

Nos. 16-1496, 16-1497

IN THE
United States Court of Appeals
FOR THE FEDERAL CIRCUIT

B/E AEROSPACE, INC.,

Appellant

v.

C&D ZODIAC, INC,

Cross-Appellant

APPEAL FROM THE
UNITED STATES PATENT AND TRADEMARK OFFICE
IN IPR2014-00727, PATENT TRIAL AND APPEAL BOARD

CORRECTED PRINCIPAL BRIEF OF APPELLANT
B/E AEROSPACE, INC.

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Date: May 19, 2016

CERTIFICATE OF INTEREST

Counsel for Appellant/Patent Owner B/E Aerospace, Inc. certifies the following:

1. The full name of every party or amicus represented by us is:

B/E Aerospace, Inc.

2. The names of all real parties in interest (if the party named in the caption is not the real party in interest) represented by us are:

N/A

3. All parent corporations and any publicly held companies that own 10% or more of the stock of the party or amicus curiae represented by us are:

None.

4. The names of all law firms and the partners or associates that have appeared for the party or amicus now represented by us in the trial court or agency or are expected to appear in this court are:

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STATEMENT OF RELATED CASES

There are no related cases that will be affected by the Court's decision in the pending appeal.

STATEMENT OF JURISDICTION

This Court has jurisdiction under 28 U.S.C. § 1295(a)(4)(A) and 35 U.S.C. § 319 as an appeal from a final written decision (the “Decision”) of the Patent Trial and Appeal Board (the “Board”) in an *inter partes* review (“IPR”).

PRELIMINARY STATEMENT

Patent Owner B/E Aerospace, Inc. (“B/E”) appeals from the Board’s IPR decision finding certain claims obvious in U.S. Patent No. 8,590,838. The ’838 patent concerns innovative, space-saving structures for use with aircraft enclosure units, such as lavatory stall units. The patented enclosure units include a specially-recessed forward wall for use with an adjacent passenger seat. The seat has a substantially non-flat seatback that nestles into the wall, allowing for new and significant space-savings in an aircraft cabin. The Board found obviousness in view of a single reference, U.S. Patent 3,738,497 (“Betts”). But Betts admittedly (a) had a flat seatback, (b) embodied the multi-enclosure technique distinguished in the ’838 patent’s specification, (c) did not include a lavatory, and (d) would not have been modified into a lavatory. The Board was wrong and the Court should reverse.

Granted, the present inventions are easy to understand and may not, in hindsight and with the ’838 patent in hand, seem complex. But for the almost four decades since Betts issued, McDonnell-Douglas (Betts’ original assignee) and Boeing (which acquired McDonnell-Douglas) never developed B/E’s patented concept despite flying planes with products that embodied the Betts disclosure. Neither did Petitioner, despite its longstanding market presence. Instead, the industry’s aircraft lavatories always had flat walls, and the lavatory space, already constrained, was thought to be inviolate. B/E changed this

paradigm and its resulting inventions took “the industry by storm.”

Appx03195. As a result, B/E’s patented products received tremendous industry praise and awards and enjoyed immediate commercial success. Far from developing such products from Betts, as Petitioner argues would have been obvious to do, Boeing—the world’s largest aircraft manufacturer and owner of the company that developed Betts—instead acquired this technology from B/E in a contract valued at more than \$800 million. And Petitioner itself, for all its protestations that the ’838 patent is invalid, copied B/E’s product.

Where, as here, the inventions may seem simple, objective evidence of non-obviousness is especially critical. Yet, the Board improperly and conclusorily discounted all such evidence. The Board simply recited it but then erroneously and inexplicably gave it no weight. Instead, the Board raised new legal hurdles to secondary considerations that no patent owner in an IPR could ever surmount. This was error, and the Court should reverse.

The Board made several other errors, each of which provides a separate and independent ground for reversal.

First, the Board interpreted the claims to cover the opposite of what they recite. For example, the Board found that all claims containing the phrase “substantially not flat” encompass a prior art seatback that the Board acknowledges “is flat.” Second, the Board deleted key, narrowing limitations from the claims. The Board, for example, removed the word “unit” from

“enclosure unit.” This resulted in a claim interpretation so erroneously overbroad that it encompassed the very space-dividing, multi-enclosure prior art structures that the patent’s specification explicitly distinguished. Many claims further narrow the invention’s “enclosure unit” to a “lavatory stall unit.” Yet, the Board ignored the plain meaning of “lavatory” and thus found obviousness despite recognizing that Betts does not include a lavatory, and in the face of Petitioner’s expert’s admission that Betts cannot be turned into one.

Third, using classic hindsight, the Board summarily concluded that it would have been obvious for one of skill in the art to apply Betts’ configuration to a lavatory, even though no contemporaneous evidence suggested any such combination or transformation. The Board’s obviousness decision depends on equating two things that are nearly diametric opposites: (1) the ’838 patent’s specially contoured lavatory stall/enclosure unit with its adjacent, conforming “not flat” passenger seatback, and (2) Betts’ two, space-divided and separate enclosures—an elevated coat closet and a floor storage space—placed in the dead space behind a flat, non-conforming seatback. Betts simply lacks key elements of the ’838 patent claims, and, irrespective of the claim construction, there is nothing to suggest that Betts should or could be transformed into or applied to a lavatory to create the claimed inventions.

The Board’s decision was erroneous and must be reversed.

STATEMENT OF THE ISSUES

1. Whether the Board erred in applying its “broadest reasonable construction” to construe claim limitations to have the opposite meaning of what they state on their face.
2. Whether the Board erred in construing the claims so broadly that certain claims and claim terms are rendered mere surplusage.
3. Whether the Board erred in its conclusion that the Betts reference, with a flat seat and non-conforming wall, falls within the scope of the ’838 claims requiring a substantially non-flat seat and conforming wall.
4. Whether the Board erred in its conclusion that the Betts reference, with two separate and space-divided enclosures, falls within the scope of the ’838 claims requiring an enclosure unit.
5. Whether the Board erred in its conclusion that it would be obvious to modify Betts’ multiple enclosures and divided surfaces to alter the forward wall of a conventional flat-walled lavatory stall unit, where there is no contemporary evidence that one of skill in the art would have

had reasons to do so at the time of the invention, and where Petitioner's own expert admitted that Betts cannot be transformed into a lavatory.

6. Whether the Board erred in giving no weight to secondary considerations—where there is overwhelming evidence of commercial success, industry praise, and other factors—and providing no adequate analysis or explanation for doing so.

STATEMENT OF THE CASE

I. THE PARTIES

B/E and Appellee's affiliate, Zodiac Aerospace ("Zodiac"), supply aircraft interior products, competing in the design, manufacture, and sale of aircraft cabin equipment such as seating, galley equipment, and lavatories. Immediately after B/E's market success with its patented new space-saving structures for aircraft interiors, Zodiac lost a valuable contract for aircraft lavatories supplied to Boeing. This contract, worth approximately \$800 million, was awarded to B/E due to its Spacewall® advanced lavatory system, which embodies the challenged patent claims. *See, e.g.*, Appx03760 ¶ 15. Desperate to quickly enter the new lavatory market that B/E's innovations created, Zodiac copied the Spacewall design. Then, when B/E sued,¹ Petitioner initiated an IPR to challenge, as obvious, the very innovations that it copied.

II. THE INTER PARTES REVIEW PROCEEDINGS

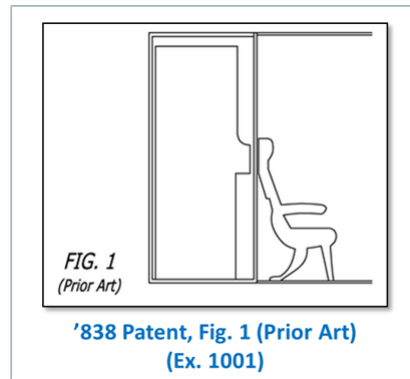
A. B/E's '838 patent

1. Prior art lavatories wasted aircraft cabin space.

For airlines, an important performance measure is the cost per mile to transport a passenger. Appx03729-30 ¶¶ 40-44. This complex measure relates to aircraft passenger capacity, efficient cabin space utilization, and fuel economy. *Id.* But in the prior art, a conventional rectangular lavatory wasted

¹ With Zodiac's IPR filed, B/E withdrew its infringement claims without prejudice.

significant cabin space, as shown in Figure 1. Substantial unused space existed between the seat and an adjacent lavatory's forward wall. This was due in part to the seat's contoured design as compared to the lavatory's flat forward wall. Appx03628-29 ¶¶ 73-74; Appx03636 ¶ 94; Appx03687 ¶ 199. At the same time, the industry did not believe that the width of a lavatory, already tight to begin with, should be further constrained. Appx03732-33 ¶¶ 49-50.



2. The patented inventions provided cabin space optimizations that fundamentally diverged from decades of conventional wisdom regarding lavatory design.

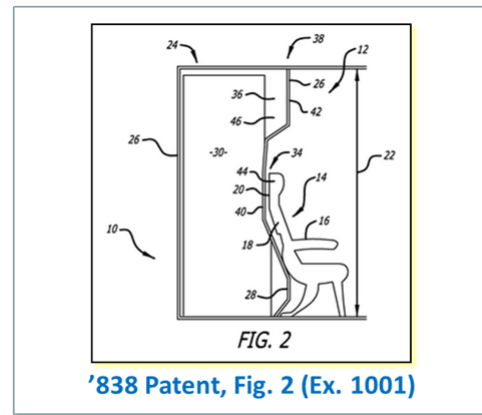
The '838 patent provides unique, space-saving structures for lavatory stall units and other “full height” enclosure units in an airplane cabin. Appx03625 ¶ 66; Appx03630-31 ¶¶ 77-78; Appx03742-47 ¶¶ 65-77. These structures paradoxically help *maximize* an enclosure unit's interior functional space while *minimizing* the overall footprint of the unit and adjacent seats. *Id.* This expands valuable cabin space for seating without sacrificing the enclosure unit's interior comfort or functionality. *Id.*

Figure 2 shows one embodiment. The lavatory stall unit has a recessed forward wall. The wall is specially configured to substantially conform to a contoured seat. Appx03625-27 ¶¶ 67-

71. The wall is also immediately behind and adjacent to the seatback. *Id.*

This reduces wasted space between the lavatory and the seat, and allows

airlines to add more seats and



passengers. Appx03625 ¶ 66; Appx03630-31 ¶¶ 77-78. The rear-most seat can be pushed further aft in the cabin, so that its contoured seatback can nestle into the recess in the substantially conforming contoured wall. This has a cascading effect—as more seats are pushed further aft, additional cabin space is freed up. Appx03664 ¶¶ 151-152; Appx03667 ¶ 157; Appx03687 ¶ 197. This enables either premium-priced seats with more legroom or an additional row of seats and associated additional ticket sales. *See, e.g.*, Appx03630-31 ¶¶ 77-78; Appx03718-19 ¶ 12; Appx03742-43 ¶¶ 64, 66-67. Both directly increase airline revenue.

Despite what might appear in hindsight to be a simple solution, B/E's approach was revolutionary. For decades, no one believed that aircraft lavatory space, tight to begin with, should be intruded upon in this way. *See, e.g.*, Appx03733 ¶ 50; Appx03740-42 ¶¶ 61-64. The rectangular box was, in

essence, inviolate. Appx03732-33 ¶ 49. This is why neither McDonnell-Douglas nor Boeing, each having access to the Betts patent, ever contoured their lavatory wall. Neither did anyone else, including Zodiac. B/E was the first to suggest doing so, and the Patent Office correctly issued the '838 patent on these innovations.

3. During prosecution, the inventors emphasized the importance of space-savings through unitary structures.

During prosecution, the Applicant distinguished the prior art (“Thompson”) based on the '838 patent's space reducing structures applied to single-function spaces called enclosure units or lavatory stall units:

As is discussed in paragraph 0005 of the specification of the present application, it is desirable to provide an aircraft lavatory or other enclosure that can reduce or eliminate gaps and volumes of space such as would occur in Thompson aft of the rear group of seats, to allow adjacent passenger seating installed forward of the lavatory or other enclosure to be installed further aft, providing more space forward of the lavatory or enclosure for passenger seating or other features than has been heretofore possible in the prior art.

Appx00997 p. 260 (emphasis added).

The Applicant concluded that “there is no evidence or suggestion in Thompson of an aircraft lavatory or enclosure including a lavatory stall or enclosure unit” having the claimed features. *Id.*, Appx00997-98 pp. 260-61 (emphasis added).

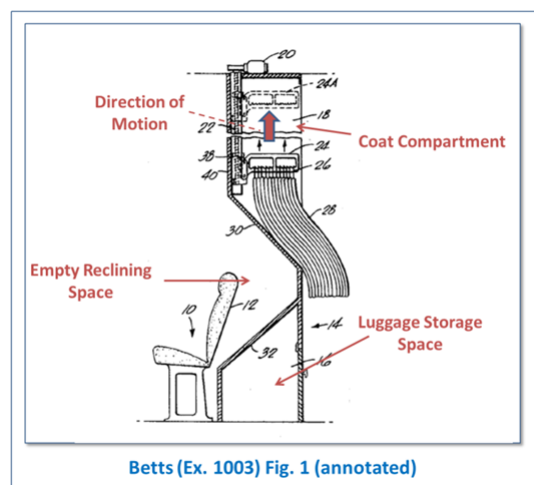
The Examiner agreed and allowed the patent. *Id.*, Appx01010-12 pp. 273-75.

B. Betts uses the typical prior art approach that the '838 Patent expressly distinguished.

Betts, like other prior art, took an approach to using space that fundamentally differs from than the '838 patent. Betts added dead (non-revenue generating) weight by filling the otherwise wasted space behind the seat with multiple enclosures, such as a small storage area on the floor often called a “dog-house,” and a separate, overhead compartment. *See, e.g.*, Appx03738 ¶ 58; Appx00037 Col. 1:41-49. This prior art approach *added* structure without increasing seating capacity or airline revenues. The '838, on the other hand, *removes* structure.

Betts is a patent for a “silent drive coat hanger rack mechanism.” Appx01041. The mechanism is used to raise coats into an otherwise empty storage space above and behind a passenger seat. Appx01044 2:7-32; Appx03481 47:12-25; Appx03650-52 ¶¶ 125-129. *See* Betts Figure 1, annotated at right. Appx03650-51

¶¶ 125-127. The overhead coat compartment 18 extends above the seat's recline area. The overhead compartment has a front wall 40 and a slanted bottom 30. Coats 28 hang from a mechanized coat rack 24 that can be raised to



position 24A. Appx01044 2:25-32. Figure 1 shows the rack 24 in a lowered position, with the coats protruding for “accessibility” into an open space behind the closet—the passenger exit aisle. *Id.*; *see also* Appx03486 52:10-24; Appx03385-87 83:18-85:15; Appx03651-53 ¶¶ 127-130. Betts also depicts seat 10 with a flat-shaped seatback 12.

Betts’ lower “luggage storage space” provides a separate enclosure that has a separate function from Betts’ overhead coat compartment. Appx03654-56 ¶¶ 131-135. This separate storage space for luggage or miscellaneous items was typically called a “dog house” due to its distinctive shape: it is shorter than the seat, positioned “along the floor” and has a “top” 32 that “slants rearwardly.” Appx01044 2:11-14, 2:22-24; Appx03654 ¶ 132; Appx03387-88 85:16-86:2; Appx03397 95:10-13; Appx03485, 51:9-20. Betts’ dog house adds separate storage beneath the flat-backed seat’s reclining area that otherwise might go unused. Appx03654 ¶ 132. This added structure, among other things, prevents the seat from being positioned further aft in the cabin because it would interfere with structure needed to support the seat.

The ’838 patent expressly distinguishes the Betts approach. Appx00037 Col. 1:41-49. (“Short, floor-mounted stowage boxes, typically no taller than the bottom cushion of a passenger seat... provide no improvement to the utility or spatial efficiency of the lavatory.”). Betts’ dog-house and coat closet are two physically and functionally separate storage areas that “provide no

improvement” in the context of a lavatory. *Id.*; *see also* Appx03651 ¶ 127.

Betts shows no lavatory stall unit at all.

C. Claim Construction

As relevant to this appeal, the Board applied its “broadest reasonable interpretation” to reach the following constructions:

<u>Claim Term</u>	<u>Board’s Interpretation</u>
“substantially <u>not flat</u> in a vertical plane”	“[T]he full limitation at issue encompasses an aft portion (in the case of claim 1) and an aft portion with an exterior aft surface (in the case of claims 9, 21, and 31) that <u>has a flat shape</u> but which is not within a vertical plane.” Appx00010.
“enclosure unit”	“Enclosure unit” has the same construction as “enclosure.” <i>See</i> , Appx00008. “The term ‘enclosure unit’ encompasses lavatories, aircraft closets, and aircraft galleys. Given the grounds of unpatentability that Petitioner raises, there is no need to further construe this term.” Appx00009.
“lavatory stall unit”	“[T]here is no need to provide an express construction for this term.” Appx00009.

D. Final Written Decision

The Board instituted IPR on two grounds: 1) obviousness of claims 1, 3–7, 9, 10, 12–14, 16–19, 21, 22, 24–29, 31, and 33–37 in view of Betts, and 2) obviousness of claims 8, 20, 30, and 38 in view of Betts and the Orange Binder—a loose-leaf collection of aircraft interior designs that includes pages that depict an embodiment of Betts. Appx00211 p.25. The Board’s Final Written Decision accepted the first ground and rejected the second. Appx00031.

SUMMARY OF ARGUMENT

The '838 patent is not obvious over the Betts reference. In reaching its contrary conclusion, the Board made several errors.

As an initial matter, the Board's claim construction conclusions are incorrect. The Board's construction holds that a seat with a flat-shaped seatback could nonetheless fall within the scope of a claim that explicitly describes the seat shape as "not flat." Still further, the Board's claim constructions for "enclosure unit" and "lavatory stall unit" effectively read "unit" out of the claims. And, the Board provides no meaning for the critical "lavatory" claim term. All of these errors combine to broaden the scope of the claims beyond any reasonable interpretation.

Fundamentally, Betts does not teach a contoured forward wall that receives and conforms to a contoured seatback, which every challenged claim requires. Betts teaches only a flat seatback. And the front faces of Betts's separate enclosures do not form a contoured forward wall of an enclosure unit. Rather they are a set of two separate enclosure walls, joined at a portion that is undisputedly "not an enclosure." This is no mere triviality. The unique contoured shape of the forward enclosure unit wall in the '838 allows for seats, with a similarly shaped contoured back, to be nestled into the wall and thus positioned further aft in the passenger cabin, all without substantial impact on the interior enclosed space. This has a cascading effect that ultimately allows

for more passenger seating in the aircraft. Betts does not address, or even appreciate, this problem.

Moreover, Betts undisputedly does not teach a lavatory. An ordinary artisan would have had no reason to transform a lavatory in view of Betts, and there was nothing to suggest a reason or motivation to use the Betts design on a lavatory. To the contrary, Zodiac's own expert admits "I don't believe this [Betts] can be turned into a lavatory." If it is not even possible to turn Betts into a lavatory, it is hard to understand how it would have been obvious to do so. Indeed, such an application of Betts would have rendered the reference useless for its intended purpose. Betts is directed to a mechanism to elevate coats in a closet, and the entire mechanism would need to be removed in a lavatory or full-height enclosure context. It would not have been obvious to reach such a result.

