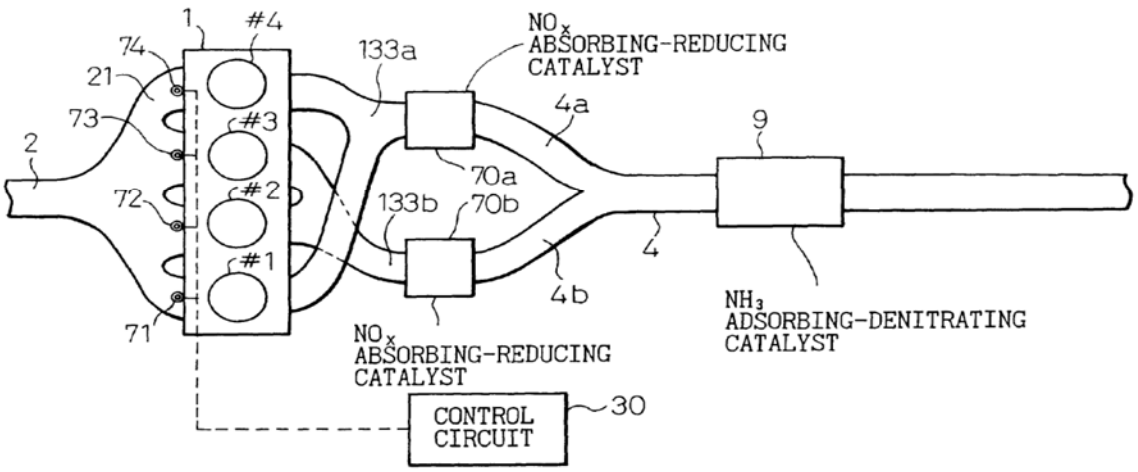
Kinugasa ’024 (Exhibit 2008)

Kinugasa ’024 also discloses a number of embodiments for an exhaust-gas purification system including at least two of (1) a three-way catalyst; (2) a NO_x absorbing-reducing catalyst; and (3) an NH_3 adsorbing-denitrating catalyst, as shown, for example, in Figure 26. Ex. 2008. A first set of embodiments is disclosed in which a three-way catalyst is used to generate ammonia and a second

set of embodiments in which a NO_x absorbing-reducing catalyst is used to generate ammonia. Ex. 2008, 5:23–25, 32–36

Figure 26 of Kinugasa ’024 shows such a system as reproduced below.

Fig. 26



As shown in Figure 26 of Kinugasa ’024, a pair of NO_x absorbing-reducing catalysts 70a, 70b are connected to exhaust manifolds 133a, 133b with a NH_3 adsorbing-denitrating catalyst 9 connected downstream. Ex. 2008, 29:48–52; Ex. 2007 ¶¶ 85, 86, 89. According to Kinugasa ’024, the exhaust-gas purification system is supplied with alternating lean and rich exhaust gases; in the rich mode, NO_x and ammonia are released from the NO_x absorbing-reducing catalysts. Ex. 2008, 19:22–26, 28:1–8, 29:54–56.

Like Kinugasa ’241, we are persuaded that Kinugasa ’024 does not teach or suggest a third supplying step that is separate and distinct from the rich and lean exhaust gas supplying steps, as recited in Beckmann’s claims 1 and 2.

Binder ’499 (Exhibit 2010)

Binder ’499 discloses a method for purifying exhaust gas from engine 1 that involves supplying a lean exhaust gas followed by a rich exhaust gas to a zoned catalyst component comprising a NO_x catalytic converter 7 and a downstream SCR [selective catalytic reduction] catalytic converter 8. Ex. 2010 ¶¶ 22, 24, Fig. 1.

Binder ’499 discloses alternately supplying a NO_x catalytic converter with lean and rich exhaust gases and switching from the lean burn mode to the rich burn mode to regenerate the NO_x catalytic converter 7. Ex. 2010 ¶ 24.

Like Kinugasa ’241 and Kinugasa ’024, we are persuaded that Binder ’499 does not teach or suggest a third supplying step that is separate and distinct from the rich and lean exhaust gas supplying steps, as recited in Beckmann’s claims 1 and 2.

