

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

DRIL-QUIP, INC.,
Petitioner,

v.

FMC TECHNOLOGIES, INC.,
Patent Owner.

PGR2021-00049
Patent 10,689,921 B1

Before GEORGE R. HOSKINS, FRANCES L. IPPOLITO, and
MICHELLE N. WORMMEESTER, *Administrative Patent Judges*.

HOSKINS, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining No Challenged Claims Unpatentable
35 U.S.C. § 328(a)

I. INTRODUCTION

Dril-Quip, Inc. (“Petitioner”) filed a corrected Petition (Paper 4, “Pet.”) pursuant to 35 U.S.C. §§ 321–329 to institute a post-grant review of U.S. Patent No. 10,689,921 B1 (“the ’921 patent”), claims 1–11, 14, and 15. We instituted the petitioned review (Paper 10, “Institution Decision” or “Inst. Dec.”).

FMC Technologies, Inc. (“Patent Owner”) filed a Patent Owner Response (Paper 16, “PO Resp.”) to the Petition. Petitioner filed a Reply (Paper 22, “Pet. Reply”) to the Patent Owner Response. Patent Owner filed a Sur-reply (Paper 24, “Sur-reply”) to the Reply. An oral hearing was held, for which the transcript was entered into the record (Paper 31, “Tr.”).

We have jurisdiction under 35 U.S.C. § 6(b)(4) and § 328(a). This Decision is a final written decision under 35 U.S.C. § 328(a) and 37 C.F.R. § 42.73 as to the patentability of claims 1–11, 14, and 15 of the ’921 patent. We conclude Petitioner has not shown by a preponderance of the evidence that those claims are unpatentable.

II. BACKGROUND

A. *Real Parties in Interest and Related Matters*

Petitioner identifies itself as the sole real party in interest for Petitioner. *See* Pet. 2. Patent Owner identifies itself and TechnipFMC plc as the real parties in interest for Patent Owner. *See* Paper 6, 1. The sole related matter identified by the parties is U.S. Patent Application No. 16/906,596, a continuation of the ’921 patent. *See* Pet. 2; Paper 6, 1.

B. The '921 Patent

The '921 patent is entitled “One-Piece Production/Annulus Bore Stab with Integral Flow Paths.” Ex. 1001, code (54). Such bore stabs may be used to provide fluid flow connection paths within the wellhead structure of an oil and gas well. *See, e.g., id.* at 1:10–37.

Figure 6 of the '921 patent is reproduced below, with our annotations.

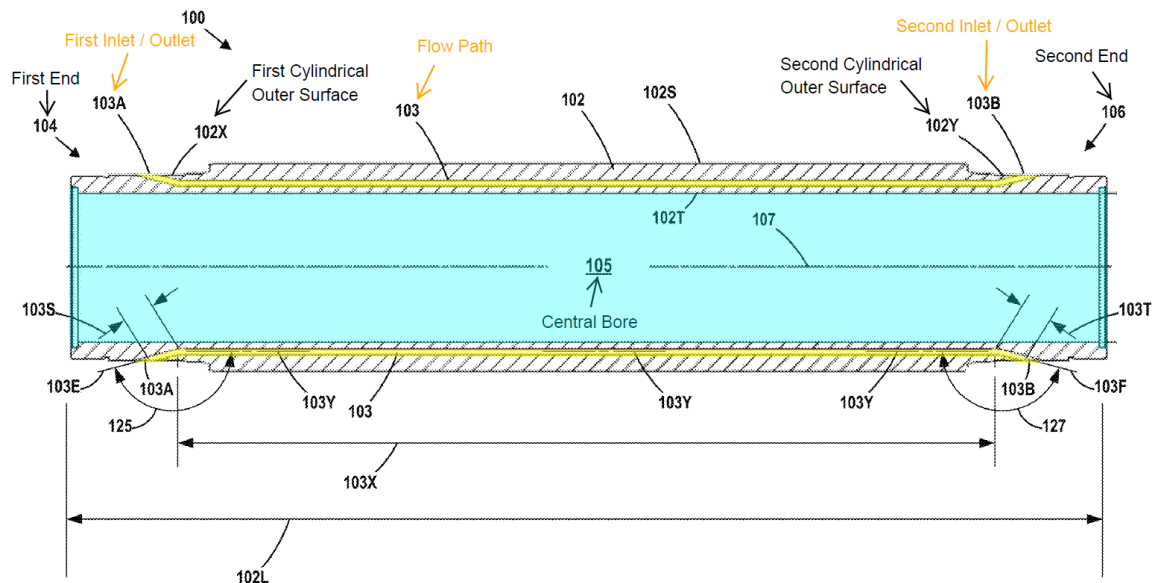


Fig. 6
'921 Patent, Figure 6 (Annotated).

Figure 6 is a cross-sectional view of production/annulus bore stab 100. *See id.* at 2:46–48, 3:33–40, Fig. 5 (line 6–6). Stab 100 comprises one-piece body 102 having first cylindrical outer surface 102X at first end 104, and second cylindrical outer surface 102Y at second end 106. *Id.* at 3:47–50, 3:65–4:2.

Stab 100 includes central bore 105 (colored blue above). *See id.* at 3:51–53. The '921 patent does not appear to disclose why stab 100 includes central bore 105. However, the parties agree bore 105 functions to carry production fluid between a tubing hanger attached to one end 104/106

of stab 100, and a production tree attached to the other end 104/106 of stab 100. *See* Inst. Dec. 21–23. This is consistent with the ’921 patent disclosure. *See* Ex. 1001, 1:30–34 (describing function of production bore stabs), 4:53–57 (Fig. 10 illustrates interaction between one end 104/106 of stab 100 and item of equipment 114, such as a tubing hanger or production tree). Production fluid is the fluid, such as oil or gas, that is conveyed from an underground formation to a wellhead. *See id.* at 1:12–13 (referring to “an oil and gas well”), 1:21–24 (“The production tubing extends through the production casing and provides a path for conveying production fluids from the formation to the wellhead.”).

Stab 100 also has a plurality of separate flow paths 103 (colored yellow above) formed within body 102. *Id.* at 3:60–61; *see also id.* at Fig. 7 (cross-sectional view showing flow paths 103). Each flow path 103 has first inlet/outlet 103A positioned in first cylindrical outer surface 102X, and second inlet/outlet 103B positioned in second cylindrical outer surface 102Y. *Id.* at 3:60–4:2. Flow paths 103 convey annular fluid between the tubing hanger and the production tree. *See* Inst. Dec. 21–23. Annular fluid is fluid found in the annulus of the well, which is “[t]he area between the production tubing and the production casing.” Ex. 1001, 1:12–26.

C. The Challenged Claims of the ’921 Patent

The ’921 patent contains seventeen claims. Ex. 1001, 8:1–10:49. Claims 1–11, 14, and 15 are challenged here, including two independent claims 1 and 14. Claim 1 illustratively recites, with line breaks and indenting added to improve readability:

1. A production/annulus bore stab, comprising:
 - a one-piece body comprising a first cylindrical outer surface and a second cylindrical outer surface; and
 - a plurality of individual fluid flow paths defined entirely within the one-piece body,
 - each of the individual fluid flow paths being fluidly isolated from one another within the one piece-body,
 - each of the fluid flow paths comprising a first inlet/outlet at a first end of the fluid flow path and a second inlet/outlet at a second end of the fluid flow path,
 - wherein the first inlet/outlet is positioned in the first cylindrical outer surface and the second inlet/outlet is positioned in the second cylindrical outer surface,
 - wherein at least a portion of the one-piece body is adapted to be positioned within and sealingly coupled to an item of equipment that has at least one fluid flow path formed therein such that the at least one fluid flow path within the item of equipment is in fluid communication with at least one of the plurality of individual fluid flow paths defined within the one-piece body via the first inlet/outlet or the second inlet/outlet.

Id. at 8:2–22 (line breaks and indenting added).

Claim 14 recites a system comprising an item of equipment and a production/annulus bore stab. *Id.* at 9:39–42. The bore stab of claim 14 is substantially identical to the bore stab of claim 1. *See id.* at 9:42–10:12.

D. Prior Art and Asserted Grounds of Unpatentability

Petitioner’s challenges rely on two prior art references: Maersk and Broussard. *See* Pet. 7–8.

“Maersk” refers to a subsea completion system that, according to Petitioner, was sold by Dril-Quip (Europe) Ltd. to Maersk Olie og Gas A/S

on or before April 27, 1993, and was thereafter installed in a subsea well.
See Pet. 4–7; Exs. 1006–1019.