In the mechanical arts, especially for seemingly simple inventions, objective indicia are often the best indicators of nonobviousness. Objective evidence helps to avoid the trap of hindsight. Here, there are multiple, compelling objective indicia of the '838's nonobviousness. When B/E's Spacewall product, which undisputedly embodies the '838, was introduced, it received substantial industry recognition, press, and even prestigious awards tied directly to the patented features. For example, B/E won the "Crystal Cabin Award for Industrial Design & Visionary Concepts" because its lavatory

allowed “six additional seats to be integrated into an aircraft without sacrificing space or comfort within the toilet.” Still further, the unique features of the Spacewall product led directly to a multi-year, near billion-dollar contract with Boeing. Zodiac itself copied B/E’s design shortly afterward.

But even more, any objective view of the art leading up to the ’838 leads to an inescapable conclusion of nonobviousness. Betts was patented in 1973. It was actually built and flown on DC-10 aircraft, which had standard flat-walled lavatories, for decades. Yet no one, for more than 30 years, ever thought to create a lavatory with a contoured forward wall as in the ’838 patent. The prior art itself was owned by McDonnell-Douglas, which Boeing later acquired. Although Boeing spent billions to acquire McDonnell-Douglas and its technology, it still spent nearly a billion more to use B/E as the exclusive lavatory provider for all new 737 aircraft. All of this, when considered objectively and not in view of hindsight, demonstrates that the ’838 patent is not obvious.

ARGUMENT

I. STANDARD OF REVIEW

The Board’s constructions rested on only the intrinsic record, so this Court determines claim construction *de novo*. See, e.g., *Straight Path IP Grp., Inc. v. Sipnet EU S.R.O.*, 806 F.3d 1356, 1360 (Fed. Cir. 2015).

Obviousness “is a question of law, based on factual determinations regarding the scope and content of the prior art, differences between the prior art and the claims at issue, the level of ordinary skill in the pertinent art, the motivations to modify or combine prior art, and any objective indicia of non-obviousness.” *Belden Inc. v. Berk-Tek LLC*, 805 F.3d 1064, 1073 (Fed. Cir. 2015). The factual determinations are reviewed for substantial evidence, while “compliance with the governing legal standards” is reviewed *de novo*. *Id.*

II. THE BOARD ERRED IN ITS OBVIOUSNESS ANALYSIS, BEGINNING WITH CLAIM CONSTRUCTION

The Board’s obviousness determination began with two fundamental claim construction errors. These errors relate to the “substantially not flat” and “enclosure unit”/“lavatory stall unit” claim elements. The Board misconstrued these phrases by effectively deleting the underlined words from the claims. This resulted in a broader claim scope than the claim text and intrinsic record can reasonably support. So broad, in fact, that the claims would encompass the very structures that the patent expressly distinguished.

A. The Board improperly used the “Broadest Reasonable Interpretation” to expand claim scope.

The Supreme Court is reviewing the proper legal standard for claim construction in an IPR. *Cuozzo Speed Technologies, LLC v. Lee*, No. 15-446. *Cuozzo* will determine whether it is appropriate in IPRs to construe claims according to the broadest reasonable interpretation (“BRI”) standard. The Board applied its BRI standard here, rather than this court’s standard from *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005). Appx00006.² But as discussed below, the Board’s construction is unsupportable under either standard.

The Board essentially ignored the specification and the claims’ text and context to expand the claims beyond their broadest reasonable interpretation. *See, e.g., Microsoft Corp. v. Proxyconn, Inc.*, 789 F.3d 1292, 1298 (Fed. Cir. 2015) (“[C]laims should always be read in light of the specification and teachings in the underlying patent.”); *see also Tempo Lighting Inc. v. Tivoli LLC*, 742 F.3d 973, 977 (Fed. Cir. 2014). The Board’s constructions are so broad that they contradict the patent’s disclosure, capture the very prior art structures distinguished in the patent’s written description, and even include structure that is the precise opposite of what is described and claimed. That is

² Should the Supreme Court hold that BRI is an incorrect standard, then the Board’s decision should be reversed for this additional and independent reason.

error. “Even under the broadest reasonable interpretation, the Board’s construction ‘cannot be divorced from the specification and the record evidence’ and ‘must be consistent with the one that those skilled in the art would reach.’” *Microsoft*, 789 F.3d at 1298 . “A construction that is ‘unreasonably broad’ and which does not ‘reasonably reflect the plain language and disclosure’ will not pass muster.” *Id.*

The Board’s construction is also inconsistent with *Phillips* because it broadens the claim language beyond “how a person of ordinary skill in the art would understand the claim terms.” *See, e.g., Phillips*, 415 F.3d at 1323. As explained below, B/E’s constructions are correct under both the BRI approach and this court’s *Phillips* standard. The Board’s constructions, on the other hand, fail under both standards.

B. The Board misconstrued “substantially not flat in a vertical plane.”

“substantially <u>not flat</u> in a vertical plane”	
B/E	Board
“a back side shape with a back exterior surface that is contoured or substantially non planar in an upright position”	“[T]he full limitation at issue encompasses an aft portion (in the case of claim 1) and an aft portion with an exterior aft surface (in the case of claims 9, 21, and 31) that <u>has a flat shape</u> but which is not within a vertical plane.” Appx00010.

1. The Board misconstrues “not flat” to include “a flat shape.”

The claims as written recite a shape that is “not flat in a vertical plane.” But the Board construed them to cover “a flat shape but which is not within a vertical plane.” Appx00010. The Board thus erroneously changed the claims’ meaning and scope by moving the word “not” such that it no longer modifies the word “flat” (a shape) and instead modifies the phrase “in a vertical plane” (a relative position). In moving the word “not,” the Board redrafted the claims to fundamentally alter their meaning rather than interpret their scope. This is improper. *Chef Am., Inc. v. Lamb-Weston, Inc.*, 358 F.3d 1371, 1373 (Fed. Cir. 2004) (“Courts are not permitted to redraft claims.”). This is especially improper here, where the specification and claims make clear that it is the shape that matters: the seat is “contoured in the vertical plane.” Appx00037 Col. 1:24 (emphasis added).

Under the Board’s construction, claims that require a seat with a shape that is “not flat” could be met by a seat that “has a flat shape.” Appx00010. This cannot be correct. *Pride Mobility Products v. Permobil*, Case Nos. 2015-1858, 2015-1586, 2016 WL 1321145 (Fed. Cir. April 5, 2016), slip op. at 7, 11 (reversing PTAB claim construction that allowed the term “perpendicular” to encompass a “parallel” configuration). As discussed throughout the specification, the ’838 patent’s approach is to “juxtapose” a “contoured”

seatback with an enclosure unit's contoured forward wall. *E.g.*, Appx00037 Col. 1:24-28. If the claim covered a flat seatback, the stated purposes for the inventions, which relate to nestling contoured aircraft structures, would be nullified.

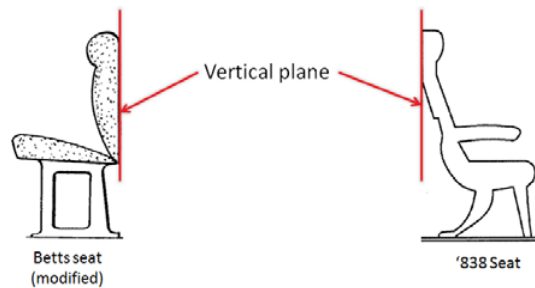
2. This term means “a back side shape with a back exterior surface that is contoured or substantially non planar in an upright position.”

The claim expressly limits “the shape of the exterior aft surface of the aft portion of the aircraft cabin passenger seat.” As discussed above, it requires that this seatback shape is “not flat.” *See, e.g.*, Appx00038-39 Claim 1. When comparing the claim language to the specification, it becomes even clearer that “not flat” means contoured. *Compare* “not flat in a vertical plain” claim language (Appx00038 Col. 4:63) *with* “contoured in the vertical plane” specification language (Appx00037 Col 1:24) (emphasis added).

But in what dimension is the seatback contoured? The patent answers this: in “a vertical plane.” This phrase provides the frame of reference (e.g., a plane stretching generally from the seatback's bottom, to its top) against which one can identify whether a seatback's shape is contoured, or substantially “not flat.”³ This is depicted in the below slides, used at the IPR hearing:

³ In patent parlance “a” typically means “one or more.” *See, e.g., KCJ Corp. v. Kinetic Concepts, Inc.*, 223 F.3d 1351, 1355 (Fed. Cir. 2000). Thus, the seatback in the claims remains non-flat in shape when measured against *any* vertical plane that one may reasonably choose as a frame of reference.

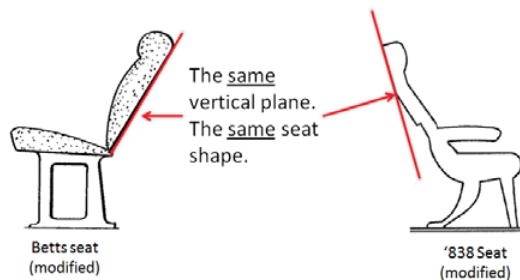
**The Vertical Plane Is The Reference Where
The Seat Shape Is Measured**



46

Appx04063

**The Vertical Plane Is The Reference Where
The Seat Shape Is Measured**



47

Appx04064

The Board criticized B/E's construction because, in its view, B/E's construction "would render the claim language 'in a vertical plane' meaningless." Appx00010. Not so. The claims use "a vertical plane" as a reference plane along which to measure the vertically extending seatback's substantially non-flat shape. The seatback is a three-dimensional object that is

taller than it is wide and deep. By way of analogy, one could view an intersecting set of planes applied to such an object to be shaped as a cereal box. The “vertical plane” is the large slice of cardboard at the back of the box, and the seatback is curved in reference to it. If the seatback were instead curved in reference to a horizontal plane (e.g., along the top of the box), that would do nothing to permit the patent’s express purpose—namely, to allow the seatback to nestle into a substantially conforming recessed wall behind the seat.

Only by curving the seatback in reference to a vertical plane (curvature along the back of the box), would one be able to nestle the seatback into a recessed wall behind it. The claims reflect that a contoured or non-planar seatback shape enables the recessed forward wall of the enclosure unit behind the seat to be “disposed immediately aft of and adjacent to an aircraft cabin passenger seat.” Appx03645 ¶ 113. A flat seatback, in contrast, would require substantially more separation from the forward wall. *Id.* This disadvantageously results in an enclosure unit that is not sufficiently proximate to the seat, creating a substantial volume of unused space between the seat and the enclosure unit’s forward wall. *Id.* This would re-introduce a problem that the ’838 patent overcomes—an interior design with “significant volumes unusable” and “further inefficiency in the use of space.” *Id.*; *see also* Appx00037 Col. 1:24-32. That would be an unreasonable interpretation. *Osram*

GmbH v. Int’l Trade Comm’n, 505 F.3d 1351, 1358 (Fed. Cir. 2007) (error to construe claims “at odds with the purposes of the invention.”).

The Board erred by construing the claims to include seatbacks having a flat shape, so long as the seatback can be reclined. In the Board’s view, any seatback *with a perfectly flat shape* meets the claims so long as the seatback is tilted to some angle, as little as one degree from normal, at the moment of measurement. That cannot be right. Nothing in the specification indicates that the “vertical plane” was used to merely distinguish whether a flat seatback is able to recline. Instead, it is a reference plane used to determine whether the vertically extending seatback’s shape itself is contoured. One skilled in the art would recognize that a seatback with a shape that is substantially flat when measured in reference to “a vertical plane,” will remain “substantially flat” even if the seatback is later observed while tilted as depicted above.

Appx03641-42 ¶¶ 108.

C. The Board misconstrued “enclosure unit.”

“enclosure <u>unit</u>”	
B/E	Board
“single functional space, enclosed on all sides”	“Enclosure unit” has the same construction as “enclosure.” Appx00008. “The term ‘enclosure unit’ encompasses lavatories, aircraft closets, and aircraft galleys. Given the grounds of unpatentability that Petitioner raises, there is no need to further construe this term.” Appx00009.

1. The Board rendered the word “unit” meaningless.

The Board construed “enclosure unit” to mean the same thing as “enclosure.” The Board found “no reason to give them [‘enclosure’ and ‘enclosure unit’] different constructions.” Appx00008. But there are multiple reasons why the Board’s construction is wrong.

First, claim construction cannot be used to simply strike words. *See, e.g., Texas Instruments Inc. v. United States Int’l Trade Comm’n*, 988 F.2d 1165, 1171 (Fed. Cir. 1993) (rejecting a patentee’s proffered claim construction because it “would render the disputed claim language mere surplusage.”). All words in a claim have meaning. *Warner-Jenkinson Co., Inc. v. Hilton Davis Chem. Co.*, 520 U.S. 17, 29, (1997). (“[e]ach element contained in a patent claim is deemed material to defining the scope of the patented invention.”); *Unique Concepts, Inc. v. Brown*, 939 F.2d 1558, 1562 (Fed. Cir. 1991) (“[a]ll the limitations of a claim must be considered meaningful.”).

In striking the word “unit” from the phrase “enclosure unit,” the Board leaves only the word “enclosure” and expands literal claim scope by removing a word inarguably used in a narrowing sense. This necessarily expands the claim’s scope beyond its literal terms. The Board’s word-striking approach is particularly problematic here because the result is to interpret the claims to encompass the very same non-unitary, multi-functional, multi-enclosure

(overhead and dog-house storage) structures that the '838 patent's specification took pains to distinguish. Appx00037 Col. 1:41-49.

Second, the Board's faulty construction stems from its conclusion that the specification uses the terms "enclosure unit" and "enclosure" "extremely similarly." Appx00008. In support, the Board compares two cited passages:

- "The present invention relates generally to aircraft enclosures, and more particularly relates to an aircraft cabin enclosure, such as a lavatory, an aircraft closet, or an aircraft galley, for example." Appx00037 Col. 1:14-17.
- "The enclosure unit can be a lavatory, an aircraft closet, or an aircraft galley, for example." Appx00037 Col. 2:27-28.

Initially, the Board's comparison is wrong because the first citation appears in the "Background of the Invention" and merely states the patent's general field, which indeed "relates generally" to aircraft enclosures. This is reflected in the claim 9 preamble, for example, which provides an intended use of the invention for an "enclosure." But nothing about that passage broadens the term "enclosure unit" to include all such enclosures. Instead, as the Board's second citation (taken from the "Summary of the Invention") explains, the claims recite a specific type of enclosure, namely an enclosure unit. Appx00037 Col. 2:27-28. Thus, as described in both the written description and the claims, the

inventions are narrowed to “units”: either “enclosure units” or, even more specifically, “lavatory stall units.”

The Board concludes from its two above-cited passages that “[b]oth terms are inclusive of lavatories, aircraft closets, and aircraft galleys.” Appx00008. But that conclusion does not merit the logical leap that these two terms are synonymous. Rather, it merely reflects that “enclosure units” are a species within the broader genus of “enclosures.” Both the broad genus and the narrow species may include certain types of lavatories, closets, and galleys. But that does not render the words coterminous and does not mean that all “enclosures” are necessarily “enclosure units.” Simply put, a structure may be an “enclosure,” but not be an “enclosure unit.”

Under the Board’s erroneous approach, any narrow claim limitation could always be replaced with a broader term simply because a broader genus may “be inclusive” of embodiments of the narrower species. But replacing a claimed species with its broader genus always expands the claims beyond their recited scope, exactly as happened here. The ’838’s claims expressly narrow the species of “enclosures” that can meet the claims because the prior art “enclosures” were deficient. Multi-functional, multi-space structures glommed together at their dividing surfaces (as in Betts) do not form “enclosure units” within the meaning of the claims.

As a final justification for its construction, the Board points to extrinsic evidence regarding galleys from an unrelated patent. Appx00008 (*citing* Appx02150 ¶ 3). The Board cites paragraph 3 from this extrinsic evidence, which describes a galley as including “storage areas, ovens, sinks, coffee makers, and the like” and being “built up from individual panels, commonly referred to as modules.” From this, the Board incorrectly concludes that the galley “may serve multiple functions.” But the cited passage actually reflects that aircraft galley features provide a single function—meal preparation and service. A galley is thus a single, functional space that may include within it secondary items and storage areas (e.g., sinks, ovens, drawers, cabinets) that are used to support its single aircraft function. This is fully consistent with B/E’s proposed construction for “enclosure unit.”

2. An “enclosure unit” is a “single functional space, enclosed on all sides.”

One of ordinary skill would understand “enclosure unit” in light of the specification to require (a) a single functional space (b) enclosed on all sides. Appx03636-38 ¶¶ 91-99; Appx03739-40 ¶¶ 59-60. This is depicted, for example, in Figure 2, showing a single room with walls on all sides, including areas above and below the “recess” for secondary storage within the outer boundaries of the single space.

Notably, the Board appeared to adopt this understanding for “enclosure unit” when it rejected Petitioner’s anticipation challenge to claim 9, which requires “an enclosure unit that is taller than the passenger seats.” The Board rejected Petitioner’s contention that three separate, but connected, enclosures constituted an “enclosure unit”:

“The elevated coatroom does not appear to be a single enclosure unit extending from the cabin floor upward. Rather, it appears to consist of three types of enclosure units. As a result, the only type of enclosure units that extends above the passenger seat (labeled ‘coat stowage’) does not extend upward from the cabin floor as do the seats.”

Appx00208 p. 22 (emphasis added).

The claims support B/E’s construction. For example, claim 9 uses the term “enclosure” and separately uses the term “enclosure unit.” The “enclosure” in the claim preamble is broader and more general than the more specific “enclosure unit” recited in the claim’s body. While an “enclosure” may or may not be a single unitary structure, the “unit” modifier in the claim body necessarily narrows the term to a single, unitary space.

Dependent claims reflect that the “enclosure unit” may include a defined “secondary space” within its “interior lavatory space.” Appx00039-40 Cls. 4, 13, 26, 34. The word “secondary” refers to something that is “subsidiary to” or within another thing—here, the enclosure unit’s primary interior space. Appx03638 ¶ 98. Thus, the unitary nature of the phrase “enclosure unit”

requires that it must not be a mere linking of separate spaces that lack a unifying outer enclosure. *Id.* ¶ 99. How else could that unitary and primary enclosed space include an interior “secondary space?” Any broader construction would be unreasonable because it would improperly render the term “unit” a nullity in view of the claim language and the dependent claims. *See Cardiac Pacemakers, Inc. v. St. Jude Med., Inc.*, 296 F.3d 1106, 1115 (Fed. Cir. 2002) (construction that rendered a portion of the claim meaningless held improper).

D. The Board erred by refusing to construe “lavatory stall unit.”

“lavatory stall unit”	
B/E	Board
“a single room, enclosed on all sides, having a toilet and washbasin and large enough to fit a person inside”	“[T]here is no need to provide an express construction for this term.” Appx00009.

1. The Board deleted the word “unit” and refused to construe “lavatory,” effectively giving the term no weight.

The Board used its same faulty analysis regarding “enclosure unit” to disregard the word “unit” in claims 1-8, 14-16, 25-26, and 31-38, regarding the recited “lavatory stall unit.” This was error at least for the reasons discussed above.

The Board also erred by applying its conclusory analysis for the claim term “enclosure” to the different claim term “lavatory stall.” Appx00009 (“For reasons similar to those with respect to ‘enclosure unit,’ we reject Patent Owner’s proposed construction of ‘lavatory stall unit’.”). The Board acknowledged that it was doing so because “[p]etitioner does not rely on any particular prior art lavatory” and hence there was no prior art lavatory for the Board to analyze. *Id.* But B/E specifically disputes that there would be any reason to modify Betts into a “lavatory stall unit” at least because Betts is not a lavatory. *See, e.g.,* Appx00261. Thus, regardless of *petitioner’s* position on the issue, this is a fundamental dispute implicating claim scope *presented by B/E*. The Board erred by ignoring this dispute at least because “[w]hen the parties present a fundamental dispute regarding the scope of a claim term, it is the court’s duty to resolve it.” *O2 Micro Int’l Ltd. v. Beyond Innovation Tech. Co.*, 521 F.3d 1351, 1362 (Fed. Cir. 2008).