C.

Gandhi argues that Beckmann’s claim 1 “simply requires that, between lean and rich operations, the Lean NOx Trap be supplied with an exhaust gas having less oxidizing constituents than lean operations and less reducing constituents than rich conditions, and that this supplying step terminate at the earliest when the Lean NO_x Trap is predominantly full of exhaust gas supplied during this step.” Gandhi Opposition 2, Paper 51, 7:19–23. Assuming the correctness of that statement, we fail to see the relevance of this argument to the teachings of Kinugasa ’241, Kinugasa ’024 or Binder ’499. Gandhi does not explain where such a step between the lean and rich operations is disclosed in those references or, most importantly, would be considered to be a step separate and distinct from the lean and rich steps. To the extent that it might be argued that, in the systems taught by each of the references, Beckmann’s third supplying step is inherently present as the transition between the lean and rich supplying steps taught in those references, we disagree. It is likely that during the transition between supplying the lean and rich exhaust gas in those systems that a composition between the two is supplied. In our view, such a minimal transition phase would not meet the requirement that the third supplying step be “separate and distinct” from the lean and rich supplying steps. Rather, the transition between lean and rich is integral to the lean and rich steps.

Absent some teaching, suggestion, motivation or reasoning why one ordinarily skilled in the art would have modified the systems of the three references by adding the separate and distinct intermediate supplying step, we see no basis for concluding that the subject matter of Beckmann's claims 1 and 2 would have been obvious from the references cited against Gandhi's claims. Thus, based upon the arguments of the parties and on the record before us, the presumption of 37 C.F.R. § 41.207(c) is not applicable against Beckmann's claims 1 and 2.

D.

Because the asserted prior art fails to teach or suggest a third supplying step that is separate and distinct from the rich and lean exhaust gas supplying steps in the manner recited in Beckmann's claims 1 and 2, we conclude that the presumption of 37 C.F.R. §41.207(c) does not apply against claims 1 and 2 of Beckmann '605 and (2) Beckmann's claims 1 and 2 are not unpatentable over Kinugasa '024 (Ex. 2008), Kinugasa '241 (Ex. 2009), and Binder '499 (Ex. 2010).

IV. BECKMANN MOTION 1 (PAPER 30) – LACK OF WRITTEN DESCRIPTION

A.

In its opinion, the court concluded "the Board's finding that the '901 application contains an adequate written description of the 'minimizing the oxygen content . . . *prior to* a rich cycle' limitation of claims 5, 8, 11, and 17 is unsupported by substantial evidence" and, based on that conclusion, vacated that finding and remanded for further proceedings. *Id.* at 3, 28–29. In support of that conclusion, the court noted:

> [t]he Board did not consider and analyze whether the '901 application provides an adequate written description of the "prior to" limitation. We therefore vacate its written description

decision as to claims 5, 8, 11, and 17.

Id. at 28.

For purposes of this decision, we limit our consideration to the issue of whether Beckman has established that Gandhi '901 does not provide adequate written description support for the "prior to" limitation, i.e., "minimizing the oxygen content . . . *prior to* a rich cycle" limitation as recited in Gandhi's claims 5, 8, 11, and 17.

B.

Gandhi's claim 5 is representative of the "prior to" claims and recites:

> A method for reducing pollutants in the exhaust gas of an engine having a system including a nitrogen oxide adsorber and a NH_3-SCR catalyst downstream of the nitrogen oxide adsorber, comprising the steps of:
>
> supplying the nitrogen oxide adsorber with exhaust gas while the engine operates under lean conditions, wherein the exhaust gas is a lean exhaust gas;
>
> transitioning the engine operations from lean to rich conditions;
>
> supplying the nitrogen oxide absorber with exhaust gas during said transitioning;
>
> *minimizing the oxygen content of the nitrogen oxide absorber prior to rich conditions* to facilitate the reduction of NO_x to NH_3;
>
> completing the transition from lean to rich conditions; and
>
> supplying the nitrogen oxide absorber with exhaust gas while the engine operates under rich conditions, wherein the exhaust gas is a rich exhaust gas.

Gandhi Clean Copy of Claims, Paper 12, Claim 5, 4–5.