“Broussard” is U.S. Patent No. 7,604,047 B2, issued on October 20, 2009, and naming Earl Broussard as the sole inventor. *See* Pet. 7; Ex. 1020.

Petitioner relies on the following two grounds of unpatentability. *See* Pet. 7–8.

Claims Challenged	35 U.S.C. §	Reference
1–11, 14, 15	103	Maersk
1–11, 14, 15	103	Broussard

E. Testimonial Evidence

Petitioner relies on the testimony of L. Brun Hilbert, Jr., Ph.D., P.E., to support Petitioner’s contentions of unpatentability. *See* Exs. 1004, 1031, 2003. Petitioner relies on the testimony of Brian Christie to support Petitioner’s reliance on Maersk as being prior art to the ’921 patent. *See* Exs. 1006, 1032, 2004.

Patent Owner relies on the testimony of William C. Parks to support Patent Owner’s opposition to Petitioner’s contentions of unpatentability. *See* Exs. 1033, 2002.

III. POST-GRANT REVIEW TIMELINESS AND ELIGIBILITY

A. Timeliness of the Petition

A petition for post-grant review of a patent “may only be filed not later than the date that is 9 months after the date of the grant of the patent.” 35 U.S.C. § 321(c). The ’921 patent was granted on June 23, 2020. *See*

Ex. 1001, code (45). The Petition’s filing on February 5, 2021, therefore, was timely. *See* Papers 2–5.

B. Post-Grant Review Eligibility of the ’921 Patent

The post-grant review provisions of 35 U.S.C. §§ 321–329 apply only to patents subject to the first-inventor-to-file provisions of the Leahy-Smith America Invents Act¹ (“AIA”). *See* AIA § 6(f)(2)(A) (“The amendments made by subsection (d) [enacting 35 U.S.C. §§ 321–329] . . . shall apply only to patents described in section 3(n)(1).”). The first-inventor-to-file provisions of the AIA apply to any patent issuing from an application that contains or contained at any time a claim to a claimed invention that has an effective filing date on or after March 16, 2013. *See id.* § 3(n)(1). As pertinent to the ’921 patent, which does not assert priority to the filing date of any parent application, the term “effective filing date” means the actual filing date of the ’921 patent. *See* 35 U.S.C. § 100(i)(1).

The actual filing date of the ’921 patent was February 5, 2019, well after March 16, 2013. *See* Ex. 1001, code (22). The ’921 patent, therefore, is eligible for post-grant review.

IV. PETITIONER’S STANDING TO CHALLENGE THE ’921 PATENT

In the Institution Decision, we disagreed with Patent Owner’s argument that Petitioner lacks standing to challenge the ’921 patent due to assignor estoppel. *See* Inst. Dec. 8–9. Patent Owner did not maintain this argument in the Patent Owner Response, so we do not consider it further here.

¹ Pub. L. No. 112-29, 125 Stat. 284 (2011).

V. PETITIONER’S GROUNDS OF UNPATENTABILITY

A. *Statement of Law*

Petitioner must prove unpatentability by a preponderance of the evidence. *See* 35 U.S.C. § 326(e); 37 C.F.R. § 42.1(d). Petitioner bears the burden of proving unpatentability of the challenged claims, and the burden of persuasion never shifts to Patent Owner. *See Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015) (considering 35 U.S.C. § 316(e), the identically-worded IPR analogue to § 326(e)).

A claim is unpatentable under 35 U.S.C. § 103 if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) objective evidence of nonobviousness, if made available in the record, which is not the case here. *See Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

B. *Level of Ordinary Skill in the Art*

Petitioner contends a person having ordinary skill in the art pertaining to the ’921 patent “would have a bachelor’s degree in mechanical or petroleum engineering, or other equivalent degree or experience, with two to five years of experience in the analysis, design or development of subsea wells or equipment systems.” Pet. 18; Ex. 1004 ¶ 57.

Patent Owner contends this person “would have had a Bachelor’s degree in mechanical or petroleum engineering or similar subject matter, and at least approximately two years of work or research experience in subsea oil and gas completion systems related to the analysis, design, development, and/or manufacturing of equipment for subsea completion systems for use in subsea oil and gas wells.” PO Resp. 16; Ex. 2002 ¶ 11.

Thus, the parties essentially agree on the level of ordinary skill in the art to be applied in this proceeding. Their agreement is consistent with the level of skill reflected in the ’921 patent and the prior art of record. Further, we would reach the same decision regardless of whether we adopt Petitioner’s or Patent Owner’s formulation. We therefore do not need to delve into any fine distinctions between the two formulations.

C. *Claim Construction*

We interpret the claims of the ’921 patent “using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. 282(b).” 37 C.F.R. § 42.200(b). This “includ[es] construing the claim in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent.” *Id.* We accordingly construe three limitations found in claims 1 and 14.

1. *“production/annulus bore stab”*

In the Institution Decision, we determined the preamble of claim 1 (“A production/annulus bore stab”) is a limitation to the claim, which was a disputed issue at the time. *See* Inst. Dec. 16–20. Neither party has objected to our preliminary determination in their post-institution briefs. *See, e.g.,*

PO Resp. 15–16; Pet. Reply; Tr. 8:24–9:13. We, therefore, again conclude here that the preamble of claim 1 is a limitation to the claim, for the reasons provided in the Institution Decision.

The Institution Decision also construed the meaning of a “production/annulus bore stab” as recited in the preamble of claim 1, and in the body of claim 14. *See* Inst. Dec. 16–17, 21–23. Our preliminary construction was based on the parties’ common understanding of this term, as reflected by their application of the claims to the prior art. *See id.* Neither party has objected to our preliminary construction in their post-institution briefs. *See, e.g.*, PO Resp. 15–16; Pet. Reply. We, therefore, apply the same construction here, for the reasons provided in the Institution Decision.

Thus, the “production/annulus bore stab” of claims 1 and 14 is “a bore stab that has at least one flow passageway for conveying a production fluid from one structure (such as a tubing hanger) to another structure (such as a production tree), and at least one other flow passageway for conveying an annular fluid between the two structures.” Inst. Dec. 23.

2. “*cylindrical outer surface*”

Claims 1 and 14 both recite a bore stab body comprising first and second “*cylindrical* outer surface[s].” Ex. 1001, 8:2–4, 9:42–44. The parties dispute whether a “cylindrical” surface can be a surface having a series of steps that combine to form a tapering profile along the axial length of the surface. Petitioner takes the position that it can, whereas Patent Owner takes the position it cannot. We agree with Patent Owner.

Petitioner specifically argues “cylindrical” shapes do not necessarily have a constant diameter. Pet. Reply 5. In support, Petitioner asserts a person of ordinary skill in the art “would understand that ‘cylindrical^{al}’ shapes may include some variation in diameter so long as the surface maintains an overall cylinder-like shape,” even if the surface has “an irregular diameter.” Pet. Reply 7–8 (citing Ex. 1031 ¶ 11).

Petitioner contends the ’921 patent specification supports Petitioner’s claim construction. *See id.* at 8–9. Petitioner accordingly annotates Figure 6 of the ’921 patent, as reproduced here.

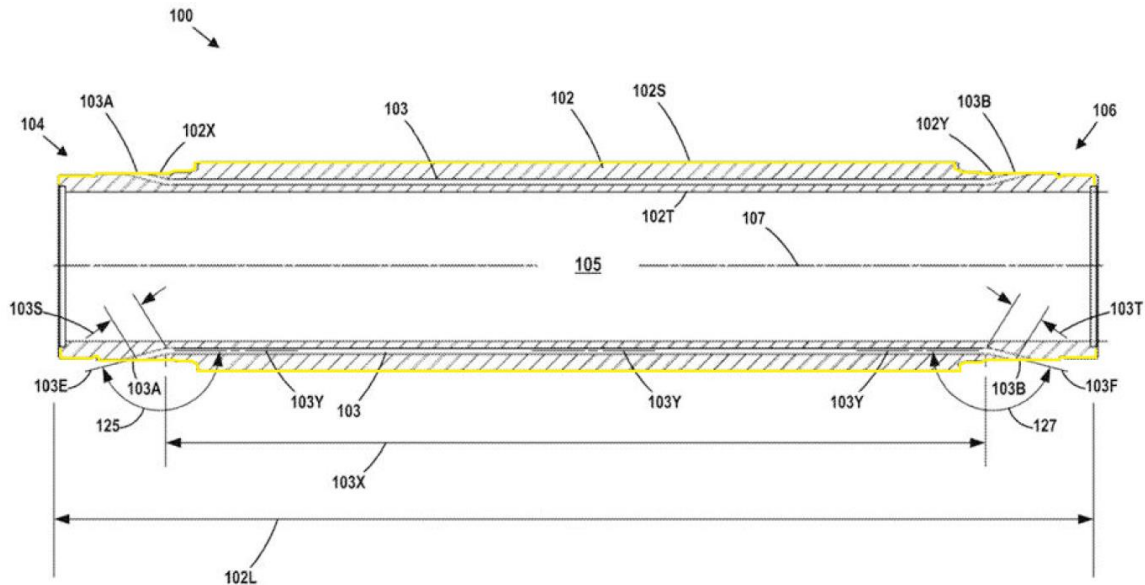


Fig. 6

’921 Patent, Figure 6 (Annotated at Pet. Reply 9).