For the “lavatory” claims, a fundamental dispute is whether Betts, which is not a lavatory, renders obvious a lavatory stall unit with a specially contoured forward wall. Without resolving the dispute regarding “lavatory stall unit,” the Board could not have properly performed the required obviousness analysis—claim construction was the required first step. The Board’s failure to provide any construction for this key disputed term, particularly when it is so inarguably absent from the sole prior art reference at issue is clear error.

Cutsforth v. MotivePower, Case No. 2015-1314, 2016 WL 1358628 at * 2 (Fed. Cir. Apr. 6, 2016) (reversing the PTAB when it declined to resolve the meaning of a disputed claim element, allowing it merely “to have its plain meaning without providing a specific construction” and “fail[ing] to explicitly address the parties’ key dispute for this term.”).

Furthermore, this Court has reversed the Board for not giving weight to plain claim language. For example, in *Straight Path*, 806 F.3d at 1360, the Court considered a claim element requiring that a “process is connected to computer network,” *id.* at 1359, and found that the term “has a meaning that can only be called plain,” *id.* at 1360. Yet, the Board ignored the “plain present-tense meaning” of the word “is,” and construed the terms so broadly that the “present-tense” meaning was gone. *Id.* Rather than address “the facially clear meaning, [the Board] instead turn[ed] immediately to the specification.” *Id.* This was an error because “[w]hen claim language has as plain a meaning on an issue as the language does here, leaving no genuine uncertainties on interpretive questions relevant to the case, it is particularly difficult to conclude that the specification reasonably supports a different meaning.” *Id.* at 1361. Indeed, “the proper construction of any claim language must, among other things, ‘stay[] true to the claim language.’” *Id.*

Similarly here, “lavatory” has a well-understood and plain meaning that the Board ignored. Instead, the Board used a strained reading of the

specification to recycle its “enclosure unit” analysis. Appx00009 (“For reasons similar to those with respect to ‘enclosure unit,’ we reject Patent Owner’s proposed construction of ‘lavatory stall unit.’”). But the term “lavatory” clearly means something different. And that meaning is plain: a lavatory on an aircraft is a bathroom for passengers to use.

A “lavatory” is something narrower than an “enclosure.” Claims 1-8, 14-16, 25-26, and 31-38, are all more narrowly directed to lavatories. Moreover, claim 14 depends from independent claim 9. Claim 9 is directed to a general enclosure unit, but claim 14 narrows that to a lavatory embodiment. Further, but for the difference between “enclosure” and “lavatory,” claims 21 and 31 would be identical. With the Board’s failure to differentiate these terms, claim 21 and 31 now have the exact same scope. This cannot be correct.

Beachcombers v. WildeWood Creative Prods., Inc., 31 F.3d 1154, 1162 (Fed. Cir. 1994) (Claim construction rejected because it “would result in claim 9 having the same scope as claim 1, and thus would render claim 9 superfluous. Accordingly, it is presumptively unreasonable.”).

This Court recently reversed the Board due to similar errors. *In re Man Machine Interface Technologies LLC*, Case No. 2015-1562 (Fed. Cir. April 19, 2016), slip op. at 7-8. There, the claim recited a “thumb switch.” Although clearly reciting a thumb, the Board concluded that “the claim term ‘thumb switch’ did not exclude switch activation by another digit or item such as a

pen.” *Id.* at 4-5. This was error because “Claim 1 expressly requires a thumb switch, not a finger switch; the Board’s construction ignores the term ‘thumb’ in ‘thumb switch.’” *Id.* at 7. Similarly here, despite that the claims expressly recite a “lavatory,” in the Board’s view they could nonetheless be met with any generic enclosures (along with a conclusory expert pronouncement about “lavatories” generally), as if the word “lavatory” were not in the claims. As in *Man Machine*, this result is incorrect and should be reversed.

2. A “lavatory stall unit” is “a single room, enclosed on all sides, having a toilet and washbasin and large enough to fit a person inside.”

The ’838 patent focuses on an innovative lavatory design. The specification explains that “[a]ircraft lavatories, closets and other full height enclosures commonly have forward walls that are flat in a vertical plane.” Appx00037 Col. 1:20-21. The lavatory comprises a “lavatory stall unit.” *Id.* Col. 2:48-50. Those skilled in the art understand that in an “aircraft cabin” a lavatory stall is a type of “enclosure” and hence is enclosed on all sides. Appx03638 ¶ 100; Appx03337-38 35:25-36:2. Further, as described above, the term “unit” here specifies that the “lavatory stall” comprises a “single” or unitary functional space, here the lavatory function. *See, e.g.*, Appx00039 Claim 9. Further, the “lavatory stall unit” is “full height” or of sufficient size to fit a person. Appx00037 Col. 1:20-21.

All record evidence is in accord. Dictionaries explain, and skilled artisans understand, that in aviation a lavatory is “a room or cubicle with a toilet bowl in it.” Appx03208-09 (Dictionary of Aviation). Zodiac’s expert agrees that a lavatory includes a toilet and must be large enough to fit a person inside. Appx03639 ¶ 103; Appx03337 35:22-24 (“**Q:** So a lavatory is an enclosure designed for, among other things, a person to get into? **A.** Yes.”); Appx03351 49:5-6 (“**Q.** So a lavatory stall unit has a toilet in it? **A.** Yes.”); Appx03346 44:1-3 (“**Q.** A lavatory is a full-height enclosure? **A.** Yes.”).

III. THE ’838 PATENT IS NOT OBVIOUS IN VIEW OF BETTS

Even apart from its erroneous claim construction, the Board’s obviousness analysis was erroneous because the prior art lacks multiple, essential claim elements. The single reference at issue, Betts, simply does not include a seatback that is both “not flat” and that interfaces with a contoured-wall enclosure unit. Nor does Betts include a unitary enclosure or a lavatory stall, or any structure that could be modified into one.

A. Betts does not teach a contoured forward wall that receives a contoured seatback.

1. Betts includes only a flat, tiltable seatback.

The ’838 claims require a seat that is “not flat.” Betts includes only a flat seatback. Betts’ seatback is shown as flat in a vertical plane extending from the seatback’s bottom towards its top. The Board agrees. Appx00016 (“the aft

portion of the Betts seatback is flat”); Appx03666-67 ¶ 156; Appx01042 Fig.1.

Further, Betts’ flat seatback is tiltable: “[t]he top 32 of storage space 16 also slants rearwardly so as not to interfere with seatback 12 when tilted.”

Appx01044 2:22-24.

2. The ’838 claims require an enclosure unit/lavatory stall unit wall that “substantially conforms” to a contoured seatback.

The ’838 claims require a contoured wall that substantially conforms to a contoured seatback. The claims, specification, and figures all make this clear. The contoured wall substantially conforms to the contoured seatback, so that the seatback can nestle into the contoured wall (“immediately aft of and adjacent to...”). Appx00038 Col. 3:13-22. Thus, the patent’s contoured seat is moved aft in the cabin to conform with the contoured wall, which removes intervening wasted structure and saves space. Appx03360 58:20-24

3. Betts’ flat, tiltable seatback is fundamentally different from the ’838 patent’s contoured seatback and substantially conforming wall.

Rather than reshape an enclosure unit and adjoin a proximate seat, Betts maintains the seat’s position and adds the prior art’s “doghouse” storage structure below the seat, plus an additional overhead coat closet. Zodiac’s witnesses agree. Appx03630 ¶ 76; Appx03654-59 ¶¶ 131-140; Appx03485 51:9-17 (Zodiac employee identifying item 16 in Betts Figure 1 as a “dog

house,” a “miscellaneous storage unit”); Appx04073. Again, the ’838 patent distinguishes such prior art, doghouse designs. Appx00037 Col. 1:41-49.

The Board appears to have concluded that the top of Betts’ doghouse structure aligns with the shape of Betts’ flat seatback when tilted. Nothing in Betts describes that condition or the relative position of Betts’ flat seatback with respect to storage top 32. Betts does not disclose any instances where these two surfaces come into close proximity when the seat is tilted (which in any event does not meet the ’838 patent’s purpose or claims), nor any wall that “substantially conforms” to the seatback in some position. This Court has held that “it is well established that patent drawings do not define the precise proportions of the elements and may not be relied on to show particular sizes if the specification is completely silent on the issue.” *Hockerson-Halberstadt, Inc. v. Avia Grp. Int’l, Inc.*, 222 F.3d 951, 956 (Fed. Cir. 2000). But the Board did just that, assuming from depictions in unscaled figures that certain surfaces may conform in some configurations that Betts never actually described.

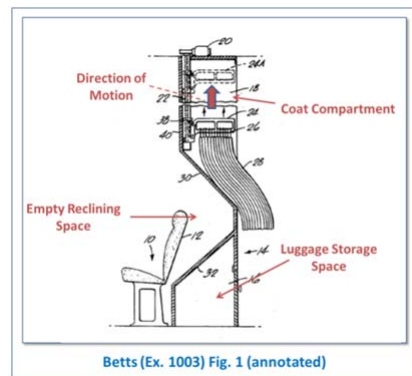
At best, Betts discloses that its deeply-angled surfaces for its divided enclosures are used to fit them above and below a tilting seatback. But the seatback is flat. So, Betts’ design does not meet the claims, which require a seatback that is “not flat” and a wall sculpted to substantially conform. This is a key feature of, and motivation for, the challenged claims. The ’838 patent’s

purpose is to move seats further aft in a cabin, not merely to accommodate tilt or add storage to functionally unusable space. The '838 explains:

It would be desirable to provide an aircraft lavatory or other enclosure that can reduce or eliminate the gaps and volumes of space previously required between lavatory enclosures and adjacent structures to allow an adjacent structure such as passenger seating installed forward of the lavatory or other enclosure to be installed further aft, providing more space forward of the lavatory or enclosure for passenger seating or other features than has been possible in the prior art.

Appx00037 Col. 1:50-57.

Betts' structure is contrary to the present invention's motivation and design. Because Betts does not have a wall that conforms to a contoured ("not flat") seat, Betts cannot meet the claims even if it were somehow transformed, as the Board (incorrectly) suggests, into a lavatory stall unit or some other enclosure unit. *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1364 (Fed. Cir. 2016) (claim not obvious when claim element missing from prior art of record).



B. Betts does not teach or suggest an enclosure unit/lavatory stall unit with a contoured forward wall.

1. Betts is an elevated coat closet with separate doghouse storage, not an "enclosure unit."

Betts teaches two separate enclosures. Betts' overhead coat compartment 18 extends above the passenger seat. Betts' separate luggage storage space 16

is added below the flat seatback's recline area, just like the prior art that the '838 patent distinguished. These are two separate storage compartments, certainly not an enclosure unit (full-length or otherwise), and not a lavatory stall unit. *Id.* Appx03651 ¶ 127. Betts *requires* a two-enclosure design, with separate upper and lower sections, for utilizing empty space above and below a flat, tiltable seat's reclining area, all without changing the floor seating capacity. *Id.* See also Appx03652-59 ¶¶ 128-40.

Contrary to the patented approach, Betts allows the tilting seatback to divide the otherwise available space into two functionally and physically separate regions. Appx03655-59 ¶¶ 134-140. The '838 patent explains that this space-dividing design fails to provide space useful to the functions of an undivided lavatory stall (or enclosure) unit and fails to provide more passenger seating space:

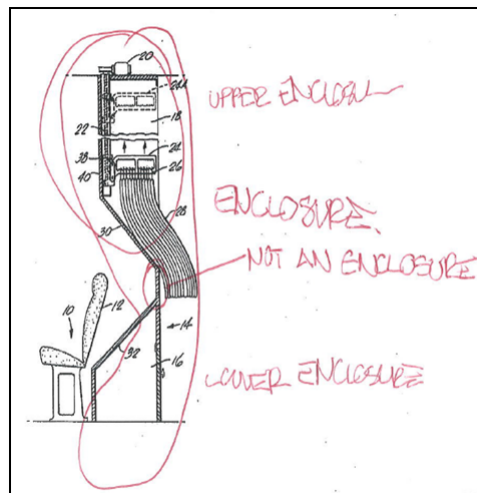
Short, floor-mounted stowage boxes, typically no taller than the bottom cushion of a passenger seat, are often positioned between the flat wall of current lavatories or other enclosures and passenger seats. These provide no improvement to the utility or spatial efficiency of the lavatory or other enclosure. While they do provide some useful stowage for miscellaneous items, they do not provide sufficient additional stowage to provide more space for passenger seating.

Appx00037 Col. 1:41-49; see also, e.g., Appx03629 ¶ 75; Appx03636-38 ¶¶ 91-99; Appx03655, ¶ 134.

Zodiac's witness confirmed that Betts is not an enclosure unit.

Specifically, Mr. Anderson testified that Betts includes two enclosures, an

upper and a lower one. Appx03374 72:3-8 (“The upper enclosure would be the parts involved with the rising coat rod closet, and the lower enclosure would be the items identified, I believe, as 16.”). He explained that the short partition between them is “not an enclosure.” Appx03375-76 73:23-74:8 (“I circled the small vertical line at the top of element 14. ... That’s not an enclosure.”). He illustrated by annotating Betts’ Figure 1 in red as shown below:



Appx03291

Thus, Betts shows no “forward wall” of an enclosure unit (let alone a lavatory stall unit) that is both “taller than the passenger” seat and shaped to conform to a non-flat seatback. In fact, the Board’s supposed “forward wall” of Betts is not even genuinely applied to an enclosure at all; there is nothing enclosed by the portion that is “not an enclosure” because it merely divides a seating area from an open hallway. Betts’ multiple, separate surfaces do not

define an enclosure unit, are not the forward wall of an enclosure unit, and certainly show no recess in any such wall.

In addition, every independent claim in the '838 patent requires that the forward wall define “an interior [enclosure/lavatory] space.” That is to say, the forward wall that includes the claimed “recess” is the enclosure unit’s *entire* forward surface. This is critical to the inventions. The express purpose is to provide a carve-out in the enclosure unit’s front surface to accommodate a contoured seat, without significant sacrifice of the unit’s usable interior space. Appx00038 Col. 4:9-14 (“the present invention provides for an enclosure 10, such as a lavatory for a cabin 12 of an aircraft ... or similar enclosed or structurally defined spaces, for example.”). The claim language is improperly rendered meaningless if the forward wall does not define an enclosed space. Appx03660 – 63 ¶¶ 141-147.⁴

2. The instituted prior art does not disclose a “lavatory stall unit” with a contoured forward wall.

Claims 1-8, 14-16, 25-26, and 31-38 all recite a lavatory. The specification distinguishes prior art lavatories that “commonly have forward walls that are flat in a vertical plane.” Appx00037 Col. 1:20-21. Additionally,

⁴ A wall that does not define an enclosed space is simply a partition divider or cabin bulkhead, much different than the claimed enclosure unit and lavatory stall unit. Appx00037 Col. 1:33-34 (“Aircraft bulkheads, typically separating passenger cabin areas or classes of passenger service, are in common use.”).

claims 14-16 depend from and narrow claim 9 to particularly claim a lavatory structure. The “lavatory” elements are thus essential to the lavatory claims.

Yet, both the Board and Zodiac admittedly “do[] not rely on any particular prior art lavatory.” Appx00009. The Board instituted review of these claims only as “obvious in view of Betts.” Appx00211 p. 25. Further, the Board narrowly defined the IPR’s scope from the outset: “no other ground of unpatentability alleged in the Petition for any claim is authorized for [this IPR].” *Id.* Yet, there is no dispute that Betts discloses no lavatory. Appx03355 53:5-9 (“**Q.** There is no reference to a lavatory in Betts anywhere? **A.** No.”).

Nothing in the prior art suggests that humans could or should use elevated coat closets or short, angled doghouses as lavatories. Designing and building a lavatory is complex. Appx03355 53:10-14. Indeed, Zodiac’s expert’s testimony explaining the complex systems in a lavatory (which are absent for a coat closet or doghouse stowage) spans over five pages. *See* Appx03339-44 37:5-42:17. Those of skill in the art understand that, beyond a sink and a toilet, aircraft passenger lavatories often include: mirrors, lights, smoke detectors, fire extinguishing systems, water, water filters, faucets, soap dispensers, amenity dispensers, waste compartments, baby basinet-type diapering tables, electricity, plumbing, waste disposal areas, halon dispensing fire suppression systems, water supply and removal lines, water recirculation

systems, and vacuum lines. *Id.* None of these systems are even suggested in Betts, which could not accommodate them.

Moreover, Betts cannot be modified to include a toilet, and one would have no reason to attempt to so modify Betts. *See, e.g.*, Appx03392-93 90:24-91:4 (“I don’t believe this [Betts] can be turned into a lavatory.”). A human cannot enter either of Betts’ upper or lower enclosures. Appx03392 90:4-8 (“**Q.** Can you fit a person into any part of this enclosure? **A.** Not in a normal upright position. **Q.** Not a living human? **A.** No.”). Betts does not suggest that it should be applied to a lavatory or any other enclosure that a person enters.

Lacking any teaching in the prior art, the Board and Zodiac only “rely[] on the knowledge and skill of a person of ordinary skill in the art” to meet the lavatory claim elements. Appx00009. Specifically, the Board’s obviousness conclusion for these critical elements rests entirely on Zodiac’s witness’ conclusory opinion “that a person of ordinary skill in the art would have been motivated to apply the recessed configuration [of Betts] to other aircraft enclosures, including lavatories.” Appx00015. This opinion is unsupported and must fail. First, as explained above, Betts has no “recessed configuration” and instead has two separate enclosures. Second, and most importantly, the opinion that someone would have been motivated to apply Betts to a lavatory is not based on anything in the record other than a sentence from a hired litigation consultant. It is a paid witness’ conclusory opinion on the ultimate issue of

obviousness. But “an expert’s opinion on the legal conclusion of obviousness is neither necessary nor controlling.” *Avia Grp. Int’l, Inc. v. L.A. Gear California, Inc.*, 853 F.2d 1557, 1564 (Fed. Cir. 1988), abrogated on other grounds by *Egyptian Goddess, Inc. v. Swisa, Inc.*, 543 F.3d 665 (Fed. Cir. 2008).

The Board’s conclusory determination is especially problematic here because conclusory assertions regarding key structural elements cannot take the place of actual evidence in an obviousness analysis. For example, in *K/S Himpp v. Hear-Wear Techs., LLC*, 751 F.3d 1362 (Fed. Cir. 2014) *cert. denied*, 135 S. Ct. 1439, (2015), a petitioner’s obviousness argument relied on assertions of “common sense” and “common knowledge” to meet an “important structural limitation.” *Id.* at 1365-66. This Court held that “[t]he determination of patentability of claims with this limitation therefore requires a core factual finding, and as such, requires more than a conclusory statement from either [Petitioner] or the Board.” *Id.* at 1365. The petitioner’s argument was rejected “because an assessment of basic knowledge and common sense as a replacement for documentary evidence for core factual findings lacks substantial evidence support.” *Id.* at 1366. Also, this Court distinguished *KSR*’s combinability analysis from the issue in *HIMPP*, which (as here) concerned a completely missing claim element: “In contradistinction to *KSR Int’l Co. v. Teleflex, Inc.*, 550 U.S. 398 (2007), this case involves the lack of evidence of a

specific claim limitation, whereas *KSR* related to the combinability of references where the claim limitations were in evidence.” *Id.* at 1366.