In all Gandhi's claims 5, 8, 11, and 17, the "prior to" language imposes a temporal requirement that "minimizing the oxygen content" take place "prior to" rich conditions as part of the claimed method.

C.

Beckmann, as the movant, bears the burden of proving by a preponderance of the evidence that Gandhi's claims 5, 8, 11, and 17 are unpatentable under 35 U.S.C. § 112, first paragraph, for lack of written description in the original specification of Gandhi '901. 37 C.F.R. §§ 41.121(b) and 41.208(b); *see also Bosies v. Benedict*, 27 F.3d 539, 541–42 (Fed. Cir. 1994).

In order to satisfy its burden, Beckmann must prove that Gandhi's written description does not convey with reasonable clarity to a person of ordinary skill in the art that the Gandhi inventors had possession of the claimed invention as of the filing date of the patent application. *See Pandrol USA, LP v. Airboss Ry. Prods. Inc.*, 424 F.3d 1161, 1165 (Fed. Cir. 2005).

D.

In its Motion 1, Beckmann argued that Gandhi claims 5, 7, 8, 10, 11, 16, and 17 were not supported by the written description of Gandhi's '901 application because those claims require:

> "the minimization the oxygen content in the NO_x catalytic converter *prior to the rich cycle*."

Beckmann Motion 1, 15:18–19 (emphasis added). Each of claims 5, 7, 8, 10, 11, 16, and 17 require minimizing the oxygen content of the NO_x trap. Gandhi Clean Copy of Claims, Paper 12, 4–8. However, as noted by the Federal Circuit, only claims 5, 8, 11 and 17 include the temporal "prior to" requirement. We refer to those claims as "the temporal claims."

In our original opinion we held that Beckmann's argument and Dr. Kröcher's testimony did not provide:

> an adequate reason as to why the structures disclosed, for example, in Gandhi's Figures 2, 4a-4c, 7a-7c and 9, and their accompanying text, including ¶[0041], do not convey to a person skilled in the art the minimization of the oxygen content in the NO_x catalytic converter (lean NO_x trap) prior to the rich cycle, as described in Gandhi's disclosure. Ex. 2001, Claims 5, 7, 8, 10, 11, 16, and 17, ¶[0041].

Paper 114, 23:24–29.

The Federal Circuit concluded that substantial evidence supported the Board's written description finding regarding non-temporal claims 7, 10 and 16, but substantial evidence did not support the temporal claims. *Beckman v. Gandhi*, 646 Fed. Appx. 950, 965 (Fed. Cir. 2016).

In light of the Court's remand, we have again reviewed Beckmann's motion, focusing on the temporal claims.

In its motion, Beckmann did not distinguish between Gandhi's temporal claims and non-temporal claims 7, 10, and 16. Beckmann's motion only argues that Gandhi's written description lacked disclosure of the minimization of the oxygen content in the NO_x converter. Thus Beckmann argued:

> The only possible disclosure in the Gandhi ['901[3]] application related to the minimization of oxygen concerns the optimization of the NOx catalytic converter "for ammonia generation by removing oxygen storage capacity (OSC)" and to "minimize OSC to lessen fuel penalty."

[3] Beckmann's Motion 1 (Paper 26) addressed the written description of Gandhi's grandparent Application 10/065,470. As we noted in our original decision, the proper application for evaluating adequate written description for the claimed subject matter is Gandhi's involved '901 application. Because the written description of Gandhi's involved application and those of its parent and grandparent applications appeared to be identical, we treated the motion as addressing the '901 application. Paper 114, 8:23 – 9:7. We do here also.

Beckmann Motion 1, Paper 30, 15:22–24. Relying on Dr. Kröcher's testimony Beckmann argued that the minimization of oxygen content would require physically changing the NO_x catalytic converter which could not occur during the operation of the system:

> [A] person of ordinary skill in the art would have recognized that the oxygen storage capacity referred to by Gandhi is a physical characteristic of the NO_x catalytic converter, and that changing the oxygen storage capacity would require physical modifications to the NO_x catalytic converter. This physical modification cannot occur while the exhaust gas purification system is operating, but instead must be performed before the system is installed in a vehicle. Thus, because Gandhi's ['901] application only contemplates minimization of oxygen content that can occur through a physical modification and not during operation of the engine, Dr. Kröcher confirms that Claims 5, 7, 8, 10, 11, 16, and 17 lack adequate written disclosure.