Figure 6 is a cross-sectional axial view of bore stab body 102, which Petitioner has highlighted in yellow to identify the outer surface profile along the entire axial extent of the stab. *See* Pet. Reply 9. According to Petitioner, the ’921 patent indicates that “the outermost cylindrical surface 102S encompasses the entire exterior surface of the stab (annotated yellow), which has a variable diameter,” thereby supporting Petitioner’s

claim construction. Pet. Reply 8–9 (also citing Ex. 1001, Fig. 5). Petitioner further asserts Figure 6 shows that “the first and second [cylindrical] surfaces [102X and 102Y] may at least include portions of the insertion ends, which do not have a constant diameter,” and the ’921 patent “never explicitly defines where the first cylindrical surface ends and the other begins.” *Id.* at 11; Ex. 1031 ¶ 11.

Petitioner further relies on extrinsic evidence, namely, testimony from Patent Owner’s witness Mr. Parks that a “stair-stepped structure” is a “common feature implemented in” bore stabs to provide “a lead-in taper . . . to be inserted into the bores of other system components.” Ex. 2002 ¶ 50 (cited at Pet. Reply 10). Petitioner’s witness Dr. Hilbert similarly testifies that a person of ordinary skill in the art “would expect these surfaces to have at least a slight taper, which is a common feature implemented at the ends of [bore stabs] to facilitate stab insertion within other wellhead components.” Ex. 1031 ¶ 11.

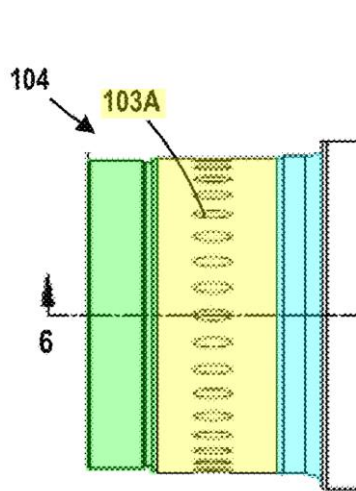
Patent Owner responds that the ’921 patent specification does not support Petitioner’s construction of “cylindrical.” See Sur-reply 6–7. This is because the ’921 patent refers to outermost cylindrical surface 102S, first cylindrical surface 102X, and second cylindrical surface 102Y, “with different terminology and different reference numerals.” *Id.* at 6 (citing Ex. 1001, Fig. 6, 3:47–4:5). Patent Owner further faults Petitioner for “fail[ing] to cite anything in the ’921 patent in support of its theory that ‘the first and second surfaces [102X and 102Y] may at least include portions of insertion ends.’” *Id.* at 6–7 (quoting Pet. Reply 11).

We start our analysis with the claim language. The claim term in dispute is simply a “cylindrical” outer surface. The parties do not cite, and

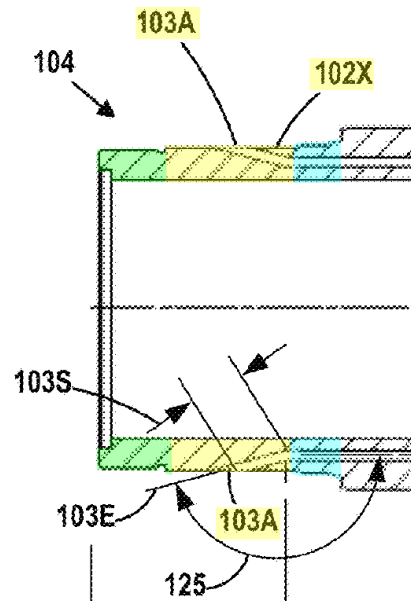
we do not discern, any other contextual claim language that might elucidate or limit the plain and ordinary meaning of “cylindrical.” Petitioner’s gloss on this term as connoting “an overall cylinder-like shape” is an unpersuasive attempt to broaden the meaning of the plain term “cylindrical.” It also would unhelpfully replace our present inquiry (What is a “cylindrical outer surface”?) with yet another inquiry (What is “an overall cylinder-like shape”?).

Turning to the ’921 patent specification, we find that it discloses three different and distinct cylindrical outer surfaces: outermost cylindrical surface 102S, first cylindrical outer surface 102X, and second cylindrical outer surface 102Y. *See* Ex. 1001, Fig. 6, 3:47–51, 3:65–4:5. The distinctness of these three surfaces can be seen in Figures 5, 6, 8, 9, and 10. Petitioner’s attempt to combine these three distinct outer cylindrical surfaces, into one allegedly cylindrical outer surface (*see* Petitioner’s yellow annotations to Figure 6, *supra*), is not supported by the ’921 patent specification, which never describes the entire axial extent of the outer surface of bore stab body 102 as being “cylindrical.”

Next, we focus on first end 104 of bore stab 100 as illustrated in Figures 5 and 6, which we have excerpted and annotated in color as reproduced below.



**'921 Patent, Figure 5
(Annotated Excerpt).**



**'921 Patent, Figure 6
(Annotated Excerpt).**

Figure 5 is a side view of bore stab 100, and Figure 6 is a cross-sectional side view of bore stab 100, which we have excerpted to focus on first end 104 of the bore stab. See Ex. 1001, 3:33–40, 3:47–50. As described in the '921 patent, these figures show: “The first inlet/outlets 103A are positioned in or extend through a first cylindrical outer surface 102X of the one-piece body 102” of bore stab 100. *Id.* at 3:65–67. We have accordingly colored the first cylindrical outer surface in yellow, along with the corresponding reference numerals 103A and 102X. We have also colored in green the portion of end 104 that extends from first cylindrical outer surface 102X to the terminal face of the bore stab, and colored in blue the portion of end 104 that extends from first cylindrical outer surface 102X to the central portion of the bore stab.

In the Petition, Petitioner agreed with the foregoing understanding of the '921 patent's disclosure. See, e.g., Pet. 40–41 (arguing Figure 6 of the '921 patent shows a “first cylindrical outer surface 102X [annotated in

red]”). It is only in the Reply that Petitioner argues the ’921 patent describes the green and the blue portions of end 104 as part of cylindrical outer surface 102X. Petitioner does not cite to any description in the ’921 patent that might suggest cylindrical outer surface 102X extends past the portions that are depicted in the figures as being cylindrical (which we have colored yellow) into the adjacent portions (which we have colored green and blue).

The extrinsic evidence cited by Petitioner does not persuade us otherwise. Mr. Parks testifies that a “stair-stepped structure” is a “common feature implemented in” bore stabs to provide “a lead-in taper . . . to be inserted into the bores of other system components.” Ex. 2002 ¶ 50. Dr. Hilbert agrees that “a slight taper . . . is a common feature implemented at the ends of [bore stabs] to facilitate stab insertion within other wellhead components.” Ex. 1031 ¶ 11. However, even if stair-stepped or other tapering structures at the ends of bore stabs were common in the art prior to the ’921 patent, that does not mean that such features would be deemed to be “cylindrical” shapes as recited in claims 1 and 14.

Dr. Hilbert also more generally supports Petitioner’s claim construction, based on the same analysis of the ’921 patent specification we have discussed above. *See id.* We conclude this testimony is not supported by the ’921 patent, for reasons provided above.

This does not mean, as Petitioner would have it, that the cylindrical surface must be perfectly cylindrical with a constant diameter. It means only that a series of steps that combine to form a tapering profile along the axial length of the surface is not a cylindrical surface. We acknowledge that during the deposition of Mr. Parks, he was asked “So in order for a surface to be cylindrical, does it have to have a constant diameter?,” to which he

answered “Yes, that’s my opinion. In order to be cylindrical, the surfaces would have to be parallel.” Ex. 1033, 45:7–11 (cited at Pet. Reply 5–6). Nonetheless, we do not construe claims 1 and 14 to require a constant outer diameter.