As in *HIMPP*, the record here lacks a critical structural claim limitation: a contoured-wall lavatory stall unit. Just as in *HIMPP*, this essential, structural element is not disclosed in any “documentary evidence.” The Board’s reliance on conclusory assertions “as a replacement for documentary evidence for core factual findings lacks substantial evidence support” and must be reversed. *Id.*

3. There was no reason or motivation to morph Betts’ spatially and functionally divided enclosures into an enclosure unit or lavatory stall unit.

The Board found it obvious to “apply the recessed forward wall design of Betts” (a feature that Betts lacks, as discussed above) “to other enclosures, including single-spaced lavatories.” Appx00012. But the Board identified nothing in the record to suggest a reason, motivation, or even ability to do so, other than one conclusory, and repeatedly contradicted, sentence in Petitioner’s declaration. *See* Section III.B.2 above. This critical error is an independent basis for reversal. Irrespective of which claim construction prevails, and even if there were prior art disclosing every claim element, the record lacks the requisite motivation to combine.

The Board’s determination that it was obvious to “apply the recessed forward wall design of Betts to other enclosures, including lavatories” is conclusory, lacking a detailed analysis as to why. This Court has rejected that

cursory approach. In *Cutsforth, Inc. v. MotivePower, Inc.*, No. 2015-1316, 2016 WL 279984 (Fed. Cir. Jan. 22, 2016), this Court reversed the Board's obviousness conclusion because "the Board made broad, conclusory statements in its analysis to determine that the claims of the [challenged] patent are obvious. ... While the decision does specify when it is rejecting a party's argument, the Board does not explain why it accepts the remaining arguments as its own analysis. This leaves little explanation for why the Board found the claimed invention obvious." *Id.* at *3. As the Court explained, "the Board must articulate its reasoning for making its decision." *Id.* As in *Cutsforth*, the Board erred in conclusorily stating that it was obvious to apply Betts to a lavatory.

A detailed analysis shows that the Board erred. Obviousness cannot be found where there is no reason or motivation in the record to make the claimed alterations. *See, e.g., Ferring B.V. v. Watson Labs., Inc.-Florida*, 764 F.3d 1401, 1407 (Fed. Cir. 2014) ("In this case, the cited prior art references neither set forth the limitations required by the asserted claims, nor provided any reason or motivation to combine those teachings to derive the claimed formulations with specific dissolution profiles. Accordingly, the asserted claims have not been shown to be invalid under 35 U.S.C. §103."). Without such motivations, the Board erred in relying only generally on the level of skill in the art, and its decision should be reversed. Appx0009. Indeed,

“the level of skill in the art is a prism or lens through which a judge or jury views the prior art and the claimed invention. This reference point prevents these deciders from using their own insight or, worse yet, hindsight, to gauge obviousness. Rarely, however, will the skill in the art component operate to supply missing knowledge or prior art to reach an obviousness judgment. Skill in the art does not act as a bridge over gaps in substantive presentation of an obviousness case, but instead supplies the primary guarantee of objectivity in the process”

Al-Site Corp. v. VSI Int'l, Inc., 174 F.3d 1308, 1324 (Fed. Cir. 1999).

The Board’s obviousness conclusion could only be reached through hindsight. This is improper. “To imbue one of ordinary skill in the art with knowledge of the invention in suit, when no prior art reference or references of record convey or suggest that knowledge, is to fall victim to the insidious effect of a hindsight syndrome wherein that which only the inventor taught is used against its teacher.” *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1553 (Fed. Cir. 1983). This “insidious effect” is just what happened here. The prior art is missing key claim limitations and the record lacks the required motivation. Petitioner attempted to fill the gaps with “skill in the art.” But this alleged skill is found only in the ’838 patent itself.

The record shows that skilled artisans did not have a reasonable expectation that Betts’ divided enclosures could be morphed into a lavatory. This also forecloses obviousness. “An obviousness determination requires that a skilled artisan would have perceived a reasonable expectation of success in

making the invention in light of the prior art.” *OSRAM Sylvania, Inc. v. Am. Induction Techs., Inc.*, 701 F.3d 698, 706-07 (Fed. Cir. 2012). This “reasonable expectation of success” must be present in addition to the required “motivation,” which is lacking as described above. *Intelligent Bio-System v. Illumina*, Case No. 15-1693, 2016 WL 2620512 at *6, (Fed. Cir. May 9, 2016) (“It was [Petitioner’s] burden to demonstrate both ‘that a skilled artisan would have been motivated to combine the teachings of the prior art references to achieve the claimed invention, and that the skilled artisan would have had a reasonable expectation of success in doing so’”) (emphasis added). Here, Zodiac’s witness admits that the prior art cannot be modified into a lavatory. Appx03392-93 90:24-91:4. There could be no “reasonable expectation of success” in a modification that experts agree could not have been done.

Mr. Anderson first admitted that, in forming his obviousness opinion: “I had never considered turning this [Betts] into a lavatory.” Appx03391 89:14-18. When asked to consider this critical issue, he admitted “I don’t believe this can be turned into a lavatory.” Appx03392-93 90:24-91:4. Anderson is a former employee of Boeing (the successor to Betts’ assignee) and an inventor on patents related to aircraft lavatory stall units. *See, e.g.*, Appx03269. He acknowledged that Betts is not relevant to space-saving lavatory designs: it was not “useful to [him] with [his own] invention of the aircraft lavatory designed to efficiently use space.” Appx03356 54:18-22. Anderson also admitted that

there were no space-saving benefits to be gleaned from Betts. Appx03353

51:10-14 (“**Q.** And there was no space savings advantage that you could get from the Betts patent when you were designing this lavatory? **A.** No.”).

Anderson’s testimony confirms that one of skill in the art cannot, would not, and actually did not attempt to use Betts to make a space-saving lavatory. Yet, the Board did not address any of Anderson’s conflicting testimony.⁵

Finally, not only is it impossible to transmogrify Betts into a lavatory, doing so would fundamentally alter Betts and render it inoperable for its intended purpose. This also forecloses obviousness. An obviousness conclusion cannot be based on modifying a prior art reference in a manner such that “it would be rendered inoperable for its intended purpose.” *In re Gordon*, 733 F.2d 900, 902 (Fed. Cir. 1984); *see also* MPEP 2143.01 V (“The Proposed Modification Cannot Render the Prior Art Unsatisfactory For Its Intended Purpose”). A proposed modification is not obvious when the “suggested combination of references would require a substantial reconstruction and redesign of the elements shown in [the prior art], as well as a change in the

⁵ The Board erroneously did not reconcile, explain, discuss, or even substantively consider Dr. Dershowitz’s detailed analysis regarding non-obviousness. Dershowitz, an expert in Aerospace and Mechanical Engineering, explained why Betts would not be combined with an aircraft lavatory. *See, e.g.*, Appx03667-70 ¶¶ 159-166. The Board improperly justified ignoring this evidence simply because “we [the Board] do not rely on any of that evidence in a manner ultimately adverse to Petitioner.” Appx00031.

basic principles under which the [the prior art] construction was designed to operate.” *Application of Ratti*, 270 F.2d 810, 813 (C.C.P.A. 1959); *see also* MPEP 2143.01 VI (“the proposed modification cannot change the principle of operation of a reference”).

Here, the primary “intended purpose” of Betts is to provide an “elevated coat closet.” Indeed, Betts is entitled “Silent Drive Coat Hanger Mechanism.” The patent is directed to the coat-raising mechanism that allows the elevated coat closet to be removed from the seatback’s recline area, not nestled with the seatback. *See, e.g.*, Appx01041-45, Abstract, Figs 2-6, Cols. 1:1-2:5, 2:25-4:3, Claims 1-8. To transform Betts’ divided spaces into a lavatory, that entire mechanism—the entire purpose and core of the reference’s existence—would be unnecessary and would need to be removed (in addition to completely reworking its deeply angled walls, flat-backed seats, and divided spaces and then accommodating all of the complexity that a lavatory requires). Appx03392 90:9-19. Well beyond a “substantial reconstruction and redesign,” Betts’ invention would be deleted and its “intended purpose” would be gone.

In sum, there is no motivation or reason in the record to take the Betts configuration and apply it to a lavatory, and the Board did not articulate one. Those of skill in the art have no reasonable expectation of success in transforming Betts into a lavatory, and doing so would render Betts inoperable

for its intended purpose. For these additional reasons, the Board's decision should be reversed.

C. The Board erred by dismissing the objective evidence that confirms that the claims would not have been obvious.

Even had there been a *prima facie* showing of obviousness based on Betts and Mr. Anderson's conclusory statement regarding lavatories, the objective evidence confirms that the '838 patent's inventions would not have been obvious. This is another, independent basis for reversal.

Objective evidence is often the most important consideration when technology appears simple at first glance. In fact, the Federal Circuit has explained that "objective consideration of simple technology is often the most difficult because, once the problem and solution appear together in the patent disclosure, the advance seems self-evident." *Mintz v. Dietz & Watson, Inc.*, 679 F.3d 1372, 1379 (Fed. Cir. 2012). Objective evidence "may often establish that an invention appearing to have been obvious in light of the prior art was not." *Transocean Offshore Deepwater Drilling, Inc. v. Maersk Drilling USA, Inc.*, 699 F.3d 1340, 1349 (Fed. Cir. 2012). In fact, "[i]t is the secondary considerations that are often most probative and determinative of the ultimate conclusion of obviousness or nonobviousness." *Pro-Mold & Tool Co. v. Great Lakes Plastics, Inc.*, 75 F.3d 1568, 1573 (Fed. Cir. 1996). This is because "[o]bviousness requires a court to walk a tightrope blindfolded (to avoid

hindsight)—an enterprise best pursued with the safety net of objective evidence.” *Mintz*, 679 F.3d at 1379. Here, the objective indicia of nonobviousness is compelling and overwhelms any *prima facie* obviousness (which was never established in any event).

1. B/E’s Spacewall product embodies the ’838 claims.

B/E earned enormous success and industry acclaim for its patented, space-saving aircraft lavatory, known as the B/E Advanced Modular Lavatory featuring B/E’s Spacewall technology, introduced in 2012. Appx03756-57 ¶ 9. B/E’s lavatory clearly embodies the ’838 patent. Indeed, the Board does not question that the required nexus is present. *See, e.g.*, Appx00022. Even Petitioner’s expert admits

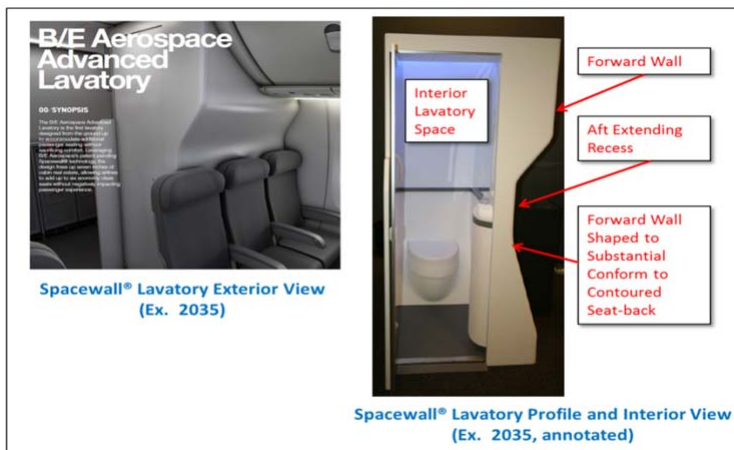
that B/E’s product practices the ’838 patent.

Appx03400-02 98:17-

100:1 (Referencing

Appx03290, which depicts

B/E’s Spacewall product). And for good reason.



As the ’838 patent explains, B/E’s Spacewall technology frees up valuable interior cabin space, which enables airlines to add seats without sacrificing comfort or lavatory functionality. Appx03742-47 ¶¶ 65-71, 74-77. By removing wasted space, the Spacewall lavatory frees approximately seven

inches of space, per lavatory, in a Boeing 737. *See, e.g.*, Appx03786; Appx03759, ¶ 14. When placed at multiple lavatory locations in the aircraft, this can allow up to six additional seats. *Id.* The significant positive publicity that B/E has received also references the patented Spacewall design. *See, e.g.* Appx03195; Appx03763-64 ¶ 22. Nexus is not a question here.

2. The '838 patent's embodiments received immediate and strong commercial success and industry acceptance.

B/E's Spacewall lavatories have been extremely successful in the market. For example, on January 17, 2012, Boeing awarded B/E an exclusive contract to supply its Spacewall lavatory systems to Boeing's new 737 family of airplanes, displacing the incumbent supplier of prior art lavatories. Appx03182; Appx03188; Appx03760 ¶ 15; Appx03408-9 106:17-107:3. The contract's estimated value exceeds \$800 million. *Id.* Aircraft industry pundits trumpeted B/E's Spacewall innovation, praising B/E for creating "a modular lavatory [that] is currently taking the industry by storm." Appx03195; Appx03763-64 ¶ 22.

The Board improperly rejected B/E's extensive commercial success evidence by elevating the discussion in a single court decision into a list of elements required for every showing of commercial success. Appx00023 (citing *Vandenberg v. Dairy Equip. Co.*, 740 F.2d 1560, 1567 (Fed. Cir. 1984)). In *Vandenberg*, this Court found a lack of commercial success

regarding different products, that embodied a different patent, in a different industry, based on evidence available in a full district court litigation. The *Vandenberg* decision did not purport to provide an exclusive or exhaustive list of required factors and evidence necessary to prove commercial success. Rather, on the facts of that case, the Court rejected commercial success evidence because “appellants failed to show how sales of the patented device compared to sales of their previous model, or what percentage of the market their new model commanded ... [and] have failed to show [the required] nexus.” *Id.* at 1567. That is not at all the case here. Zodiac admits and the Board does not question nexus. *See, e.g.*, Appx00022. Further, B/E had no previous model of OEM lavatory, so there is no prior model comparison to make. Appx03755 ¶ 7. Indeed, it was because of its patented lavatory that B/E broke into this market to begin with. And B/E explained that it captured 100% of the market share for new Boeing 737 aircraft, completely displacing the incumbent provider. *Id.* Appx03760 ¶ 15 (“The Boeing Company had selected B/E Aerospace to be the exclusive manufacturer of modular lavatory systems for Boeing’s 737 Next-Generation family of airplanes”) (emphasis added).

Further, the Board here required more to demonstrate commercial success than the Federal Circuit has ever required litigants to show. In criticizing B/E’s commercial success evidence, the Board’s requirements were oppressive and untenable:

For example, Patent Owner does not tell us: how many years over which the \$800 million is spread; how much revenue Patent Owner's competitors estimate they will make off aircraft lavatory manufacturing over the same period;⁶ how much Patent Owner has made over prior spans of the same number of years (in constant dollars);⁷ what the global market sales revenue is for aircraft lavatories each year⁸ and what share of that belongs to Patent Owner; or whether the share has changed since Patent Owner introduced Spacewall and by how much.⁹

Appx00023.

But the Federal circuit has never required this much detail about competitors and unrelated third parties to prove commercial success. For example, this court has held “sales figures alone are also evidence of commercial success.” *Tec Air, Inc. v. Denso Mfg. Mich. Inc.*, 192 F.3d 1353, 1361 (Fed. Cir. 1999). And evidence of switching from prior art designs to a patented design (just as Boeing did here) is further evidence of commercial success, without the detailed financial and market analysis the Board demanded of B/E. *Al-Site*

⁶ Such extensive discovery into non-party confidential information would be far outside what is available in IPR proceedings. *See, e.g.*, 35 U.S.C. 316(a)(11)(IPR must generally conclude in 1 year); 35 U.S.C. 316(a)(5) (in IPR “discovery shall be limited”)

⁷ The evidence actually does show that B/E did not have an OEM lavatory previously, so it did not make any money in prior years on such products. Appx03755 ¶ 7

⁸ Here, the Board's requirement would necessitate extensive and time consuming economic analysis and accompanying international discovery of B/E's competitors around the globe.

⁹ Again, the record does show that B/E's share of the OEM market did increase from zero, to it being the “exclusive” supplier of lavatories in new Boeing 737s. Appx03760 ¶ 15

Corp., 174 F.3d at 1325 (commercial success demonstrated by evidence that all retail chains that sold Magnivision glasses “wanted to switch from the prior art displays to Magnivision’s patented displays.”).

Here the record is clear that B/E’s patented technology was “taking the industry by storm” and allowed B/E to enter a market that previously was controlled by Zodiac and others. Appx03195. Obtaining contracts for aircraft interior products is extraordinarily difficult, particularly when there are existing incumbent suppliers. Appx03721-29 ¶¶ 17-39. Yet, the airline industry immediately jumped at the opportunity to purchase B/E’s Spacewall lavatory, the commercial success of which provides compelling evidence of non-obviousness. Appx03730-36 ¶¶ 45-54, Appx03742-47 ¶¶ 64-77.

The Board improperly characterized B/E’s commercial success as “weak” in view of its misinterpretation of applicable Federal Circuit precedent. The Board also erroneously ignored the substantial record evidence, including a detailed declaration from Thomas Boozer, a former Singapore Airlines vice president and aviation industry expert. Appx03716-17 ¶ 6. Boozer explained the enormous challenges that must be overcome to introduce aircraft interior products to the market and how Spacewall’s unique, patented features enabled its commercial success despite those challenges. Appx03721-48 §§ 4-6. B/E’s market share, as evidenced in part by the Boeing contract, is “very substantial,” particularly due to the difficulties in becoming a qualified supplier and

displacing established suppliers with long-term contracts. *Id.* ¶¶ 11, 17-31. Industry considerations long counseled against altering the prior art, flat-shaped lavatory walls. *Id.* ¶¶ 61-64. Overcoming this inertia was tremendously difficult. *Id.* ¶¶ 45-54, 73. Yet, B/E was quickly successful when it introduced Spacewall, won the Boeing contract, and had a major airline begin to retrofit its lavatories with Spacewall. *Id.* ¶¶ 65-72, 75-77. Against this evidence, there could be no serious dispute regarding the enormity of the '838 patent's commercial success. Yet, the Board erroneously ignored all of Mr. Boozer's opinions.¹⁰

On September 30, 2013, B/E announced Boeing's first delivery of a Boeing Next-Generation 737-900ER that featured Spacewall. Appx03760 ¶ 16. That airplane was only the first of 100 planes featuring Spacewall that Delta ordered from Boeing. *Id.*; Appx03189. On April 8, 2013, B/E announced that Alaska Airlines had decided to retrofit its entire Boeing 737 fleet with Spacewall lavatories. Appx03760-61, ¶ 17. Boeing selected B/E's patented design "to provide greater value to our airplane customers by freeing up floor space in the cabin." Appx03183; Appx03761-62 ¶ 19. The Board erroneously

¹⁰ The Board also erroneously ignored Boozer's explanation regarding why one of ordinary skill would understand (1) Betts to disclose a seatback that is flat in an upright (and vertical) position, *Id.* ¶¶ 55-57, (2) Betts' separate overhead and floor-mounted storage spaces are not an "enclosure unit." *Id.* ¶¶ 58-60.

ignored this evidence.

3. The patented products received significant industry praise and awards based on the patented features.

B/E's evidence of industry praise includes industry articles and analyses discussing the patented products' revolutionary features, and industry awards and recognition. The Board did not properly consider this evidence. Rather, the Board summarized B/E's praise and awards before inexplicably dismissing them as merely "moderate evidence of industry praise" (Appx00024):

For evidence of industry praise, Patent Owner points to its Spacewall lavatory product ("Spacewall"), which Patent Owner asserts "is a commercial embodiment of the '838 patent." PO Resp. 56. Patent Owner presents evidence that Spacewall received the Crystal Cabin Award, which Patent Owner asserts is "the premier international honor bestowed for excellence in aircraft interior design." *Id.* at 58 (citing Ex. 2033 ¶ 25). Other evidence cited by Patent Owner reveals that there are seven such awards annually, one in each of seven categories. Ex. 2010, 1–2. Patent Owner also presents evidence of complimentary remarks about Spacewall that appeared in the *Wall Street Journal*, *Barron's*, and *APEX* blog. PO Resp. 59 (citing Ex. 2033 ¶¶ 21–24; Exs. 2006–2009).