Beckmann Motion 1, Paper 30, 16:1–10 (citations to Kröcher's testimony, Ex. 2004, ¶¶ 107–116, 124, and 125 excluded).

Beckmann's motion treated all the "minimizing the oxide content" claims as a single group and did not argue or direct us to evidence attempting to establish that the claims including the "prior to" limitation—separate from the minimization of oxygen content requirement—was not described. Beckmann Motion 1, Paper 30, 15:16–16:10. Beckmann's motion, at best, provides only an unsubstantiated allegation that the "prior to" limitation of Gandhi's temporal claims is not supported by the written description of the Gandhi '901 application.

Beckmann, as the moving party, bears the burden of providing a showing supported by appropriate evidence that if unrebutted would justify finding that the "prior to" limitations were not supported. *See* 37 C.F.R. § 41.208(b). Because Beckmann has neither provided argument nor directed us to evidence related to the lack of a description of the temporal limitation—other than that held to be

insufficient with respect to minimizing the oxide content—Beckmann has failed to meet its burden of establishing entitlement to a holding that the "prior to" limitations of claims 5, 8, 11, and 17 are not adequately supported.

In the context of this *inter partes* proceeding, it is not our province to review Gandhi's written description based upon the mere allegation that a limitation is not supported. We cannot make factual findings interpreting Gandhi's written description based upon our own expertise. *Brand v. Mille*r, 487 F3d 862, 869 (Fed. Cir. 2007) ("in the context of a contested case, it is impermissible for the Board to base its factual findings on its expertise, rather than on evidence in the record"). Rather, it is Beckmann's burden to explain why the limitation lacks support. Beckman has not provided an explanation or directed us to evidence that would establish that the "prior to" limitation of the temporal claims lacks written description support.

We deny Beckmann's Motion 1 as to Gandhi's claims 5, 8, 11, and 17.

V. HOLDINGS

Based on the court's revised construction of Beckmann's claims 1 and 2, and after consideration of the parties' arguments and evidence, we conclude Beckmann has rebutted the presumption under 37 C.F.R. §41.207(c) that claims 1 and 2 of Beckmann '605 are not unpatentable over prior art cited in Beckmann Motion 2 (Paper 42). We also conclude Gandhi has established that Beckmann's claims 1 and 2 are unpatentable under 35 U.S.C. § 103(a) over prior art cited in Gandhi Motion 1 (Paper 26). Gandhi Motion 1 (Paper 26) is GRANTED as to Beckmann's claims 1 and 2. We also conclude Beckmann has failed to prove that Gandhi's claims 5, 8, 11, and 17 are unpatentable under 35 U.S.C. § 112, first paragraph, for lacking a written description support. Beckmann Motion (Paper 30) is DENIED.

Because we hold that claims 1 and 2 of Beckmann ’605 are unpatentable over the art cited in Gandhi Motion 1 (Paper 26), and because the Federal Circuit affirmed the Board’s decision that claims 3 and 4 of Beckmann ’605 are unpatentable, Beckmann has no patentable claims in the interference. Gandhi’s remaining claims 5, 7, 8, and 10–17 have not been shown to be unpatentable. Because Beckmann, the junior party, has not filed a priority statement alleging a date of invention prior to Gandhi’s accorded filing date, there is no basis to proceed to a priority determination. Accordingly, we enter a judgment terminating the interference in a separate paper.

cc (e-mail):

Attorneys for Beckmann:

Michael H. Jacobs, Esq.
Vincent J. Galluzzo, Esq.
CROWELL & MORING, LLP
Intellectual Property Group
MJACOBS@CROWELL.COM
VGALLUZZO@CROWELL.COM

Attorneys for Gandhi:

E. Anthony Figg, Esq.
R. Danny Huntington, Esq.
ROTHWELL, FIGG, ERNST & MANBECK, PC
EFIGG@RFEM.COM
DHUNTINGTON@RFEM.COM