For the foregoing reasons, we conclude that by requiring a “cylindrical” outer surface, claims 1 and 14 exclude a series of steps that combine to form a tapering profile along the axial length of the outer surface.

3. *“a plurality of individual fluid flow paths . . . each of the fluid flow paths comprising a first inlet/outlet . . . positioned in the first cylindrical outer surface”*

Claims 1 and 14 both recite “a plurality of individual fluid flow paths” with “each of the fluid flow paths comprising a first inlet/outlet at a first end of the fluid flow path . . . wherein the first inlet/outlet is positioned in the first cylindrical outer surface.” Ex. 1001, 8:5–14, 9:47–10:7. The parties dispute whether the claims thereby require multiple inlet/outlets to be positioned in the same cylindrical outer surface.²

Petitioner argues claim 1 does not require multiple inlet/outlets to be positioned in the same cylindrical outer surface. See Pet. Reply 1–5. Petitioner relies principally on the plain and ordinary meaning of the claim language to support this argument. See *id.* at 1–2 (stating Patent Owner’s “construction is inappropriate because it reads additional limitations into the

² The claims also contain identical recitations for the flow paths to comprise a “second” inlet/outlet at a “second” end of the body. Ex. 1001, 8:5–14, 9:47–10:7. We focus on the first end for convenience and clarity of discussion. Our consideration of the first end applies equally well to the second end.

term [‘the’] contrary to its plain and ordinary meaning”). Petitioner annotates claim 1, as it is printed in the ’921 patent, to illustrate Petitioner’s argument. *See id.* at 3. We reproduce a portion of Petitioner’s annotations here.

a plurality of individual fluid flow paths defined entirely within the one-piece body, each of the individual fluid flow paths being fluidly isolated from one another within the one-piece body, each of the fluid flow paths comprising a first inlet/outlet at a first end of the fluid flow path and a second inlet/outlet at a second end of the fluid flow path, wherein the first inlet/outlet is positioned in the first cylindrical outer surface and the second inlet/outlet is positioned in the second cylindrical outer surface, wherein at least a portion of the

’921 Patent, Claim 1 (Excerpt, Annotated at Pet. Reply 3).

In this reproduction of column 8 (lines 5–14) of the ’921 patent, Petitioner highlights a first passage of claim 1 in green, and highlights a second passage of claim 1 in yellow. *See* Pet. Reply 2–3. Petitioner’s construction would divorce the introductory word “each” in the green passage from the yellow passage, so that the introductory term “the first inlet/outlet” in the yellow passage may refer to only one flow path, rather than being a property of “each” of the flow paths. *See id.*

Petitioner then asserts: “It is well-established that the articles ‘a’ and ‘the’ carry the meaning of ‘one or more,’” so a person of ordinary skill in the art “would interpret ‘the’ to mean ‘one,’ or at least ‘one or more.’” *Id.* at 3–4 (citing *01 Communique Lab’y, Inc. v. LogMeIn, Inc.*, 687 F.3d 1292, 1297 (Fed. Cir. 2012)); Ex. 1031 ¶ 10. Petitioner argues Patent Owner’s construction, by contrast, would improperly “[l]imit[] ‘the’ to mean ‘multiple.’” Pet. Reply 3–4. Petitioner suggests Patent Owner’s

construction would improperly re-write “the first inlet/outlet” in the yellow passage of claim 1 to refer instead to “the first inlets/outlets,” or “~~the~~ each first inlet/outlet,” or “~~the~~ two or more first inlet/outlets.” *Id.*

Petitioner further argues the ’921 patent specification is consistent with Petitioner’s claim construction, because the specification refers “to the inlets/outlets in plural” or to “the inlet/outlet of ‘each’ path,” unlike the singular claim term “the first inlet/outlet.” *Id.* at 4–5 (citing Ex. 1001, code (57), 2:30–35; 3:65–4:2, 7:29–33).

Patent Owner responds that the plain and ordinary claim language, in referring to “each” of “a plurality of” flow paths comprising a first inlet/outlet positioned in the first cylindrical outer surface, requires “*multiple* ‘first inlet/outlets’ *each* positioned in ‘the first cylindrical surface.’”

Sur-reply 2–4 (emphases added); Ex. 2002 ¶¶ 32–34, 47. Patent Owner argues that Petitioner’s focus on the claim term “the” mischaracterizes Patent Owner’s argument, to set up a straw man to knock down.

Sur-reply 3. Indeed, according to Patent Owner, the claim term “the first inlet/outlet” refers back for antecedent basis to “each of the fluid flow paths comprising a first inlet/outlet,” thereby supporting Patent Owner’s claim construction. *Id.* at 4. Patent Owner further argues the ’921 patent specification supports Patent Owner’s claim construction, because Figures 5 and 6 illustrate multiple inlet/outlets 103A positioned in cylindrical surface 102X, and there are no embodiments where there is only one inlet/outlet positioned in a cylindrical surface. *Id.* at 4–5.

We start our analysis with the claim language. We agree with Patent Owner’s reading of the claim, rather than Petitioner’s reading. First, it is significant that the clause in dispute begins with the term “a *plurality* of

individual fluid flow paths,” and then specifies two properties that apply to “*each* of the individual fluid flow paths”—they each are fluidly isolated from one another, and they each are “*comprising a first inlet/outlet* at a first end of the fluid flow path and a second inlet/outlet at a second end of the fluid flow path.” Ex. 1001, 8:5–11 (emphases added). This recitation of a plurality of flow paths each having a first inlet/outlet is then followed directly by two “wherein” clauses. *See id.* at 8:11–14 (first “wherein” clause), 8:14–22 (second “wherein” clause).

The parties focus on the first “wherein” clause, which specifies “wherein *the* first inlet/outlet is positioned in the first cylindrical outer surface.” *Id.* at 8:11–14 (emphasis added). Patent Owner’s reading of this clause as referring back to the previously-recited first inlet/outlet of *each* fluid flow path is the only reasonable reading of this limitation. Petitioner’s attempt to divorce the first “wherein” clause (*id.*) from its directly preceding clause (*id.* at 8:8–11) is not persuasive. In context, the two clauses must be read together.

This understanding is informed further by the second “wherein” clause, which refers to “fluid communication with *at least one of* the plurality of individual fluid flow paths . . . via the first inlet/outlet.” *Id.* at 8:14–22 (emphasis added). This demonstrates that the applicant knew how to refer specifically to only one of the previously-recited fluid flow paths or only one of their respective inlet/outlets, and yet chose not to do so in the first “wherein” clause. Petitioner’s claim construction of the first “wherein” clause would improperly replace “the first inlet/outlet” in that clause with “at least one of the plurality of the inlet/outlets.”

Our reading of claims 1 and 14 is supported also by the '921 patent specification. In every embodiment of the claimed invention illustrated in the figures, multiple inlet/outlets 103A are positioned in the same cylindrical outer surface 102X. *See, e.g., id.* at 3:60–4:2, Figs. 5, 6, and 8. Petitioner does not cite any written description in the '921 patent that contemplates only one inlet/outlet being positioned in its own cylindrical outer surface, without any other inlet/outlets. *See, e.g., Ex. 1001*, 2:30–35, 3:65–4:2, 7:29–33.

Finally, the claim term “plurality” means “the condition of being plural,” or “more than one.” *See Ex. 3001*³, 1040. This is equivalent to the term “multiple” in Patent Owner’s proffered claim construction. *See Tr. 28:13–30:10.*

For the foregoing reasons, we conclude claims 1 and 14 require at least two inlet/outlets to be positioned in the same cylindrical outer surface.

4. *Remaining Claim Terms*

We determine no further explicit construction of any claim term is needed to resolve the issues presented by the arguments and evidence. *See Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019) (“The Board is required to construe ‘only those terms . . . that are in controversy, and only to the extent necessary to resolve the controversy.’”) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

³ *Webster’s New World Dictionary of American English* (3rd College Edition ©1988, Victoria Neufeldt ed.).

D. Obviousness over Maersk

Petitioner asserts claims 1–11, 14, and 15 of the '921 patent are unpatentable under 35 U.S.C. § 103 as having been obvious over Maersk. *See* Pet. 7, 19–85; Pet. Reply 1–25; Ex. 1004 ¶¶ 72–186; Ex. 1031 ¶¶ 10–50. Patent Owner opposes. *See* PO Resp. 16–78; Sur-reply 1–24; Ex. 2002 ¶¶ 36–104.