Appx00022.

This rote recitation and unexplained dismissal of critical evidence is itself grounds for reversal. *Cutsforth*, 2016 WL 279984 at *3.

Contrary to the Board's view, B/E's products embodying the '838 patent received overwhelming praise and awards that were due directly to the patented features. Appx03742-47. There is nothing "moderate" about it. In

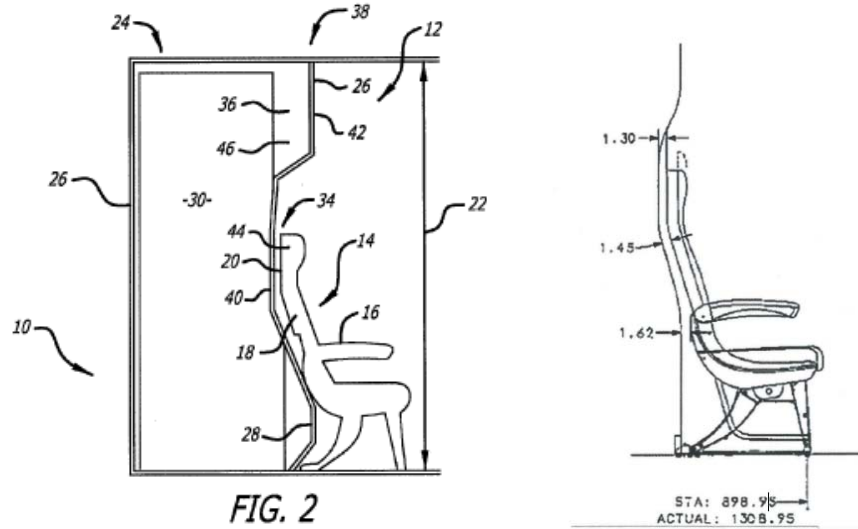
April 2014, at the annual aircraft interiors industry trade show, B/E was awarded the Crystal Cabin Award for Industrial Design & Visionary Concepts for its Spacewall lavatory. Appx03199; Appx03766-68 ¶¶ 25-28. The Crystal Cabin is the premier international honor bestowed for excellence in aircraft interior design. Appx03766 ¶ 25. The Awards Association lauded the Spacewall lavatory for allowing “six additional seats to be integrated into an aircraft without sacrificing space or comfort within the toilet cabin and without restricting the space for passengers in other seating rows.” Appx03199 (“The 7 best products for aircraft cabins in 2014”); Appx03767-68 ¶ 28.

Independent industry experts also took note, calling B/E’s product “ground-breaking,” comparing it to “a celebrity . . . currently taking the industry by storm,” and noting that its adoption has already “caused a major stir in the passenger experience community.” Appx03763-65 ¶¶ 21-23; Appx03192-96. These experts emphasized how Spacewall distinguishes B/E’s lavatory from rival offerings, including those by “incumbent Zodiac Aerospace.” Appx03763 ¶ 21; Appx03192. Barons observed that “B/E Aerospace is Flying High” because Spacewall allows “airlines to add as many as six additional coach seats in every cabin,” and thus, “[a]s airlines look for more space, a big winner is B/E Aerospace” Appx03765-66 ¶ 24; Appx03197.

If this substantial evidence is “moderate,” it is hard to contemplate praise that would suffice to overcome any *prima facie* obviousness determination.

4. Zodiac copied the patented products.

Zodiac has been a major supplier in the aircraft lavatory market for decades. But until recently it had offered only flat-walled lavatories. It was not until Zodiac saw B/E’s curved-wall Spacewall product that Zodiac produced a replica. Zodiac introduced its own curved wall lavatory in 2013, a year after Boeing awarded its contract to B/E (for which Zodiac also competed). Appx04165. Zodiac’s new lavatory is substantially similar (if not identical) to B/E’s product. As Zodiac’s expert admits, Zodiac’s product (shown on the right below) practices the ’838 patent claims. Appx03398-400 96:12-98:11 (referencing Ex. 2018, a depiction of Zodiac’s curved wall lavatory “Q: So assuming that what you identified before is an enclosed space, with that assumption, does this figure fall within the scope of Claim 9? A: Yes.”). Compare Appx00036 (’838 figure 2) with Appx03289 (Zodiac product drawing, Ex. 2018).



Zodiac admitted that it had access to B/E's commercial product.

Zodiac's expert and part-time consultant testified (objections omitted):

Q: Are you familiar with any of B/E's lavatory products that have a curved front-facing wall?

A: Yes, I am.

Q: How are you familiar with that lavatory?

A: If we're talking about the current product offering by B/E Aerospace, I know it because it's a choice of some customers in the 737, I understand. And I may have seen prototypical versions of it while I worked at Boeing.

Appx03408-9 106:17-107:3.

After admitting that this Zodiac consultant had access to B/E's product, Zodiac blocked all discovery of its copying, and throughout the IPR proceeding

Zodiac never denied that it copied.¹¹ The substantial similarity of Zodiac’s product to the patented product, together with Zodiac’s access to the patented product, is strong evidence of copying. *Wyers v. Master Lock Co.*, 616 F.3d 1231, 1246 (Fed. Cir. 2010) (“Our case law holds that copying requires evidence of efforts to replicate a specific product, which may be demonstrated through ... access to the patented product combined with substantial similarity to the patented product.”).

Zodiac now contends that the innovation that created a new lavatory market—the same innovation that Zodiac promptly copied—is retroactively obvious. But “the litigation argument that an innovation is really quite ordinary carries diminished weight when offered by those who had tried and failed to solve the same problem, and then promptly adopted the solution that they are now denigrating.” *Heidelberger Druckmaschinen AG v. Hanatscho Comm. Prod., Inc.*, 21 F.3d 1068, 1072 (Fed. Cir. 1994). Zodiac’s decision to adopt B/E’s contoured wall solution, together with its many years of experience in the industry without such a product, is strong evidence of non-obviousness. *Specialty Composites v. Cabot Corp.*, 845 F.2d 981, 991 (Fed. Cir. 1988).

¹¹ The Board erred by refusing to allow B/E to collect further evidence of Zodiac’s copying. *See, e.g.* Appx03142-53 15:21-26:16. Despite that Zodiac admits it had prior access to the B/E product, the Board did not consider this fact in its copying analysis, as it should have in accordance with *Wyers v. Master Lock Co.*, 616 F.3d 1231, 1246 (Fed. Cir. 2010).

5. Despite owning the instituted prior art for decades, the owners never created a curved wall lavatory, and instead purchased B/E's commercial embodiment.

Betts was patented in 1973 by McDonnell-Douglas. It was implemented and flown in commercial DC-10 aircraft for decades. Appx03396 94:9-19. McDonnell-Douglas has since merged with Boeing. For over 30 years, neither Boeing nor McDonnell-Douglas created a curved wall lavatory. To the contrary, Boeing immediately recognized the value and novelty of B/E's Spacewall and chose to pay \$800M to use B/E's patented technology. And, as discussed above, Zodiac's approach was even simpler: it copied from B/E. If the '838 patent's inventions had been obvious, Zodiac, Boeing, McDonnell-Douglas and others in the industry would have implemented them in lavatories decades before rather than copying B/E's technology or paying enormous sums to acquire it.

CONCLUSION

“The ultimate conclusion of obviousness is a legal conclusion to be reached after weighing all the evidence on both sides.” *Apple Inc. v. Int’l Trade Comm’n*, 725 F.3d 1356, 1365 (Fed. Cir. 2013). This conclusion is reviewed *de novo*. *Belden*, 805 F.3d at 1073. Here, the weight of evidence makes clear that the challenged claims are not obvious, and the Board made multiple errors in reaching the opposite decision.

The Board first deleted essential elements from the claims to expand their scope. It also rewrote other elements so fundamentally that they encompass exactly the opposite of what the claims recite. Properly construed, the prior art of record lacks critical claim elements. Further the Board erred in concluding, without explanation, that the prior art would be modified, where the record is devoid of any motivation for such modifications. The Board also erred by brushing aside extensive objective evidence of commercial success and industry awards and acclaim, which have no explanation if the patented inventions would have been obvious based on a single patent, regarding a completely unrelated mechanism (a coat rack), filed over 35 years earlier.

True, with the ’838 patent in hand, it may seem like what B/E created was simple. But no one, for over 35 years after Betts, created B/E’s patented lavatory stall units—not the Betts owners and not even Petitioner, all of whom had been major players in this precise industry for a long time. In light of all

this evidence, concluding that the patent is obvious because it appears simple is merely a demonstration of “the insidious effect” of hindsight. Some of the most insightful and elegant solutions to previously-intractable problems appear, in hindsight, simple. The Court must protect against penalizing such solutions and their inventors.

The Board’s obviousness conclusion was contrary to law, contrary to the evidence, and should be reversed.

Dated: May 19, 2016

/s/ Benjamin Haber

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ADDENDUM

- **FINAL WRITTEN DECISION – APPX00001-APPX00033**
- **'838 PATENT – APPX00034-APPX00040**

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

C&D ZODIAC, INC.,
Petitioner,

v.

B/E AEROSPACE, INC.,
Patent Owner.

Case IPR2014-00727
Patent 8,590,838 B2

Before MICHAEL J. FITZPATRICK, SCOTT A. DANIELS, and
CARL M. DEFRANCO, *Administrative Patent Judges*.

FITZPATRICK, *Administrative Patent Judge*.

FINAL WRITTEN DECISION
35 U.S.C. § 318; 37 C.F.R. § 42.73

Appx00001

I. INTRODUCTION

Petitioner, C&D Zodiac, Inc., filed a corrected Petition for an *inter partes* review of claims 1, 3–10, 12–14, 16–22, 24–31, and 33–38 of U.S. Patent No. 8,590,838 B2 (“the ’838 patent”). Paper 4 (“Pet.”). Patent Owner, B/E Aerospace, Inc., filed a Preliminary Response pursuant to 35 U.S.C. § 313. Paper 12 (“Prelim. Resp.”). In an October 29, 2014, Decision, we instituted trial on all challenged claims as follows:

- (1) claims 1, 3–7, 9, 10, 12–14, 16–19, 21, 22, 24–29, 31, and 33–37 as asserted to be unpatentable under 35 U.S.C. § 103(a)¹ in view of Betts (Ex. 1003)²; and
- (2) claims 8, 20, 30, and 38 as asserted to be unpatentable under 35 U.S.C. § 103(a) in view of Betts and the Orange Book (Ex. 1004).³

Paper 15 (“Inst. Dec.”).

After institution, Patent Owner filed a Second Corrected Patent Owner Response (Paper 31, “PO Resp.”), Petitioner filed a Reply (Paper 41, “Pet. Reply”), and an oral hearing was held on June 30, 2015.⁴

¹ The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, took effect on March 18, 2013. Because the application from which the ’838 patent issued was filed before that date, our citations to Title 35 are to its pre-AIA version.

² U.S. Patent No. 3,738,497 (June 12, 1973).

³ McDonnell Douglas DC-10 Customer Configuration Summary (Oct. 1978), which is commonly referred to as the “Orange Book” (Ex. 1008 ¶ 4), presumably because its cover is colored orange. *See* Ex. 1004, 1.

⁴ A transcript of the oral hearing is included in the record under seal. Paper 63. A public version of the transcript with redactions to portions of a single sentence is

As discussed below, Petitioner has shown by a preponderance of the evidence that claims 1, 3–7, 9, 10, 12–14, 16–19, 21, 22, 24–29, 31, and 33–37 of the '838 patent are unpatentable as obvious over Betts. But, Petitioner has *not* shown by a preponderance of the evidence that claims 8, 20, 30, and 38 are unpatentable as obvious in view of Betts and the Orange Book, as Petitioner has not established that the evidence relied upon within the Orange Book is a printed publication.

A. Related Proceedings

Patent Owner asserted the '838 patent against Petitioner in *B/E Aerospace, Inc. v. Zodiac Aerospace, Inc.*, No. 2:14-cv-210 (E.D. Tex.). Pet. 1; Paper 7, 2. The lawsuit was unilaterally terminated by Patent Owner on June 19, 2014, via a Notice Of Voluntary Dismissal Of Complaint Without Prejudice.

B. The '838 Patent

The '838 patent relates to space-saving aircraft enclosures, including lavatories, closets, and galleys. Ex. 1001, 1:14–19, 2:18–22. Figure 2 of the '838 patent is reproduced below.

also included in the record. Paper 64 (“Tr.”).

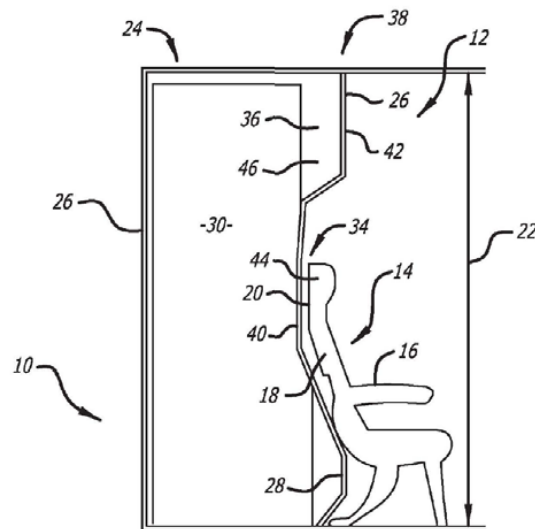


FIG. 2

Figure 2, reproduced above, illustrates enclosure 10, such as a lavatory, positioned aft of aircraft cabin 12. Ex. 1001, 4:8–13. The lavatory has walls that define interior lavatory space 30. *Id.* at 4:20–25. Forward wall 28 of the lavatory is described as “substantially not flat in a vertical plane” and “disposed immediately aft of and adjacent to or abutting the exterior aft surface of” passenger seat 16. *Id.* at 4:14–26. In particular, the forward wall includes recess 34, which accommodates the partially-reclined backrest of the passenger seat, as shown in Figure 2. *Id.* at 4:25–29.

The '838 patent contrasts the embodiment of Figure 2 with a prior art configuration shown in Figure 1, which is reproduced below.

FIG. 1
(Prior Art)

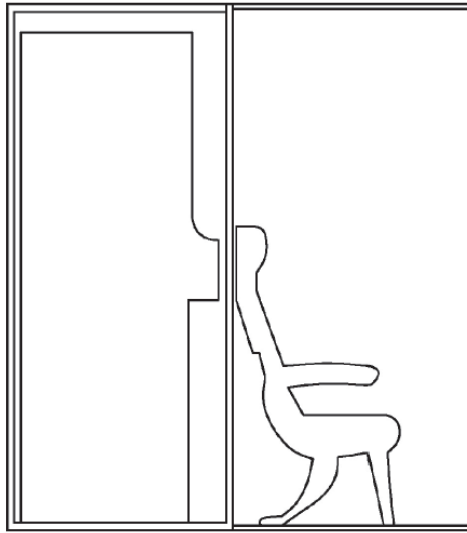


Figure 1, reproduced above, illustrates “a prior art installation of an aircraft lavatory immediately aft of and adjacent to an aircraft passenger seat.” Ex. 1001, 3:65–67. In the depiction of the prior art, a forward wall of the lavatory (double-lined structure immediately aft of seat) is flat in the vertical plane.

C. Illustrative Claims

Independent claim 1 and dependent claim 8 are illustrative and reproduced as follows:

1. A lavatory for a cabin of an aircraft, the cabin including a passenger seat having an aft portion that is substantially not flat in a vertical plane, the lavatory comprising:

a lavatory stall unit having at least one wall having a forward wall portion, said at least one wall defining an interior lavatory space, and said forward wall portion being configured to be disposed immediately aft of and adjacent to an aircraft cabin passenger seat

having an aft portion with an exterior aft surface having a shape that is substantially not flat in a vertical plane; and

wherein said forward wall portion is shaped to substantially conform to the shape of the exterior aft surface of the aft portion of the aircraft cabin passenger seat, and said forward wall portion includes an aft-extending recess in said forward wall portion configured to receive the aft portion of the aircraft cabin passenger seat therein.

8. The lavatory of claim 1, wherein said lavatory stall unit has a top, a bottom, a height therebetween, and a middle therebetween, said lavatory stall unit has varying lengths along the height of the lavatory stall unit, and said lavatory stall unit is longer at the top of the lavatory stall unit than at the bottom of the lavatory stall unit.

II. ANALYSIS

A. Claim Construction

“A claim in an unexpired patent shall be given its broadest reasonable construction in light of the specification of the patent in which it appears.” 37 C.F.R. § 42.100(b). That construction must be consistent with the specification, and the claim language should be read in light of the specification as it would be interpreted by one of ordinary skill in the art. *In re Suitco Surface, Inc.*, 603 F.3d 1255, 1260 (Fed. Cir. 2010). Thus, we give claim terms their ordinary and customary meaning. *See In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007) (“The ordinary and customary meaning is the meaning that the term

would have to a person of ordinary skill in the art in question.” (internal quotation marks omitted)).

Petitioner did not propose an express construction of any claim term. Pet. 7. Patent Owner proposed an express construction for several claim terms. PO Resp. 8–19.

1. “enclosure unit”

Independent claim 9, for example, recites “enclosure unit.” Patent Owner proposes it be construed as “a single functional space, enclosed on all sides.” PO Resp. 8. In doing so, Patent Owner asserts that the doctrine of claim differentiation supports its position because “enclosure unit” must be narrower than “enclosure.” PO Resp. 8 (citing *Phillips v. AWH Corp.*, 415 F.3d 1303, 1314–15 (Fed. Cir. 2005) (en banc)). But, Patent Owner is mistaken that claim differentiation applies, given the evidence Patent Owner presents. In that regard, Patent Owner instructs us to compare “Ex. 1001, 5:37 *with* 5:41.” PO Resp. 8. Line 37 of column 5 is part of the preamble of independent claim 9 and recites, in relevant part, “[a]n aircraft enclosure.” Ex. 1001, 5:37. Line 41 of column 5 is part of the body of the *same claim* and recites, in relevant part, “an enclosure unit.” *Id.* at 5:41. These are parts of the same claim. Thus, even if the preamble were limiting, the doctrine of claim differentiation would not apply here. *See Phillips*, 415 F.3d at 1314–15 (“Differences among claims can also be a useful guide in understanding the meaning of particular claim terms. For example, the presence of a dependent claim that adds a particular limitation gives rise to a presumption that the limitation in question is not present in the independent claim.”) (internal citations omitted).

Patent Owner does cite a case that is relevant to the use of different terms within the same claim. PO Resp. 9 (citing *Innova/Pure Water, Inc. v. Safari Water Filtration Sys., Inc.*, 381 F.3d 1111 (Fed. Cir. 2004)). In that case, the Court of Appeals held that “when an applicant uses different terms in a claim *it is permissible* to infer that he intended his choice of different terms to reflect a differentiation in the meaning of those terms.” *Innova*, 381 F.3d at 1119–20 (emphasis added). *Innova* thus does not *require* different constructions be given to “enclosure unit” and “enclosure.” In light of the specification, which uses the terms extremely similarly, we see no reason to give them different constructions. Compare Ex. 1001, 1:14–17 (“The present invention relates generally to aircraft enclosures, and more particularly relates to an aircraft cabin enclosure, such as a lavatory, an aircraft closet, or an aircraft galley, for example.”), with 2:27–28 (“The enclosure unit can be a lavatory, an aircraft closet, or an aircraft galley, for example.”). Both terms are inclusive of lavatories, aircraft closets, and aircraft galleys.