For the following reasons, we conclude Petitioner has established by a preponderance of the evidence that Maersk is prior art to the '921 patent. However, Petitioner has not established by a preponderance of the evidence that the challenged claims are unpatentable as having been obvious over Maersk.

1. Maersk's Prior Art Status

Petitioner contends the Maersk subsea completion system was on sale prior to April 1993, more than 25 years before the February 2019 effective filing date of the '921 patent, and therefore is prior art under 35 U.S.C. § 102(a)(1). *See* Pet. 4–7. Mr. Christie, who is a Sales Administration Manager for Petitioner, provides testimony in support of this contention. *See* Ex. 1006 ¶¶ 3, 8–18; Ex. 1032 ¶¶ 1–13.

Patent Owner argues Petitioner “never demonstrates the structure of” the Maersk system that was offered for sale and shipped during 1992–1993. PO Resp. 2, 72–73. Patent Owner asserts “Petitioner submits no drawings or analysis of the Maersk system that was built in 1992 and referenced in” sales documentation dated in 1991 and 1992 (i.e., Exhibits 1008–1013 and 1017). PO Resp. 2, 72–74. Instead, according to Patent Owner, Petitioner’s unpatentability contentions are “based on **later** CAD drawings

created” in 1993 (i.e., Exhibits 1014–1016, 1018, and 1019), “**after** the purported 1992 offer for sale” of a system that was manufactured and delivered in 1992. PO Resp. 72–74. Patent Owner insists CAD drawings with release dates in 1993 cannot correspond to the Maersk system that was manufactured and sold by the end of 1992, because “CAD drawings are design documents prepared **before building** subsea equipment” and a CAD drawing’s release date is the date the design “is finally approved and ‘**now can be machined.**’” *Id.* at 74, 76 (quoting Pet. 6 and Ex. 2003, 67:5–15). Patent Owner argues this creates an evidentiary gap that Petitioner does not address. *See id.* at 13, 72. Patent Owner cites cross-examination testimony from Mr. Christie as supporting these contentions. *See id.* at 72–73, 76–77 (citing Ex. 2004, 7:3–7, 8:19–21, 9:2–7, 11:4–16, 11:20–23, 12:18–22, 15:10–23).

Petitioner responds that “Maersk was ready for patenting” prior to April 1993 as established by the CAD drawings, so Maersk qualifies as prior art even if the related sales documentation is dated in 1991–1992, because there is no requirement for “inventions . . . to be ready for patenting by the time of the offer” for sale. Pet. Reply 12–14 (citing *Pfaff v. Wells Elecs., Inc.*, 525 U.S. 55, 67 (1998) and *Aug. Tech. Corp. v. Camtek, Ltd.*, 655 F.3d 1278, 1288–89 (Fed. Cir. 2011)). Petitioner adds that “it is common in the industry for drawings of designs to be revised after the sale to reflect the product sold to the customer.” *Id.* at 13 (citing Ex. 1032 ¶¶ 6–8, 10–13; Ex. 1033, 25:5–14, 26:1–9). Petitioner relies on Mr. Christie’s testimony only to establish “that Maersk was sold in 1992 and that the drawings dated 1993 demonstrate the structure of the product sold,” not to explain the technical features of the Maersk system shown in the drawings, for which

Petitioner relies on Dr. Hilbert not Mr. Christie. *Id.* at 14 (“Mr. Christie does not need to understand the technical features of the drawings . . . to know that the drawings illustrate the system sold to Maersk.”) (citing Ex. 1006 ¶ 18; Ex. 1032 ¶¶ 5, 10–13).

Patent Owner replies that Petitioner’s reliance on Mr. Christie’s testimony “is specious at best.” Sur-reply 23–24. This is because, based on his cross-examination, “[i]t cannot be reasonably disputed that Mr. Christie’s testimony as to the structural features of the [bore stab] shown in the drawings as they relate to the earlier sales order are entitled to little or no weight.” *Id.* at 24.

Upon review of the foregoing, we first conclude it is undisputed that Dril-Quip⁴ made and sold a subsea tree assembly to Maersk Olie⁵ in the 1991–1993 time frame. This is established by several documents (Exhibits 1009–1013 and 1017) as well as the declaration testimony of Mr. Christie (Exhibits 1006 and 1032). *See* Pet. 4–7; Pet. Reply 12–14.

In particular, it is undisputed that in January 1991, Dril-Quip and Maersk Olie entered into a General Service Contract, pursuant to which Dril-Quip began designing a subsea tree assembly. *See* Ex. 1009; Ex. 1006 ¶¶ 9–10 (also citing Ex. 1008). In July 1992, Maersk Olie issued a Purchase Order to Dril-Quip, for various pieces of equipment making up a subsea tree assembly. *See* Ex. 1011; Ex. 1006 ¶ 12. In August 1992, Dril-Quip shipped several pieces of equipment from Houston, Texas to Aberdeen, Scotland, which in December 1992 were identified in a Sales Order issued by

⁴ We use the term “Dril-Quip” to refer collectively to Petitioner Dril-Quip, Inc., and its related entities as identified in the Exhibits we cite herein.

⁵ We use the term “Maersk Olie” to refer to Maersk Olie og Gas A/S.

Dril-Quip to Maersk Olie in response to Maersk Olie's Purchase Order. See Ex. 1012; Ex. 1013; Ex. 1006 ¶¶ 13–14 (also citing Ex. 1007). In March 1993, Dril-Quip made a repair to one component of the Maersk Olie subsea tree assembly. See Ex. 1010; Ex. 1006 ¶ 15. In April 1993, an independent certification entity verified that the design of the Maersk Olie subsea tree assembly complied with Danish Offshore Regulations. See Ex. 1017; Ex. 1006 ¶ 24. Mr. Christie testifies that the subsea tree assembly “was delivered to [Maersk Olie] in 1993 and installed thereafter, well before February 5, 2019,” but he does not provide specific dates of delivery or installation. Ex. 1006 ¶ 16.

The disputed issue is whether the subsea tree assembly that Dril-Quip made and sold to Maersk Olie in the 1991–1993 time frame had the structure that is illustrated in several CAD drawings, entered into the record as Exhibits 1014–1016, 1018, and 1019 (“the Drawings”). We find a preponderance of the evidence indicates that it did, for the following reasons.

First, Mr. Christie testifies that the Drawings were “prepared by Dril-Quip as part of the sale to” Maersk Olie in the 1991–1993 time frame, to document the structure of the Maersk Olie subsea tree assembly. Ex. 1006 ¶¶ 18–25; Ex. 1032 ¶¶ 4–13. This testimony is un rebutted by any directly conflicting evidence. It is also supported by the dates found on the face of the Drawings. In particular, on December 1, 1992, Dril-Quip issued a Sales Order (Ex. 1012) to Maersk Olie to document the sale of the subsea tree assembly. Four of the five CAD Drawings bear roughly contemporaneous release dates of “16-Dec-92” (Ex. 1018), “14-Jan-93”

(Ex. 1016), “10-Mar-93” (Ex. 1015), and “18-Mar-93” (Ex. 1014). The fifth CAD Drawing (Ex. 1019) does not bear any release date.

The CAD Drawing in Exhibit 1016 is particularly important here, because it shows the detailed structure of the bore stab that Petitioner alleges was used in the Maersk Olie subsea tree assembly. This Drawing bears a Release Date of “14-Jan-93,” as well as a Revision A date of “26-Feb-93” and a Revision B date of “27-Apr-93.” Patent Owner points out that the certification of the Maersk Olie subsea tree assembly as complying with Danish Offshore Regulations refers to Revision A, and criticizes Petitioner for not producing the Revision A version in this proceeding. *See* Ex. 1017, 3 (referring to “2-899966 Rv. A Stab Sub, Final Machine”); PO Resp. 78; Sur-reply 24.

Despite the foregoing revision history of Exhibit 1016, we are persuaded by Mr. Christie’s un rebutted testimony that the Maersk Olie subsea tree assembly that was made and sold in the 1991–1993 time frame “was built according to” the Exhibit 1016 Drawing. Ex. 1006 ¶¶ 18, 21, 24–25; Ex. 1032 ¶¶ 4–5, 10–13. That is, regardless of what Revision A might be, it is Revision B as shown in Exhibit 1016 that reflects the bore stab used in the Maersk Olie subsea tree assembly.

Patent Owner’s argument that the Drawings cannot correspond to the Maersk Olie subsea tree assembly made and sold in the 1991–1993 time frame is not persuasive. Although it may be common for CAD drawings of parts to be prepared prior to the illustrated parts being manufactured (*see* Ex. 2003, 67:5–15), the evidence of record does not indicate that this must always be the case. Mr. Christie was personally involved on behalf of Dril-Quip in the sale of the Maersk Olie tree assembly in the 1991–1993

time frame (*see* Ex. 1006 ¶¶ 3–4, 6, 10), so we credit his testimony that the Drawings were “prepared . . . as part of” that sale (*id.* ¶¶ 18–25), despite the fact that the Drawings bear dates that are later than many of the corresponding sale documents. We also credit Mr. Christie’s un rebutted testimony that, at least at Dril-Quip, it is routine for engineering drawings to be released and revised *after* the pertinent products are designed, manufactured, or even sold. *See* Ex. 1032 ¶¶ 6–8.

We have considered the cross-examination testimony of Mr. Christie that is cited by Patent Owner. *See* Ex. 2004, 7:3–7, 8:19–21, 9:2–7, 11:4–16, 11:20–23, 12:18–22, 15:10–23. This testimony establishes, at best for Patent Owner, that Mr. Christie was not personally involved in designing the Maersk Olie subsea tree assembly or in preparing the Drawings, and he lacks the engineering expertise to testify competently concerning the parts illustrated in the Drawings. *See id.* But, Petitioner has relied on testimony from Dr. Hilbert and not Mr. Christie concerning the engineering significance of parts illustrated in the Drawings.

Mr. Christie pertinently testifies that he has been a Sales Administration Manager at Dril-Quip for 33 years, including during the 1991–1993 time frame, and in that capacity he is “responsible for all sales quotations, sales orders, tenders, and other sales documentation of Dril-Quip’s subsea systems” and “to keep electronic archives of all sales documentation” on his computer. Ex. 1006 ¶¶ 4–6. He is therefore competent to testify that the Drawings were kept by Dril-Quip in order to document the Maersk Olie subsea tree assembly that Dril-Quip made and sold in the 1991–1993 time frame. *See id.* ¶¶ 18–25 (stating that the Drawings “were obtained from Dril-Quip’s sales databases . . . kept in the

ordinary course of business at Dril-Quip and as a regular practice”); Ex. 1032 ¶ 10 (“With respect to the sale to Maersk, the CAD drawings released in 1993 correspond to the product sold to Maersk in 1992.”). His testimony is persuasive on these points.

In conclusion, we find a preponderance of the evidence establishes that the Maersk Olie subsea tree assembly, as shown in various CAD drawings found in the record as Exhibits 1014–1016, 1018, and 1019, was on sale prior to April 1993 and therefore is prior art to the ’921 patent.

2. Independent Claims 1 and 14

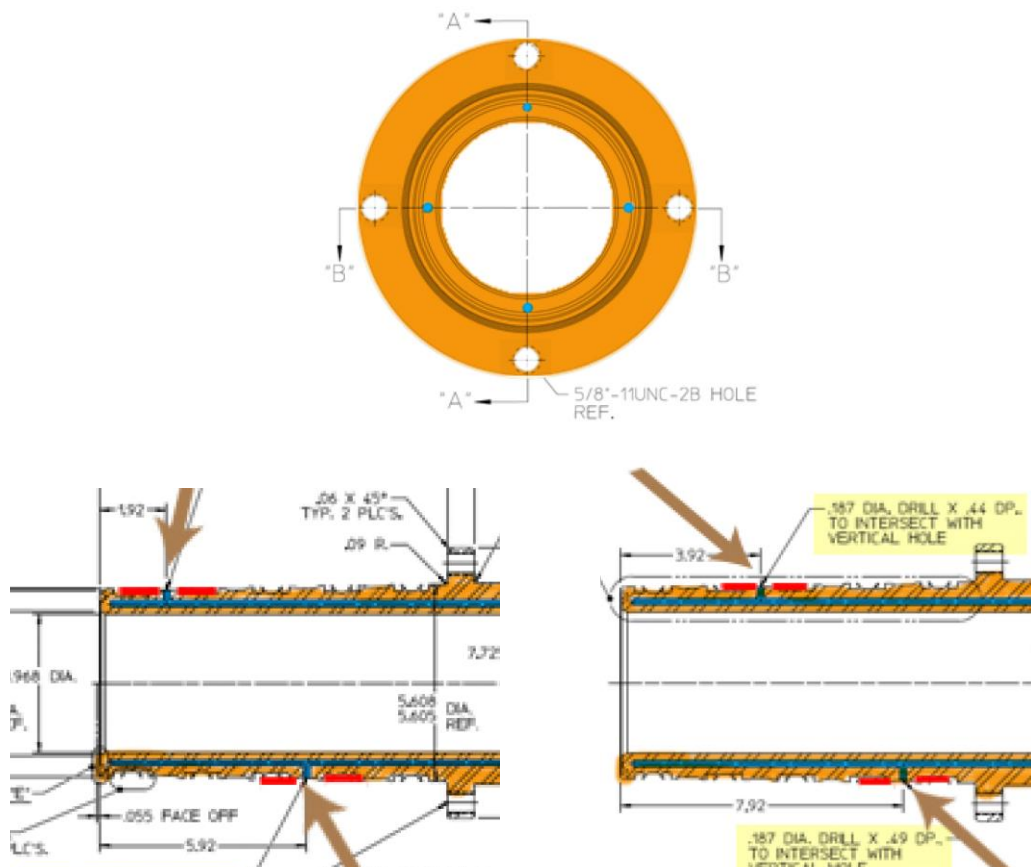
Petitioner provides arguments and evidence in support of contending claims 1 and 14 are unpatentable as having been obvious over Maersk. See Pet. 19–49 (claim 1), 82–85 (claim 14); Pet. Reply 1–22; Ex. 1004 ¶¶ 72–106 (claim 1), 171–183 (claim 14); Ex. 1031 ¶¶ 10–44. Patent Owner opposes. See PO Resp. 16–56; Sur-reply 1–20; Ex. 2002 ¶¶ 36–90.

Upon review of the foregoing, we conclude a preponderance of the evidence does not support Petitioner’s unpatentability contentions, in at least two respects.

a. Maersk Does Not Disclose At Least Two Inlet/Outlets Positioned in the Same Cylindrical Outer Surface

We first find that Maersk does not disclose at least two inlet/outlets positioned in the same cylindrical surface, as is required by claims 1 and 14. See *supra* Sections V.C.2 & V.C.3 (claim construction). Petitioner does not provide an alternative motivation for modifying Maersk to have at least two inlet/outlets positioned in the same cylindrical outer surface, so this shortcoming of Maersk is fatal to Petitioner’s case.

The Petition's pertinent comparison of claims 1 and 14 with Maersk is illustrated by the following annotations to CAD drawings showing various views of the Maersk bore stab. These drawings include an end view of the Maersk bore stab identifying two planes A-A and B-B, a cross-sectional view taken through plane A-A (at left below), and a cross-sectional view taken through plane B-B (at right below).



Maersk Bore Stab CAD Drawings (Ex. 1016, Annotated at Pet. 36–37).

These drawings show one end of the Maersk bore stab body (which Petitioner has colored orange), and illustrate four separate fluid flow paths (which Petitioner has colored blue) each having an inlet/outlet (which Petitioner has identified with brown arrows) positioned in a cylindrical outer

surface (which Petitioner has colored red). See Pet. 31–34, 36–37, 41–45; Ex. 1004 ¶¶ 94–95; Ex. 1016.

Importantly, the Petition’s red annotations identify *four different* cylindrical outer surfaces, each corresponding to *one* of the four inlet/outlets. None of the identified four cylindrical outer surfaces corresponds to at least two inlet/outlets. This can also be seen in Detail C of Exhibit 1016, which we reproduce here with our annotations.