The specific construction proposed by Patent Owner for “enclosure unit”—that it be “a single functional space, enclosed on all sides”—is not supported by the intrinsic evidence. As just discussed, the ’838 patent states that “enclosure unit” includes an aircraft galley. Ex. 1001, 2:27–28. An aircraft galley is not necessarily enclosed on all sides, and it may serve multiple functions. Ex. 1020 ¶ 3 (“Galleys incorporate features such as storage areas, ovens, sinks, coffee makers, and the like, and are usually built up from individual panels, commonly referred to as modules.”).

The term “enclosure unit” encompasses lavatories, aircraft closets, and aircraft galleys. Given the grounds of unpatentability that Petitioner raises, there is no need to further construe this term.

2. “*lavatory stall unit*”

Whereas independent claim 1 recites “enclosure unit,” independent claim 9 recites “lavatory stall unit.” Patent Owner proposes the latter be construed as “a single room, enclosed on all sides, having a toilet and washbasin and large enough to fit a person inside.” PO Resp. 12. For reasons similar to those with respect to “enclosure unit,” we reject Patent Owner’s proposed construction of “lavatory stall unit.”

Further, given the grounds of unpatentability that Petitioner raises, there is no need to provide an express construction for this term. More specifically, Petitioner does not rely on any particular prior art lavatory. Indeed, Petitioner does not rely on either of the asserted references to teach a “lavatory stall unit,” instead relying on the knowledge and skill of a person of ordinary skill in the art.

3. “*substantially not flat in a vertical plane*”

Independent claim 1 recites (with emphasis added) “a passenger seat having *an aft portion that is substantially not flat in a vertical plane.*” Patent Owner proposes that the italicized language be construed as “a back side shape that is contoured or substantially non-planar in an upright position.” PO Resp. 13.

Similar to claim 1, each of independent claims 9, 21, and 31 recites (with emphasis added) a “passenger seat having *an aft portion with an exterior aft surface having a shape that is substantially not flat in a vertical plane.*” Patent

Owner proposes that the italicized language be construed as “a back side shape with a back exterior surface that is contoured or substantially non-planar in an upright position.” PO Resp. 13–14.

These proposed constructions would render the claim language “in a vertical plane” meaningless because tilting a seatback between an upright position and another position would have no effect on the shape of the aft surface of the seatback. Therefore, we do not adopt them. *See Cardiac Pacemakers, Inc. v. St. Jude Med., Inc.*, 296 F.3d 1106, 1115 (Fed. Cir. 2002) (proposed construction that rendered a portion of the claim language meaningless held improper). Rather, we construe “in a vertical plane” according to its ordinary and customary meaning and consistent with the specification, which contrasts a forward wall in a vertical plane (*see* Fig. 1—the prior art) against a recessed forward wall (*see* Fig. 2—an embodiment of the claimed invention).

In sum, the full limitation at issue encompasses an aft portion (in the case of claim 1) and an aft portion with an exterior aft surface (in the case of claims 9, 21, and 31) that has a flat shape but which is not within a vertical plane. This is within the broadest reasonable construction in light of the Specification, which discloses a substantially conforming recessed forward wall positioned behind the seat (*see* Ex. 1001, Fig. 2), as opposed to a wall that is flat in a vertical plane (*see id.* at Fig. 1).

4. *“forward wall portion is shaped to substantially conform to the shape of the exterior aft surface of the aft portion of the . . . passenger seat”*

In its Preliminary Response, Patent Owner had proposed that this term be construed to require that “the forward wall portion is shaped to generally match or coincide with the shape of the exterior back surface of the back of the . . .

passenger seat.” Prelim. Resp. 14. In instituting this *inter partes* review, we adopted Patent Owner’s proposed construction because it was the broadest reasonable construction in light of the Specification as it would be interpreted by one of ordinary skill in the art. Inst. Dec. 8.

In offering a construction for the instant limitation, Patent Owner now further argues the following:

Notably, in each claim, it is a very specific forward wall portion that must have this conforming shape. [Ex. 2027 ¶¶ 121–123.] The forward wall in question must be one that is “defining an interior [enclosure/lavatory space]” of the same “[lavatory stall/enclosure] unit” referenced throughout the claims. *Id.* Separate walls defining separate spaces for separate enclosures could not be the root for the claimed “forward wall portion,” even if such separate walls were shaped in the requisite manner. *Id.*

PO Resp. 19. Without saying so, Patent Owner is advancing a construction of different limitations of the independent claims, namely the forward wall “defining an interior lavatory space” in claims 1 and 31 and “defining an interior enclosure space” in claims 9 and 21. Confusingly, this is after Patent Owner proposed an express construction for these very terms. *See* PO Resp. 13 (proposing that these terms be construed to mean “forming a boundary or shape of the interior of the [lavatory/enclosure].”) (bracketed material not added).

The forward wall “defining an entire . . . space” does not mean fully enclosing the space, because the limitation is in reference to a *forward* wall. Hence, the forward wall is required to define merely the forward side of the space. Nothing more is required of that particular claim language. Patent Owner does not provide persuasive evidence, intrinsic or extrinsic, to support a construction of the

forward wall that would exclude a wall that defines the forward side of *two* spaces instead of one.

Patent Owner's construction clearly is designed to avoid Betts, which teaches a wall forward of both an overhead coat compartment and floor luggage space. But, the ground of unpatentability at issue is not anticipation by Betts but obviousness in view of Betts. Thus, even if we were to adopt Patent Owner's overly narrow construction, it would not save the claims because, as discussed below, Petitioner has shown that it would have been obvious to apply the recessed forward wall design of Betts to other enclosures, including single-spaced lavatories.

5. *"immediately aft of and adjacent to . . . passenger seat"*

Patent Owner proposes that this term, which is recited in all of the independent claims, be construed to mean "located behind and closely proximate to . . . passenger seat without intervening cabin structures." PO Resp. 17. Thus, Patent Owner's construction effectively would replace "aft" with "behind" and "adjacent" with "closely proximate . . . without intervening cabin structures." The claim term, however, does not need an express construction. Its plain and ordinary meaning is readily apparent.

B. Obviousness in View of Betts

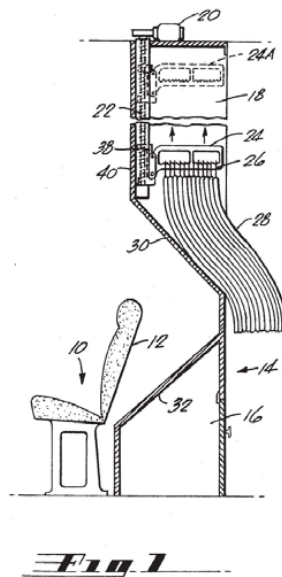
In assessing obviousness, "the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved." *Graham v. John Deere Co.*, 383 U.S. 1, 17 (1966). Additionally, secondary considerations

such as “commercial success, long felt but unsolved needs, failure of others, etc., might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented. As indicia of obviousness or nonobviousness, these inquiries may have relevancy.” *Id.* at 17–18.

Petitioner asserts that the subject matter of claims 1, 3–7, 9, 10, 12–14, 16–19, 21, 22, 24–29, 31, and 33–37 would have been obvious over Betts. Pet. 18–32.⁵ For reasons explained below, Petitioner has established this assertion by a preponderance of the evidence.

1. Disclosure of Betts

Figure 1 of Betts is reproduced below.



⁵ Petitioner asserted that the subject matter of claims 8, 20, 30, and 38 also would have been obvious over Betts, but we did not institute on this ground with respect to those additional claims. Inst. Dec. 25.

Figure 1 discloses airplane passenger seat 10 having tiltable backrest 12. Ex. 1003, 2:8–9. Behind the seat is coat closet 14, which has luggage space 16 along the floor and overhead coat compartment 18. *Id.* at 2:9–14. “The lower portion 30 of the coat compartment 18 slants rearwardly to provide a space for seatback 12 to be tilted rearwardly as desired by the occupant. The top 32 of storage space 16 also slants rearwardly so as not to interfere with seatback 12 when tilted.” *Id.* at 2:19–24. Thus, together slanting wall portions 30 and 32 form a recess in the forward wall of the overhead coat compartment/floor luggage space.

2. The Independent Claims

a. Independent Claim 1

Betts discloses all of the features of claim 1 except for the lavatory-specific limitations. Ex. 1003, Fig. 1. Petitioner offers testimony from Alan Anderson that it would have been obvious to a person of ordinary skill in the art⁶ at the time of the invention to apply the recessed design of the forward wall of Betts to other aircraft enclosures, including lavatories. Ex. 1009 ¶¶ 65–68. In particular, Mr. Anderson testifies that a person of ordinary skill in the art would have been

⁶ Mr. Anderson opines that a person of ordinary skill in the art would be someone having “a bachelor’s degree in mechanical engineering, industrial design, or a similar discipline, or the equivalent experience, with at least two years of experience in the field of aircraft interior design.” Ex. 1009 ¶ 30. Adam Dershowitz opines, on behalf of the Patent Owner, that the person of ordinary skill in the art would have had the same or similar education background but a few more years of experience in the field. Ex. 2027 ¶ 43. Our legal conclusions of obviousness in this Decision are supported by either level of skill.

motivated to efficiently use space on an aircraft, as evidenced by Betts, “to provide more room for passengers.” *Id.* ¶ 65 (quoting Ex. 1003, 1:6–7). Mr. Anderson further testifies that Betts teaches the person of ordinary skill in the art a recessed forward wall configuration that uses space more efficiently than a flat configuration, and that a person of ordinary skill in the art would have been motivated to apply the recessed configuration to other aircraft enclosures, including lavatories.

Patent Owner argues that a person of ordinary skill in the art “would have been discouraged from attempting to tailor Betts’ divided space design to any lavatory stall unit (or any other enclosure unit) because Betts required separate enclosures divided both functionally and spatially.” PO Resp. 29. But, Petitioner’s ground of unpatentability is not premised on whether it would have been practical or possible to convert Bett’s “divided space” (i.e., its overhead coat compartment and floor luggage space) into a lavatory. Rather, Petitioner argues that it would have been obvious to apply Bett’s recessed forward wall design to other aircraft enclosures, including a lavatory. Pet. 19 (“One of ordinary skill in the art would recognize that the teachings of the McDonnell Douglas patent [i.e., Betts] are equally applicable to the forward walls of other enclosure units, such as lavatories or galleys.”) (citing Ex. 1009 ¶¶ 65–68); *cf. In re Etter*, 756 F.2d 852, 859 (Fed. Cir. 1985) (en banc) (“Etter’s assertions that Azure cannot be incorporated in Ambrosio are basically irrelevant, the criterion being not whether the references could be physically combined but whether the claimed inventions are rendered obvious by the teachings of the prior art as a whole.”); *In re Keller*, 642 F.2d 413, 425 (CCPA 1981) (“The test for obviousness is not whether the

features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art.”).

Patent Owner argues that the aft portion of the seat in Betts does not meet the “substantially not flat in a vertical plane” limitation because it is flat. PO Resp. 31. That argument is premised on an erroneously narrow construction of the limitation, which we rejected above. Although the aft portion of the Betts seatback is flat, it is not flat in a vertical plane.

Patent Owner argues that Betts does not disclose positioning a forward wall “immediately aft of and adjacent to” an aircraft passenger seat. PO Resp. 27–29. But, Betts depicts the seat immediately in front of the lowest portion of the forward wall (i.e., the vertical wall portion below lower slanting wall 32). Ex. 1003, Fig. 1. This alone meets the limitation in question. Further, Betts expressly teaches that the backrest is tiltable toward lower slanting wall 32, the slanting of which is meant to accommodate the tilting. *Id.* at 2:19–24.

Finally, Patent Owner presents arguments concerning purported distinctions between Betts and the challenged claims. In particular, Patent Owner argues that Betts requires two separate compartments behind its forward wall and also machinery for its coat compartment. PO Resp. 22–27. None of these arguments addresses the obviousness ground raised by Petitioner, which is not premised on modifying the existing structure of the Betts embodiment illustrated in Figure 1,

but rather on applying its space-saving recessed forward wall design to other enclosure units, such as lavatories or galleys. *See, e.g.*, Pet. 19.

b. Independent Claims 9, 21, and 31

The remaining independent claims are of similar scope to claim 1. Independent claim 9 is similar to claim 1, with the primary difference being that, whereas claim 1 recites “a lavatory stall unit,” claim 9 recites “an enclosure unit that is taller than the passenger seat.” Independent claim 21 is similar to claim 9, with the primary difference being that claim 21 recites “an aircraft cabin passenger seat” as part of the claimed apparatus. Independent claim 31 is similar to claim 1, with the primary difference being that claim 31 recites “an aircraft cabin passenger seat” as part of the claimed apparatus. Applying the recessed forward wall design of Betts to an aircraft lavatory, which a person of ordinary skill in the art would have been motivated to do as discussed above with respect to claim 1, also renders obvious the subject matter of claims 9, 21, and 31.

3. The Dependent Claims

a. Claims 14 and 25

Claims 14 and 25 depend from claims 9 and 21, respectively, and additionally recite that the “enclosure unit comprises a lavatory stall, and said at least one wall defines an interior lavatory space.” This limitation is met by the asserted prior art because, as discussed above in connection with claim 1, it would have been obvious to apply the space-saving recessed forward wall design of Betts to other enclosure units, including lavatories.

b. Claims 10 and 22

Claim 10 depends from claim 9 and additionally recites that “the passenger seat is installed immediately forward of said enclosure unit.” Claim 22 depends from claim 21 and additionally recites that “the aircraft cabin passenger seat is installed immediately forward of said aircraft enclosure unit.” These limitations are taught by Betts, as discussed above in connection with claim 1. *See* Ex. 1003, Fig. 1.

c. Claims 3, 12, 16, 24, and 33

Claim 3 depends from claim 1 and additionally recites that the “forward wall portion includes a forward projection configured to project over an aft portion of the seat back of the aircraft cabin passenger seat immediately forward of the lavatory stall unit.” Claims 12, 16, 24, and 33 recite similar limitations. To meet these limitations, Petitioner relies on Figure 1 of Betts, which shows upper slanting wall 30 forming a forward projection above a portion of seatback 12. Pet. 22 (citing Ex. 1003, 2:7–11, 2:19–22, Fig. 1). Wall 30 projects partly above the seatback even in the non-reclined configuration shown in Figure 1. When the seat is reclined, wall 30 projects above even more of the seatback. *See* Ex. 1003, 2:22–24 (discussing tilting of the seatback). We are persuaded that the prior art, as asserted by Petitioner, meets the additional limitations of these dependent claims.

d. Claims 4, 13, 26, and 34

Claim 4 depends from claim 3 and additionally recites that the “forward wall portion defines a secondary space in said interior lavatory space in an area forward of an aft-most portion of the forward wall portion above the seat back of the

aircraft cabin passenger seat.” Claims 13, 26, and 34 recite similar limitations. To meet these limitations, Petitioner relies on Figure 1, which shows upper slanting wall 30 defining a space above the backrest of the Betts seat and forward of the aft-most portion of the forward wall of the coat closet. Pet. 22 (citing Ex. 1003, 2:11–14, Fig. 1; Ex. 1009 ¶¶ 67–68). Patent Owner argues that the coat closet is a primary space in Betts, not a secondary space. PO Resp. 30. That argument, however, addresses Betts in isolation, whereas the asserted ground of unpatentability is based on a person of ordinary skill in the art applying the recessed forward wall design of Betts (which forms a space above the seatback) to other enclosure units, including lavatories. *Cf. In re Merck & Co.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986) (“Non-obviousness cannot be established by attacking references individually where the rejection is based upon the teachings of a combination of references.”).

The ’838 patent specification uses the term “secondary space” broadly and without providing much detail. For example, the specification provides the following:

In another presently preferred aspect, the forward wall portion defines a secondary space 36 in the interior lavatory space in an area 38 forward of an aft-most portion 40 of the forward wall portion, and the forward wall portion includes a forward projection 42 configured to project over the aft portion of the adjacent passenger seat back 44 immediately forward of the lavatory stall unit. The secondary space can include an amenity stowage space 46 inside the lavatory stall unit in the area forward of the aft-most portion of the forward wall portion, and the secondary space can include design elements providing visual space, such as a visual

perception of space, inside the lavatory in the area forward of an aft-most portion of the forward wall portion.

Ex. 1001, 4:33–45. In Figure 2, the '838 patent illustrates a secondary space 36. Other than its location, the Figure does not illustrate any details regarding the secondary space. *Id.* at Fig. 2, ref. 36. As set forth above, the specification does state that the “secondary space can include an amenity stowage space 46,” but it is not a requirement of a secondary space. *Id.* at 4:39–40.

We are persuaded that the prior art, as asserted by Petitioner, meets the “secondary space” limitation within the broadest reasonable construction of that term as read in light of the specification as it would be interpreted by one of ordinary skill in the art.

e. Claims 5, 17, 27, and 35

Claim 5 depends from claim 1 and additionally recites that the “forward wall portion includes a lower portion that extends under the aft portion of the aircraft cabin passenger seat.” Claims 17, 27, and 35 recite similar limitations. To meet these limitations, Petitioner relies on Figure 1 of Betts, which shows lower slanting wall 32 extending under the backrest. Pet. 23 (citing Ex. 1003, 2:7–11, 2:22–24, Fig. 1). We are persuaded that the prior art, as asserted by Petitioner, meets the additional limitations of these dependent claims.

f. Claims 6, 18, 28, and 36

Claim 6 depends from claim 1 and additionally recites that the “aft-extending recess in said forward wall portion is disposed between a forward-extending upper wall portion and a forward-extending lower wall portion.” Claims

18, 28, and 36 recite similar limitations. To meet these limitations, Petitioner relies on Figure 1 of Betts, which shows an aft-extending recess formed by the slanting upper and lower walls 30, 32. Pet. 23 (citing Ex. 1003, 2:19–24, Fig. 1). We are persuaded that the prior art, as asserted by Petitioner, meets the additional limitations of these dependent claims.

g. Claims 7, 19, 29, and 37

Claim 7 depends from claim 1 and additionally recites that the “aft-extending recess in said forward wall portion extends along substantially a full width of said forward wall portion.” Claims 19, 29, and 37 recite similar limitations. To meet these limitations, Petitioner relies, in part, on Figure 1 of Betts. Pet. 24 (citing Ex. 1003, Fig. 1). Patent Owner argues that Betts does not disclose such a feature. PO Resp. 53. However, Petitioner’s declarant, Mr. Anderson, points out that Figure 1 of Betts is a side elevation view and testifies that one of ordinary skill would have understood that the depicted recess extends the full width of the forward wall. Ex. 1009 ¶ 62. Mr. Anderson further testifies that, regardless of what is depicted, one of ordinary skill would have been motivated to extend the recess the full width of the forward wall in order to accommodate a full row of seats installed immediately forward of the wall. *Id.* ¶ 63. We agree with Petitioner that Figure 1 depicts a recess extending along the full width of the forward wall. We additionally find persuasive Mr. Anderson’s testimony that, even if Betts did not disclose such a configuration, it would have been obvious to one of ordinary skill in the art to extend the recess along the full width of the forward wall.

4. *Secondary Considerations*

As the Court of Appeals has “repeatedly held, ‘evidence rising out of the so-called ‘secondary considerations’ must always when present be considered en route to a determination of obviousness.’” *Transocean Offshore Deepwater Drilling, Inc. v. Maersk Drilling USA, Inc.*, 699 F.3d 1340, 1349 (Fed. Cir. 2012) (quoting *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1538 (Fed. Cir. 1983)). Thus, we turn now to the evidence of secondary considerations that Patent Owner has offered as purportedly demonstrating non-obviousness of the independent claims (and, thus, also the dependent claims). *See* PO Resp. 55–61.

In particular, Patent Owner asserts that its claimed invention has received industry praise and commercial success and has been copied. *Id.*

For evidence of industry praise, Patent Owner points to its Spacewall lavatory product (“Spacewall”), which Patent Owner asserts “is a commercial embodiment of the ’838 patent.”⁷ PO Resp. 56. Patent Owner presents evidence that Spacewall received the Crystal Cabin Award, which Patent Owner asserts is “the premier international honor bestowed for excellence in aircraft interior design.” *Id.* at 58 (citing Ex. 2033 ¶ 25). Other evidence cited by Patent Owner reveals that there are seven such awards annually, one in each of seven categories. Ex. 2010, 1–2. Patent Owner also presents evidence of complimentary remarks about Spacewall that appeared in the *Wall Street Journal*, *Barron’s*, and *APEX* blog. PO Resp. 59 (citing Ex. 2033 ¶¶ 21–24; Exs. 2006–2009).

⁷ Patent Owner does not specify which claims of the ’838 patent read on Spacewall.

Patent Owner's evidence of commercial success consists of a contract "to be the exclusive manufacturer of modular lavatory systems for Boeing's 737 Next-Generation family of airplanes, as well as the upcoming 737 MAX." PO Resp. 57. The contract is reportedly valued at \$800 million or more. Ex. 2004, 2. Although such a figure may sound impressive in vacuum, Patent Owner does not provide a frame of reference against which we can make an informed judgment of the evidentiary value of the \$800 million figure.

We are left with many unanswered questions with respect to the dollar figure provided by Patent Owner. For example, Patent Owner does not tell us: how many years over which the \$800 million is spread; how much revenue Patent Owner's competitors estimate they will make off aircraft lavatory manufacturing over the same period; how much Patent Owner has made over prior spans of the same number of years (in constant dollars); what the global market sales revenue is for aircraft lavatories each year and what share of that belongs to Patent Owner; or whether the share has changed since Patent Owner introduced Spacewall and by how much. Because questions like these are unanswered, the \$800 million figure does not compel a conclusion of commercial success. *See Vandenberg v. Dairy Equip. Co.*, 740 F.2d 1560, 1567 (Fed. Cir. 1984) ("appellants failed to show how sales of the patented device compared to sales of their previous model, or what percentage of the market their new model commanded").

Patent Owner's evidence of copying is limited to alleged copying by Petitioner, and not by any additional, third parties. PO Resp. 59–61. In that regard, Patent Owner argues that Petitioner has a product that allegedly "practices the '838 patent claims." *Id.* at 60. Even it were true that claims of the '838 patent

read on Petitioner's product—and we make no determination either way in that regard—such evidence alone is insufficient to establish copying as objective evidence of non-obviousness. *See Iron Grip Barbell Co. v. USA Sports, Inc.*, 392 F.3d 1317, 1325 (Fed. Cir. 2004) (“Not every competing product that arguably [falls] within the scope of a patent is evidence of copying. Otherwise every infringement suit would automatically confirm the nonobviousness of the patent.”). “Rather, copying requires the replication of a specific product.” *Id.* The Court of Appeals in *Iron Grip* listed specific examples of the types of evidence that can establish copying, none of which is present here. *See id.*

Considering all the evidence presented, including the strong evidence of obviousness in view of Betts, the moderate evidence of industry praise, and the weak evidence of copying and commercial success, we determine that claims 1, 3–7, 9, 10, 12–14, 16–19, 21, 22, 24–29, 31, and 33–37 would have been obvious over Betts to a person of ordinary skill in the art.

C. Obviousness in View of Betts and the Orange Book

Petitioner asserts that the subject matter of claims 8, 20, 30, and 38 would have been obvious over Betts in view of the Orange Book. Pet. 38–39, 43, 47, 49, 52.⁸

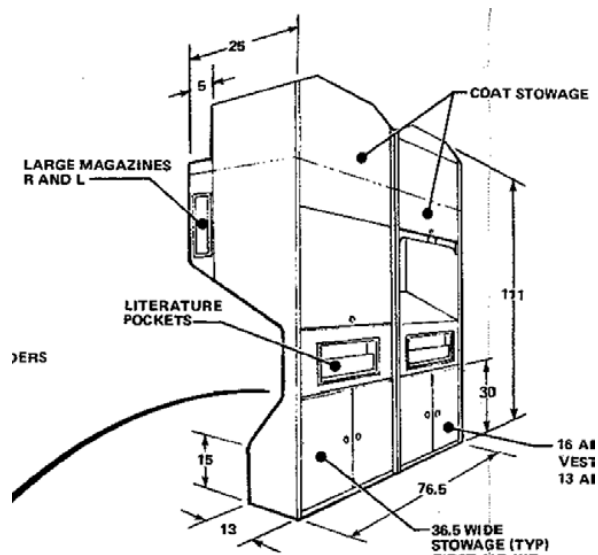
Claim 8 depends from claim 1 and additionally recites that the “lavatory stall unit has a top, a bottom, a height therebetween, and a middle therebetween, said

⁸ Petitioner also challenged other claims as obvious over Betts in view of the Orange Book, but we instituted on this ground only with respect to claims 8, 20, 30, and 38. Inst. Dec. 25.

lavatory stall unit has varying lengths along the height of the lavatory stall unit, and said lavatory stall unit is longer at the top of the lavatory stall unit than at the bottom of the lavatory stall unit.” Claims 20, 30, and 38 recite similar limitations. Figure 1 of Betts appears to disclose equal lengths at the top and bottom.

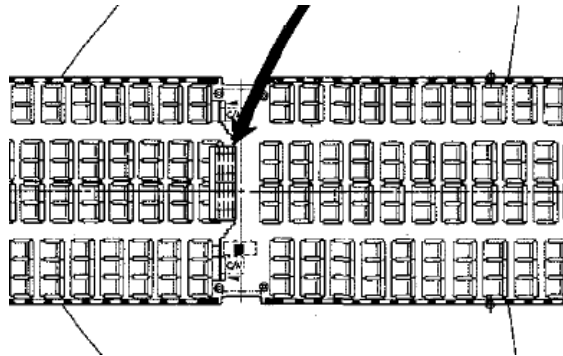
Ex. 1001, Fig. 1. Petitioner relies on McDonnell Douglas DC-10 Customer Configuration Summary (October 1978), also known as the Orange Book, to meet this limitation.

An illustration of the embodiment from page 5.3 of the Orange Book version in evidence here, and on which Petitioner relies, is reproduced below.



The illustration above shows an elevated coatroom having a recessed forward wall. Ex. 1004, 5.3. The forward wall has a greater length at the top (i.e., 20 inches) than at the bottom (i.e., 13 inches) of its elevated coatroom. Ex. 1004, 5.3.

Petitioner also relies on a related illustration from the same page of the Orange Book, depicting the location of the elevated coatroom within a passenger airplane, as reproduced below.



The illustration above shows placement of the elevated coatroom overlapping the aft portion of the last row of seats in a cabin portion. Petitioner offers testimony from Mr. Anderson that it would have been obvious to a person of ordinary skill in the art at the time of the invention to apply the recessed design of the forward wall of the elevated coatroom of the Orange Book (with its forward extension at the top being greater than at the bottom) to other aircraft enclosures, including lavatories, because Betts teaches that person to make efficient use of space in the aircraft interior cabin. Ex. 1009 ¶¶ 93–96.

Patent Owner argues, among other things, that the Orange Book is not a printed publication and, thus, cannot serve as a basis of holding any claim unpatentable in this *inter partes* review. PO Resp. 33; *see also* 35 U.S.C. § 311(b) (“A petitioner in an *inter partes* review may request to cancel as unpatentable 1 or more claims of a patent only on a ground that could be raised under section 102 or 103 and *only on the basis of prior art consisting of patents or printed publications.*”) (emphasis added).

Public accessibility is the touchstone for determining whether a printed document is a publication for prior art purposes. *In re Bayer*, 568 F.2d 1357, 1359 (CCPA 1978).

A document is publicly accessible if it “has been disseminated or otherwise made available to the extent that persons interested and ordinarily skilled in the subject matter or art, exercising reasonable diligence, can locate it and recognize and comprehend therefrom the essentials of the claimed invention without need of further research or experimentation.”

Cordis Corp. v. Boston Sci. Corp., 561 F.3d 1319, 1333 (Fed. Cir. 2009) (quoting *In re Wyer*, 655 F.2d 221, 226 (CCPA 1981)).

Petitioner presented declaration testimony from Jarold Newkirk regarding publication of the Orange Book. In particular, Mr. Newkirk testified that he was an employee of McDonnell Douglas Corporation (and its predecessor Douglas Aircraft Corporation) from 1962–2002, and that, in 1973, he joined the company’s commercial aircraft division, where his responsibilities included interior design and customer engineering. Ex. 1008 ¶ 3. Mr. Newkirk testified to having personal knowledge of the publication and distribution of the Orange Book to airline customers to provide those customers with customization options for interior cabins for the DC-10 aircraft. *Id.* ¶¶ 5–6. In fact, Mr. Newkirk initially testified that “[t]he copy of the Orange Book attached hereto as Exhibit A [i.e., Ex. 1004 in this proceeding⁹] is a true and correct copy of the Orange Book *as it appeared*

⁹ Compare Ex. 1008, “Exhibit A”, with Ex. 1004. (Petitioner should not have filed a duplicate of the Orange Book as an exhibit to Mr. Newkirk’s declaration. See 37 C.F.R. § 42.6(d). Instead, it should have directed Mr. Newkirk to refer to

when published and distributed publicly in October 1978.” Ex. 1008 ¶ 8 (emphasis added).

Patent Owner points out that the Orange Book is actually a three-ringed binder of loose-leaf pages that can be inserted or removed, for example, when updating the Orange Book. PO Resp. 33 (citing Ex. 2025; Ex. 2026); *see also* Ex. 1008 ¶ 7 (Mr. Newkirk testifying that McDonnell Douglas published “[u]pdated versions of the Orange Book”). This is significant because, on cross-examination, Mr. Newkirk admitted that he lacked personal knowledge of whether the version of the Orange Book submitted as Exhibit 1004 was actually published in October 1978.

Q. How do you know the particular copy you reviewed is exactly as it was published and distributed in October 1978?

A. Well, the way it was presented to me was that the person that had had it was given the book by McDonnell Douglas. And so based on that, I felt that it was, you know, an accurate book that was published at that time, based on the revision dates that were in the book. *I mean, whether or not it was exactly that, I have no knowledge.*

Q. And when you say “the person that had had it,” who are you referring to?

A. John Schoenberg.

Q. And who specifically gave to you the copy that you reviewed in preparing your declaration?

Exhibit 1004.)

A. Well, it was someone in our Legal department.

Q. Okay. Have you spoken with John Schoenberg about the Orange Book?

A. I have not.

Q. Did you ever get a copy of the Orange Book directly from John Schoenberg?

A. I did not. I had no contact with him.

Ex. 2023, 45:20–46:17 (emphasis added).

Petitioner submitted a declaration by John Schoenberg. Ex. 1019. In it, Mr. Schoenberg testified that he worked for a company called Fairchild Stratos (“Fairchild”) from at least the late 1960s until 1981 when he went to work for “C&D Plastics, later re-named C&D Aerospace, then C&D Zodiac” (i.e., Petitioner). *Id.* ¶ 4. He then testified to the following:

I am familiar with the McDonnell Douglas DC-10 Customer Configuration Summary, commonly referred to as the “Orange Book.” The so-called Orange Book (Ex. 1004) came into my possession *possibly from the Fairchild marketing department in 1981 or perhaps later* when at C&D I was in charge of developing the OEM ceiling panels for all DC-10 and MD-11 aircraft.

Id. ¶ 5 (emphasis added). This testimony is not definitive of what was published and by when. It lacks an affirmative statement that Exhibit 1004 is a true and accurate copy of the version of the Orange Book that he says came into his possession. Also, it does not establish that any Orange Book ever came into Mr.

Schoenberg's possession prior to the critical date of the '838 patent.¹⁰ Mr.

Schoenberg says "possibly" and "perhaps." Ex. 1019 ¶ 5.

On cross-examination, Mr. Schoenberg testified that he believed his copy of the Orange Book was in his possession (at his office at Petitioner C&D Zodiac) before he retired, which was in 1997 and before the critical date. But this testimony does not establish how the Orange Book came into his possession. Moreover, we are not persuaded that Mr. Schoenberg's testimony regarding the Orange Book relates specifically to the version of the Orange Book on which Petitioner relies. Indeed, at his deposition, he could not say whether the copy of the Orange Book that was placed in front of him was the same copy he had once possessed. Ex. 2024, 22:2–5; *see also* Tr. 81:3–9 (Trial Board: "How do we know that the specific page that you're relying on was part of the Orange Book back in that relevant time frame?" / Counsel for Petitioner: "John [Schoenberg] showed me – so, we have testimony that those are the pages of the Orange Book. We don't have testimony that that specific page was in that specific Orange Book.")).

Petitioner has not shown, by a preponderance of the evidence, that Exhibit 1004 was published prior to the critical date of the '838 patent.

¹⁰ Petitioner asserted the Orange Book as prior art under 35 U.S.C. § 102(b), but not under § 102(a). Pet. 14. The earliest possible filing date of the '838 patent is April 20, 2010. Ex. 1001, at [60]. The earliest possible critical date is therefore April 20, 2009. 35 U.S.C. § 102(b).

III. MOTIONS TO EXCLUDE

Petitioner filed a Motion to Exclude Exhibits 2004, 2018, 2019, 2034–2036, and portions of Exhibit 2022 (evidence pertaining to secondary considerations of non-obviousness) and Exhibit 2027 (Mr. Dershowitz’s declaration pertaining to patentability of the claims). Paper 48. Because we do not rely on any of that evidence in a manner ultimately adverse to Petitioner, we dismiss the Motion as moot.

Patent Owner filed a Motion to Exclude Exhibit 1029, which is a declaration by Gary L. Frazier challenging Patent Owner’s commercial success evidence. Paper 50. Because we do not rely on Exhibit 1029 in any manner, we dismiss the Motion as moot.

IV. CONCLUSION

Petitioner has shown by a preponderance of the evidence that claims 1, 3–7, 9, 10, 12–14, 16–19, 21, 22, 24–29, 31, and 33–37 of the ’838 patent are unpatentable as obvious over Betts.

Petitioner has *not* shown by a preponderance that claims 8, 20, 30, and 38 are unpatentable as obvious in view of Betts and the Orange Book.

V. ORDER

Accordingly, it is

ORDERED that claims 1, 3–7, 9, 10, 12–14, 16–19, 21, 22, 24–29, 31, and 33–37 of U.S. Patent No. 8,590,838 B2 are held unpatentable; and

FURTHER ORDERED that, because this Decision is final, a party to the proceeding seeking judicial review of the Decision must comply with the notice

and service requirements of 37 C.F.R. § 90.2.

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US008590838B2

(12) **United States Patent**
Cook et al.

(10) **Patent No.:** **US 8,590,838 B2**
(45) **Date of Patent:** **Nov. 26, 2013**

(54) **AIRCRAFT INTERIOR LAVATORY**

(75) Inventors: **Don Cook**, Arlington, WA (US); **Liberty Harrington**, Seattle, WA (US); **Phillip Steiner**, Seattle, WA (US); **Robert K. Brauer**, Seattle, WA (US); **Trevor Skelly**, Mercer Island, WA (US)

(73) Assignee: **BE Intellectual Property, Inc.**, Wellington, FL (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 228 days.

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(21) Appl. No.: **13/089,063**

(22) Filed: **Apr. 18, 2011**

(65) **Prior Publication Data**

US 2011/0253835 A1 Oct. 20, 2011

Related U.S. Application Data

(60) Provisional application No. 61/326,198, filed on Apr. 20, 2010, provisional application No. 61/346,835, filed on May 20, 2010.

(51) **Int. Cl.**
B64D 11/06 (2006.01)

(52) **U.S. Cl.**
USPC **244/118.6; 114/116**

(58) **Field of Classification Search**
USPC 244/1 R, 118.5, 118.6, 129.1, 117 R;
114/116

See application file for complete search history.

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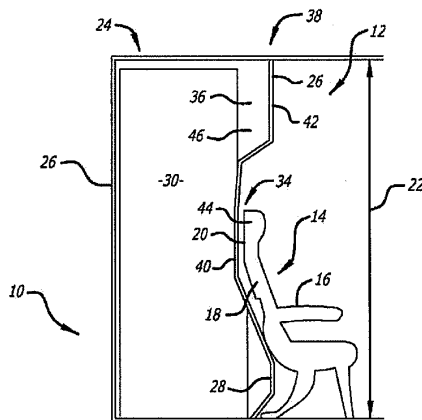
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(57) **ABSTRACT**

A lavatory for an aircraft cabin includes a wall having a forward wall portion disposed immediately aft of and substantially conforming to an exterior aft surface of an aircraft cabin structure, such as a passenger seat, that is substantially not flat in a vertical plane. The forward wall portion includes a forward projection over an aft portion of the adjacent passenger seat. The forward wall portion can define a secondary space in the interior lavatory space, which can provide an amenity stowage space, and can include design elements providing visual space.

38 Claims, 1 Drawing Sheet



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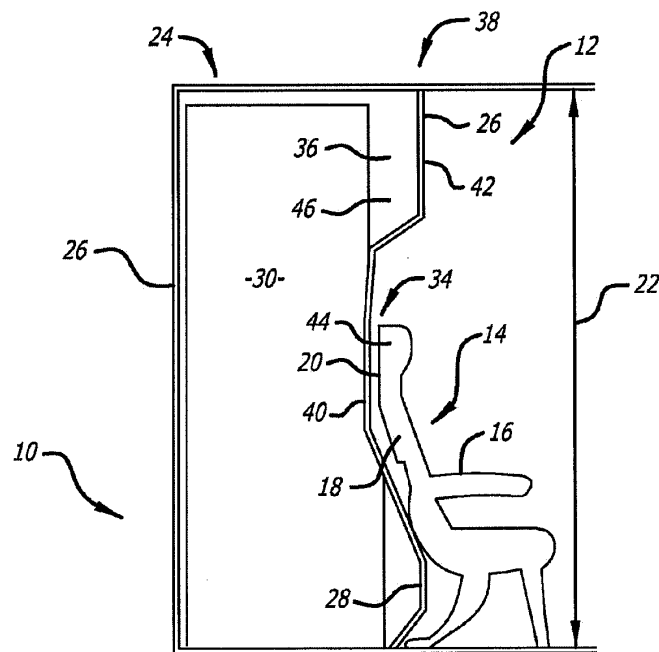
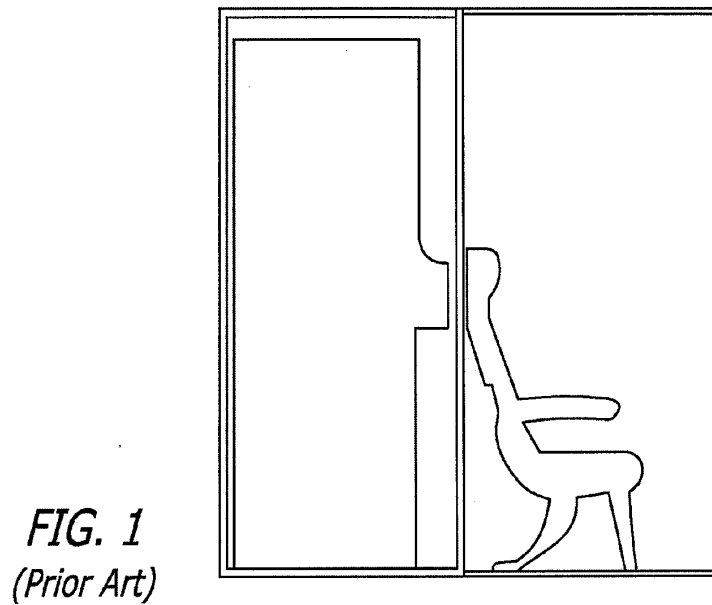
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AIRCRAFT INTERIOR LAVATORY**CROSS-REFERENCES TO RELATED APPLICATIONS**

This application is based upon and claims priority from Provisional Application No. 61/326,198, filed Apr. 20, 2010, and Provisional Application No. 61/346,835, filed May 20, 2010, which are incorporated by reference in their entirety herein.