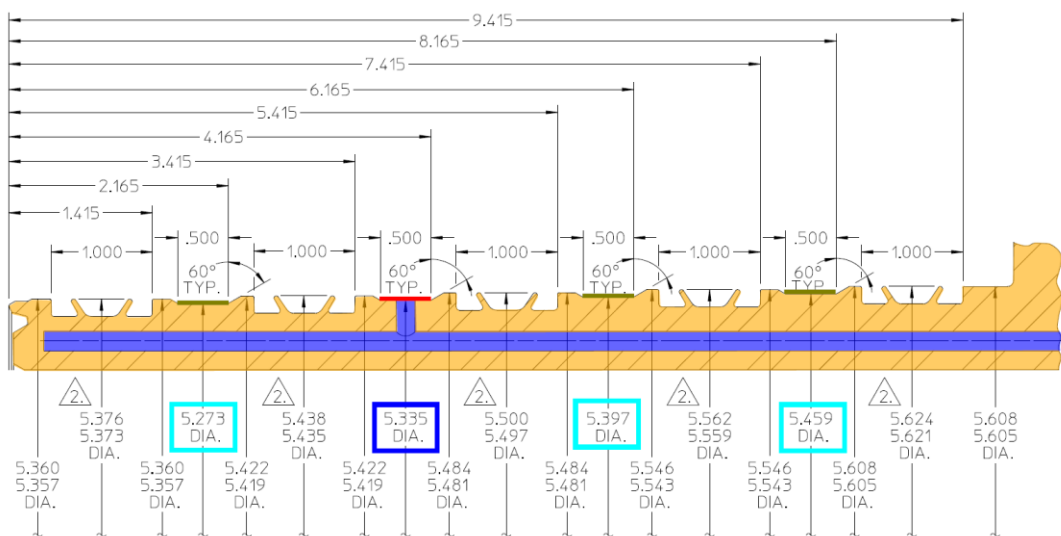


Exhibit 1016, Detail C (Annotated).

This annotated Detail C illustrates the wall of the Maersk bore stab (colored orange) at one end of the bore stab, where one of the four fluid passageways (colored dark blue) has an inlet/outlet positioned in an outer cylindrical surface of the bore stab (colored red) having a diameter of 5.335 inches (dark blue box). The other three fluid passageways, which are not shown in this Detail C because they are radially offset in 90° intervals around the periphery of the Maersk bore stab, each has an inlet/outlet positioned in different outer cylindrical surfaces (colored dark green) with diameters of 5.273, 5.397, and 5.459 inches (light blue boxes). Thus, applying Petitioner’s theory of unpatentability as set forth in the Petition, Maersk

lacks at least two inlet/outlets positioned in the same cylindrical surface, as we have construed claims 1 and 14 to require. *See supra* Section V.C.3.

That claim construction issue first arose in this proceeding via the Patent Owner Response. *See, e.g.*, PO Resp. 16–30; Ex. 2002 ¶¶ 36–56. Accordingly, in the Reply, Petitioner appears to offer an alternative theory, whereby Maersk might be found to disclose two inlet/outlets positioned in the same cylindrical outer surface. *See* Pet. Reply 7–8; Ex. 1031 ¶ 11. This alternative theory, as we understand it, is illustrated here by our annotations to Detail C of Exhibit 1016.

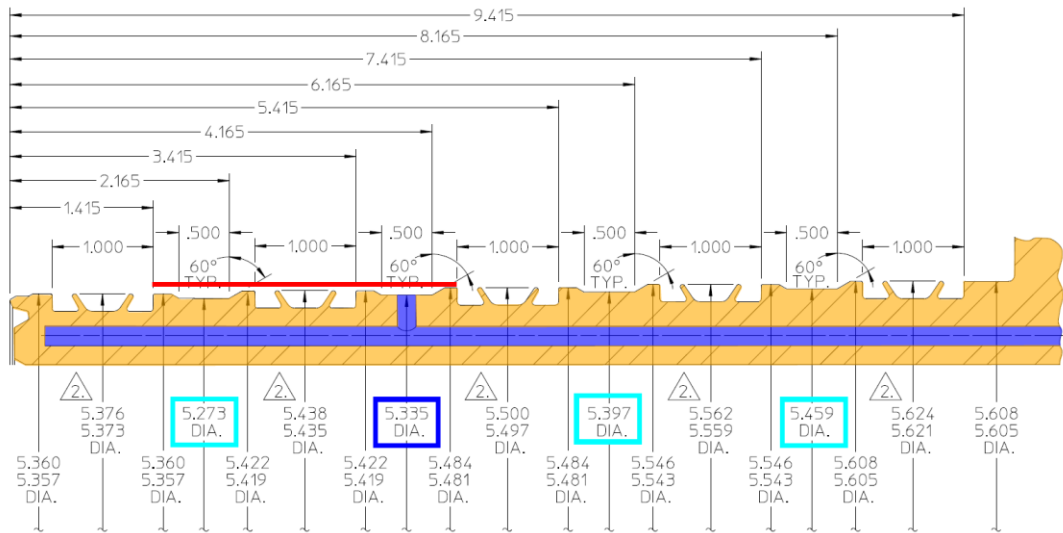


Exhibit 1016, Detail C (Annotated).

This annotated Detail C illustrates the wall of the Maersk bore stab (colored orange) at one end of the bore stab, where one of the four fluid passageways (colored dark blue) has an inlet/outlet positioned in an outer surface of the bore stab. We have added a red line corresponding to the axial extent of the outer surface that encompasses two adjacent inlet/outlets, the illustrated one at a diameter of 5.335 inches (dark blue box), and another one at a diameter of 5.273 inches (light blue box). We understand Petitioner’s position to be

that the outer surface of the Maersk bore stab along the axial extent of the red line is a “cylindrical” surface as recited in claims 1 and 14.

Petitioner’s alternative theory is not persuasive. We have construed the “cylindrical” outer surface to exclude a series of steps that combine to form a tapering profile along the axial length of the surface. *See supra* Section V.C.2. It is undisputed that the outer surface of the Maersk bore stab encompassing any two axially adjacent holes is stepped to form a tapering profile.

Indeed, this structure of Maersk provides two inter-related functional benefits. First, the tapering profile of the outer surface allows Maersk’s bore stab to be easily inserted into Maersk’s tree (at one end of the bore stab) and into Maersk’s tubing hanger (at the other end of the bore stab). *See* Ex. 2002 ¶ 50; Ex. 1031 ¶ 11; Ex. 2003, 59:7–18, 51:15–52:15, 53:3–8, 58:18–59:22. Second, the outer surface of each respective inlet/outlet “is **separate and isolated** from” the other outer surfaces, which is accomplished by the stair-stepped structure and sealing grooves placed between each step. *See* PO Resp. 20; Ex. 2002 ¶¶ 42–43, 46 (citing Ex. 1016); Ex. 2003, 51:16–18, 57:19–58:17. The stair-stepped structure, in particular, “helps to maintain seal integrity by having a gradually widening diameter such that the seals are not dragged along the interior surface of the production bore into which [the bore stab] is inserted during assembly.” Ex. 2002 ¶¶ 43, 50–51 (citing Exs. 1015, 1016). Maersk needs this separation and isolation because the four fluid passageways convey hydraulic fluid to perform four different operations within the well: (1) subsurface safety valve (“SSSV”) operations; (2) SSSV monitoring; (3) annulus isolation valve opening; and (4) annulus

isolation valve closing. *See* Ex. 2002 ¶¶ 48–49, 54 (citing Exs. 1015, 1016); Ex. 2003, 59:7–18, 61:12–62:5, 63:21–65:12.⁶

Thus, regardless of whether we apply Petitioner’s theory as set forth in the Petition or in the Reply, we find the Maersk bore stab does not have at least two inlet/outlets positioned in the same cylindrical surface, as required by claims 1 and 14. Further, Petitioner does not provide an alternative motivation for modifying Maersk to have this claimed structure. *See* Pet. 29–34; Pet. Reply 1–12.⁷ Therefore Maersk’s lack of disclosure in this respect is fatal to Petitioner’s case for obviousness.

⁶ The bore stab of claims 1 and 14, in contrast, provides at least two inlet/outlets positioned in the same cylindrical surface, which “facilitates an arrangement in which fluid through each of the fluid paths comingles in a gallery region defined between” the bore stab’s outer surface and the inner surface of the equipment in which the bore stab is inserted. Ex. 2002 ¶¶ 53–54 (citing Ex. 1001, Fig. 10, 4:65–5:7).