BACKGROUND OF THE INVENTION

The present invention relates generally to aircraft enclosures, and more particularly relates to an aircraft cabin enclosure, such as a lavatory, an aircraft closet, or an aircraft galley, for example, including an aircraft cabin structure having an aft portion with a substantially vertically extending exterior aft surface that is substantially not flat in a vertical plane.

Aircraft lavatories, closets and other full height enclosures commonly have forward walls that are flat in a vertical plane. Structures such as passenger seats installed forward of such aircraft lavatories, closets and similar full height enclosures often have shapes that are contoured in the vertical plane. The juxtaposition of these flat walled enclosures and contoured structures renders significant volumes unusable to both the function of the flat walled lavatory or enclosure and the function of the contoured seat or other structure. Additionally, due to the lack of a provision for structural load sharing, conventional aircraft lavatories require a gap between the lavatory enclosures and adjacent structures, resulting in a further inefficiency in the use of space.

Aircraft bulkheads, typically separating passenger cabin areas or classes of passenger service, are in common use, and typically have a contour permitting passengers seated behind the bulkhead to extend their feet modestly under the premium seats immediately forward of the bulkhead. These provide a comfort advantage to passengers seated behind the bulkhead, but provide no increased efficiency in the use of space, in that they do not enable the seats fore and aft of the bulkhead to be placed more closely together. Short, floor-mounted stowage boxes, typically no taller than the bottom cushion of a passenger seat, are often positioned between the flat wall of current lavatories or other enclosures and passenger seats. These provide no improvement to the utility or spatial efficiency of the lavatory or other enclosure. While they do provide some useful stowage for miscellaneous items, they do not provide sufficient additional stowage to provide more space for passenger seating.

It would be desirable to provide an aircraft lavatory or other enclosure that can reduce or eliminate the gaps and volumes of space previously required between lavatory enclosures and adjacent structures to allow an adjacent structure such as passenger seating installed forward of the lavatory or other enclosure to be installed further aft, providing more space forward of the lavatory or enclosure for passenger seating or other features than has been possible in the prior art. Alternatively, the present invention can provide a more spacious lavatory or other enclosure with no need to move adjacent seats or other structures forward.

It would also be desirable to provide an aircraft lavatory or other enclosure with a wall to bear loads from an adjacent passenger seating or other structure, permitting elimination of a required gap between the lavatory or other enclosure and the adjacent passenger seating or other structure, making more space available for other uses. In addition, enabling a lavatory or other enclosure to bear loads from an adjacent

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structure can reduce the combined weight of the lavatory or other enclosure and the adjacent structure.

It also would be desirable to provide an aircraft lavatory or other enclosure that can reduce or eliminate the gaps and volumes of space previously required between lavatory enclosures and adjacent structures, to allow the installation of an increased number of passenger seats, to increase the value of the aircraft. The present invention meets these and other needs.

SUMMARY OF THE INVENTION

Briefly, and in general terms, the present invention provides for an enclosure, such as a lavatory, an aircraft closet, or an aircraft galley, for example, for a cabin of an aircraft including a structure having an aft portion with a substantially vertically extending exterior aft surface that is substantially not flat in a vertical plane. The enclosure structure permits a combination of the enclosure with the structure in a manner that permits significant saving of space in the aircraft, which in turn permits more seats to be installed, or more space to be offered per seat, increasing the value of the aircraft.

Accordingly, in one presently preferred aspect, the present invention provides for an enclosure unit for a cabin of an aircraft including an aircraft cabin structure having an aft portion with an exterior aft surface that is substantially not flat in a vertical plane. The enclosure unit can be a lavatory, an aircraft closet, or an aircraft galley, for example. In one presently preferred aspect, the enclosure unit includes one or more walls that are taller than an adjacent aircraft cabin structure, the one or more walls defining an interior enclosure space and having a forward wall portion. The forward wall portion is configured to be disposed immediately aft of and adjacent to or abutting the exterior aft surface of the aircraft cabin structure, and the forward wall portion is shaped to substantially conform to the shape of the exterior aft surface of the aircraft cabin structure.

In another presently preferred aspect, the enclosure unit includes an enclosure stall unit, and the aircraft cabin structure is a passenger seat installed immediately forward of the enclosure stall unit. In another presently preferred aspect, the forward wall portion of the enclosure unit is configured to accept loads from the aircraft passenger seat. In another presently preferred aspect, the forward wall portion includes a forward projection configured to project over an aft portion of the adjacent passenger seat immediately forward of the enclosure stall unit.

In another presently preferred aspect, the enclosure is a lavatory, including a lavatory stall unit with one or more walls having a forward wall portion. The one or more walls define an interior lavatory space, and the forward wall portion is configured to be disposed immediately aft of and adjacent to or abutting an aircraft cabin structure having an exterior aft surface having a shape that is substantially not flat in a vertical plane. In a presently preferred aspect, the forward wall portion is shaped to substantially conform to the shape of the exterior aft surface of the aircraft cabin structure.

In another presently preferred aspect, the aircraft cabin structure is a passenger seat installed immediately forward of the lavatory stall unit, and the forward wall portion of the lavatory stall unit is configured to accept loads from the passenger seat. In another presently preferred aspect, the forward wall portion includes a forward projection configured to project over an aft portion of the adjacent passenger seat immediately forward of the lavatory stall unit. In another presently preferred aspect, the forward wall portion defines a secondary space in the interior lavatory space in an area

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forward of an aft-most portion of the forward wall portion. The secondary space can provide an amenity stowage space inside the lavatory stall unit in the area forward of an aft-most portion of the forward wall portion, and can include design elements providing visual space inside the lavatory in the area forward of an aft-most portion of the forward wall portion.

In another presently preferred aspect, the present invention provides for an assembly of an aircraft enclosure unit and an aircraft cabin structure for an aircraft cabin, the assembly in combination including an aircraft cabin structure having an exterior aft surface having a shape that is substantially not flat in a vertical plane, and an aircraft enclosure unit including at least one wall having a forward wall portion. The one or more walls define an interior enclosure space, the forward wall portion is disposed immediately aft of and adjacent to the aircraft cabin structure, and the forward wall portion is shaped to substantially conform to the shape of the exterior aft surface of the aircraft cabin structure. In another presently preferred aspect, the aircraft cabin structure is a passenger seat installed immediately forward of the aircraft enclosure unit. In another presently preferred aspect, the forward wall portion is configured to accept loads from the aircraft passenger seat. In another presently preferred aspect, the forward wall portion includes a forward projection configured to project over an aft portion of the adjacent passenger seat immediately forward of the aircraft enclosure unit.

In another presently preferred aspect, the aircraft enclosure unit is a lavatory stall, and the one or more walls define an interior lavatory space. In another presently preferred aspect, the forward wall portion defines a secondary space in the interior lavatory space in an area forward of an aft-most portion of the forward wall portion.

In another presently preferred aspect, the present invention provides for an assembly of an aircraft lavatory unit and an aircraft cabin structure for an aircraft cabin, in which the assembly in combination includes an aircraft cabin structure having an exterior aft surface having a shape that is substantially not flat in a vertical plane, and an aircraft lavatory stall unit including one or more walls having a forward wall portion. In another presently preferred aspect, the one or more walls define an interior lavatory space, the forward wall portion is disposed immediately aft of and adjacent to the aircraft cabin structure, and the forward wall portion is shaped to substantially conform to the shape of the exterior aft surface of the aircraft cabin structure. In another presently preferred aspect, the aircraft cabin structure is a passenger seat installed immediately forward of the aircraft lavatory stall unit, and wherein the forward wall portion of the aircraft lavatory stall unit is configured to accept loads from the passenger seat. In another presently preferred aspect, the forward wall portion includes a forward projection configured to project over an aft portion of the adjacent passenger seat immediately forward of the aircraft lavatory stall unit. In another presently preferred aspect, the forward wall portion defines a secondary space in the interior lavatory space in an area forward of an aft-most portion of the forward wall portion.

These and other aspects and advantages of the invention will become apparent from the following detailed description and the accompanying drawings, which illustrate by way of example the features of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic diagram of a prior art installation of a lavatory immediately aft of and adjacent to an aircraft passenger seat.

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FIG. 2 is a schematic diagram of an installation of a lavatory according to the present invention immediately aft of and adjacent to or abutting an aircraft cabin passenger seat.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the drawings, which are provided by way of example, and not by way of limitation, the present invention provides for an enclosure 10, such as a lavatory for a cabin 12 of an aircraft (not shown), although the enclosure may also be an aircraft closet, or an aircraft galley, or similar enclosed or structurally defined spaces, for example. As is illustrated in FIG. 2, the cabin includes a structure 14, and the enclosure may be taller than the cabin structure. The cabin structure can be a passenger seat 16, for example, installed immediately forward of the enclosure and having an aft portion 18 with and exterior aft surface 20 that is substantially not flat in a vertical plane 22. The lavatory includes a lavatory stall unit 24 having one or more walls 26 having a forward wall portion 28. The one or more walls define an interior lavatory space 30, and the forward wall portion is configured to be disposed immediately aft of and adjacent to or abutting the exterior aft surface of the aircraft cabin structure. The forward wall portion has a shape that is substantially not flat in the vertical plane, and preferably is shaped to include a recess 34 such that the forward wall portion substantially conforms to the shape of the exterior aft surface of the aircraft cabin structure. In a presently preferred aspect, the forward wall portion of the lavatory stall unit is configured to accept loads from the passenger seat.

In another presently preferred aspect, the forward wall portion defines a secondary space 36 in the interior lavatory space in an area 38 forward of an aft-most portion 40 of the forward wall portion, and the forward wall portion includes a forward projection 42 configured to project over the aft portion of the adjacent passenger seat back 44 immediately forward of the lavatory stall unit. The secondary space can include an amenity stowage space 46 inside the lavatory stall unit in the area forward of the aft-most portion of the forward wall portion, and the secondary space can include design elements providing visual space, such as a visual perception of space, inside the lavatory in the area forward of an aft-most portion of the forward wall portion.

It will be apparent from the foregoing that while particular forms of the invention have been illustrated and described, various modifications can be made without departing from the spirit and scope of the invention. Accordingly, it is not intended that the invention be limited, except as by the appended claims.

We claim:

1. A lavatory for a cabin of an aircraft, the cabin including a passenger seat having an aft portion that is substantially not flat in a vertical plane, the lavatory comprising:

a lavatory stall unit having at least one wall having a forward wall portion, said at least one wall defining an interior lavatory space, and said forward wall portion being configured to be disposed immediately aft of and adjacent to an aircraft cabin passenger seat having an aft portion with an exterior aft surface having a shape that is substantially not flat in a vertical plane; and wherein said forward wall portion is shaped to substantially conform to the shape of the exterior aft surface of the aft portion of the aircraft cabin passenger seat, and said forward wall portion includes an aft-extending

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recess in said forward wall portion configured to receive the aft portion of the aircraft cabin passenger seat therein.

2. The lavatory of claim 1, wherein the aircraft cabin passenger seat is installed immediately forward of said lavatory stall unit, and wherein the forward wall portion of the lavatory stall unit is configured to accept loads from the aircraft cabin passenger seat.

3. The lavatory of claim 1, wherein the aft portion of the aircraft cabin passenger seat comprises a seat back, and said forward wall portion includes a forward projection configured to project over an aft portion of the seat back of the aircraft cabin passenger seat immediately forward of the lavatory stall unit.

4. The lavatory of claim 3, wherein said forward wall portion defines a secondary space in said interior lavatory space in an area forward of an aft-most portion of the forward wall portion above the seat back of the aircraft cabin passenger seat.

5. The lavatory of claim 1, wherein said forward wall portion includes a lower portion that extends under the aft portion of the aircraft cabin passenger seat.

6. The lavatory of claim 1, wherein said aft-extending recess in said forward wall portion is disposed between a forward-extending upper wall portion and a forward-extending lower wall portion.

7. The lavatory of claim 1, wherein said aft-extending recess in said forward wall portion extends along substantially a full width of said forward wall portion.

8. The lavatory of claim 1, wherein said lavatory stall unit has a top, a bottom, a height therebetween, and a middle therebetween, said lavatory stall unit has varying lengths along the height of the lavatory stall unit, and said lavatory stall unit is longer at the top of the lavatory stall unit than at the bottom of the lavatory stall unit.

9. An aircraft enclosure for a cabin of an aircraft, the cabin including a passenger seat having an aft portion that is substantially not flat in a vertical plane, the aircraft enclosure comprising:

an enclosure unit that is taller than the passenger seat, said enclosure unit having at least one wall having a forward wall portion, said at least one wall defining an interior enclosure space, and said forward wall portion being configured to be disposed immediately aft of and adjacent to the passenger seat, said passenger seat having an aft portion with an exterior aft surface having a shape that is substantially not flat in a vertical plane; and wherein said forward wall portion is shaped to substantially conform to the shape of the exterior aft surface of the aft portion of the passenger seat, and said forward wall portion includes an aft-extending recess in said forward wall portion configured to receive the aft portion of the passenger seat therein.

10. The aircraft enclosure of claim 9, wherein the passenger seat is installed immediately forward of said enclosure unit.

11. The aircraft enclosure of claim 9, wherein the forward wall portion of the enclosure unit is configured to accept loads from the passenger seat.

12. The aircraft enclosure of claim 9, wherein the aft portion of the passenger seat comprises a seat back, and said forward wall portion includes a forward projection configured to project over an aft portion of the seat back of the passenger seat immediately forward of the enclosure unit.

13. The aircraft enclosure of claim 12, wherein said forward wall portion defines a secondary space in said interior

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lavatory space above the seat back of the passenger seat in an area forward of an aft-most portion of the forward wall portion.

14. The aircraft enclosure of claim 9, wherein said enclosure unit comprises a lavatory stall, and said at least one wall defines an interior lavatory space.

15. The aircraft enclosure of claim 14, wherein the forward wall portion of the lavatory stall is configured to accept loads from the passenger seat.

16. The aircraft enclosure of claim 14, wherein said forward wall portion includes a forward projection configured to project over an aft portion of the passenger seat immediately forward of the lavatory stall.

17. The aircraft enclosure of claim 9, wherein said forward wall portion includes a lower portion that extends under the aft portion of the passenger seat.

18. The aircraft enclosure of claim 9, wherein said aft-extending recess in said forward wall portion is disposed between a forward-extending upper wall portion and a forward-extending lower wall portion.

19. The aircraft enclosure of claim 9, wherein said aft-extending recess in said forward wall portion extends along substantially a full width of said forward wall portion.

20. The aircraft enclosure of claim 9, wherein said enclosure unit has a top, a bottom, a height therebetween, and a middle therebetween, said enclosure unit has varying lengths along the height of the enclosure unit, and said enclosure unit is longer at the top of the enclosure unit than at the bottom of the enclosure unit.

21. An assembly of an aircraft enclosure unit and an aircraft cabin passenger seat for an aircraft cabin, the assembly in combination comprising:

an aircraft cabin passenger seat having an aft portion with an exterior aft surface having a shape that is substantially not flat in a vertical plane; and

an aircraft enclosure unit including at least one wall having a forward wall portion, said at least one wall defining an interior enclosure space, said forward wall portion being disposed immediately aft of and adjacent to said aircraft cabin passenger seat, said forward wall portion being shaped to substantially conform to the shape of the exterior aft surface of the aft portion of the aircraft cabin passenger seat, and said forward wall portion includes an aft-extending recess in said forward wall portion configured to receive the aft portion of the passenger seat therein.

22. The assembly of claim 21, wherein the aircraft cabin passenger seat is installed immediately forward of said aircraft enclosure unit.

23. The assembly of claim 21, wherein said forward wall portion is configured to accept loads from the aircraft cabin passenger seat.

24. The assembly of claim 21, wherein said forward wall portion includes a forward projection configured to project over the aft portion of the aircraft cabin passenger seat.

25. The assembly of claim 21, wherein said aircraft enclosure unit comprises a lavatory stall, and said at least one wall defines an interior lavatory space.

26. The assembly of claim 25, wherein said forward wall portion defines a secondary space in said interior lavatory space in an area forward of an aft-most portion of the forward wall portion.

27. The assembly of claim 21, wherein said forward wall portion includes a lower portion that extends under the aft portion of the aircraft cabin passenger seat.

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28. The assembly of claim 21, wherein said aft-extending recess in said forward wall portion is disposed between a forward-extending upper wall portion and a forward-extending lower wall portion.

29. The assembly of claim 21, wherein said aft-extending recess in said forward wall portion extends along substantially a full width of said forward wall portion.

30. The assembly of claim 21, wherein said lavatory stall unit has a top, a bottom, a height therebetween, and a middle therebetween, said lavatory stall unit has varying lengths along the height of the lavatory stall unit, and said lavatory stall unit is longer at the top of the lavatory stall unit than at the bottom of the lavatory stall unit.

31. An assembly of an aircraft lavatory unit and an aircraft cabin passenger seat for an aircraft cabin, the assembly in combination comprising:

an aircraft cabin passenger seat having an aft portion with an exterior aft surface having a shape that is substantially not flat in a vertical plane; and

an aircraft lavatory stall unit including at least one wall having a forward wall portion, said at least one wall defining an interior lavatory space, said forward wall portion being disposed immediately aft of and adjacent to said aircraft cabin passenger seat, and said forward wall portion being shaped to substantially conform to the shape of the exterior aft surface of the aft portion of the aircraft cabin passenger seat, and said forward wall portion includes an aft-extending recess in said forward wall portion configured to receive the aft portion of the passenger seat therein.

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32. The assembly of claim 31, wherein the aircraft cabin a passenger seat is installed immediately forward of said aircraft lavatory stall unit, and wherein the forward wall portion of the aircraft lavatory stall unit is configured to accept loads from the aircraft cabin passenger seat.

33. The assembly of claim 32, wherein said forward wall portion includes a forward projection configured to project over the aft portion of the aircraft cabin passenger seat.

34. The assembly of claim 31, wherein said forward wall portion defines a secondary space in said interior lavatory space in an area forward of an aft-most portion of the forward wall portion.

35. The assembly of claim 31, wherein said forward wall portion includes a lower portion that extends under the aft portion of the passenger seat.

36. The assembly of claim 31, wherein said aft-extending recess in said forward wall portion is disposed between a forward-extending upper wall portion and a forward-extending lower wall portion.

37. The assembly of claim 31, wherein said aft-extending recess in said forward wall portion extends along substantially a full width of said forward wall portion.

38. The assembly of claim 31, wherein said enclosure unit has a top, a bottom, a height therebetween, and a middle therebetween, said enclosure unit has varying lengths along the height of the enclosure unit, and said enclosure unit is longer at the top of the enclosure unit than at the bottom of the enclosure unit.

* * * * *

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

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