⁷ During oral argument, Petitioner’s counsel referred to an alternative obviousness argument. *See* Tr. 17:14–18:2. When asked for “a citation to where [Petitioner’s] expert has testified as to that specific modification,” Petitioner’s counsel cited Dr. Hilbert’s supplemental declaration and deposition testimony, as well as Mr. Parks’ deposition testimony. *See id.* at 18:3–13, 43:21–45:5 (discussing Ex. 1031 ¶ 37; Ex. 2003, 51:15–21; Ex. 1033, 102:16–103:2). However, this testimony was not cited in Petitioner’s Reply to support an obviousness argument. *See* Pet. Reply 1–12; Tr. 31:15–20, 49:8–23. “During an oral hearing, a party . . . may only present arguments relied upon in the papers previously submitted.” PTAB Consolidated Trial Practice Guide (Nov. 2019), 85–86. We therefore do not consider Petitioner’s alternative obviousness argument here. *See Dell Inc. v. Acceleron, LLC*, 884 F.3d 1364, 1369–70 (Fed. Cir. 2018).

b. Insufficient Motivation to Modify Maersk to Route Annular Fluid Through the Bore Stab Body

As discussed above, we have construed the “production/annulus bore stab” of claims 1 and 14 to require “at least one flow passageway for conveying a production fluid” and “at least one other flow passageway for conveying an annular fluid.” *See supra* Section V.C.1.

To address these claim requirements, Petitioner provides the following annotations to Exhibit 1019.

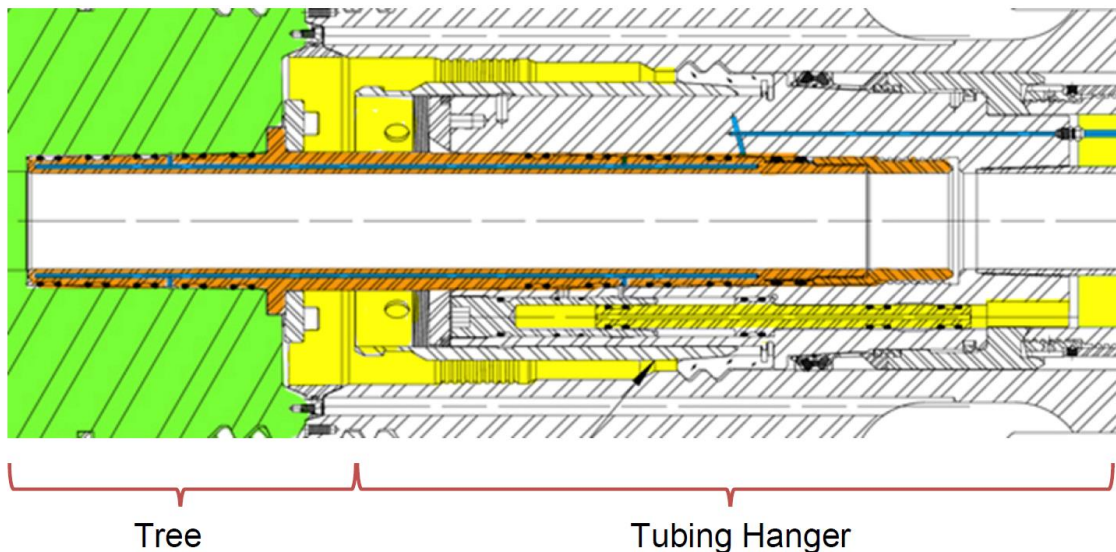


Exhibit 1019 (Excerpt, Annotated at Pet. 22).

Exhibit 1019 is a CAD drawing of the Maersk wellhead system, which Petitioner has annotated to identify a tree (in green), a tubing hanger (with some fluid flow passages in yellow or blue),⁸ and a bore stab (in orange, with some fluid flow passages in blue). See Ex. 1019; Pet. 20–22; Ex. 1004 ¶ 77.

⁸ Petitioner uses a bracket, but no coloring, to identify the “Tubing Hanger” structure. See Ex. 1004 ¶ 77. Mr. Parks distinguishes between a “Tubing hanger” and a “Casing hanger” being shown in the uncolored structure. See Ex. 2002 ¶ 36. This distinction is not material to the issues disputed between the parties.

Petitioner contends the Maersk bore stab has four fluid flow passageways defined within the wall of the bore stab, two of which are colored blue by Dr. Hilbert's annotations to Exhibit 1019 above. See Pet. 22–23; Ex. 1004 ¶¶ 77–78. Petitioner provides the following annotations to Exhibit 1016, to identify all four of these passageways.

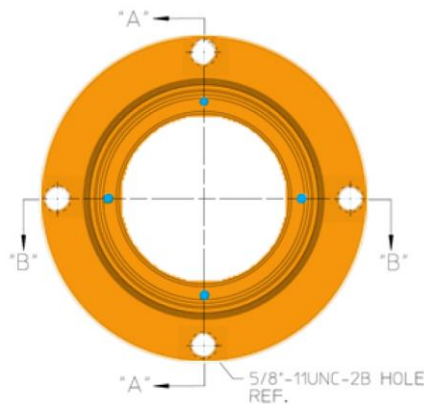


Exhibit 1016 (Excerpt, Annotated at Pet. 24, 31).

This excerpt of Exhibit 1016 is an end view of the Maersk bore stab (in orange), identifying in dotted lines the location of four vertical holes in the bore stab body (in blue). See Ex. 1016; Pet. 24, 31; Ex. 1004 ¶¶ 80, 90. It is undisputed that these four passageways convey hydraulic fluid between the tree and the tubing hanger. See Pet. 22–23, 25; Ex. 1004 ¶¶ 78, 82; PO Resp. 9–11; Ex. 2002 ¶¶ 38–39. The hydraulic fluid is used to operate and monitor valves, such as a subsurface safety valve and an annulus isolation valve, located in the tubing hanger or deeper within the wellbore. See Ex. 1004 ¶¶ 78, 82; Ex. 2002 ¶¶ 38–39.

Petitioner concedes Maersk's bore stab is not an *annulus* bore stab, as required by claims 1 and 14, because "Maersk does not expressly disclose a flow path for annular fluid through" the bore stab. Pet. 25; Ex. 1004 ¶ 81. It is undisputed that Maersk's annular fluid flow path lies entirely outside of

Maersk's bore stab, as shown in Petitioner's annotations to Exhibit 1015, reproduced below.

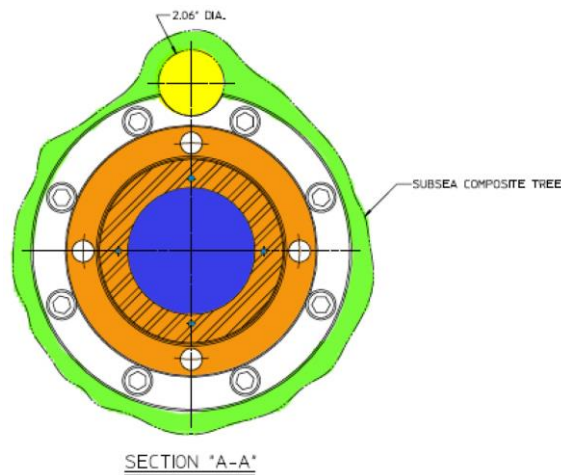


Exhibit 1015 (Excerpt, Annotated at Pet. 26).

This excerpt of Exhibit 1015 is a partially cross-sectional view of the Maersk bore stab (in orange), illustrating where it extends into the Maersk tree (in green). See Ex. 1015; Pet. 25–26; Ex. 1004 ¶ 82. The illustration shows a flange (not colored) having a cut-out to provide a free path to a 2.06 inch diameter port in the tree (in yellow). See Ex. 1015. It is undisputed that this tree port permits annular fluid to be conveyed between the tree and the tubing hanger, via the fluid passageways colored yellow in Dr. Hilbert's annotations to Exhibit 1019 above, without flowing through the bore stab. See Pet. 22, 25–26; *id.* at 47 (annotating Ex. 1014 in yellow, to identify a passage in the tree extending between the port next to the flange and two outlets); Ex. 1004 ¶¶ 77, 82; PO Resp. 9; Ex. 2002 ¶ 37, 57.

Petitioner argues “it would have been obvious for a [person of ordinary skill in the art], based on Maersk alone, to route annular fluid through the body of the production stab.” Pet. 25–30; Ex. 1004 ¶¶ 81–87. Patent Owner disagrees. See PO Resp. 30–56; Ex. 2002 ¶¶ 57–90. For the

following reasons, we conclude a preponderance of the evidence does not support Petitioner’s argument.

As a first motivation, Petitioner asserts a person of ordinary skill in the art would have known that “[o]ne of the benefits” of the Maersk bore stab “was that it included isolated fluid flow pathways (annotated in blue) disposed within the body” for conveying hydraulic fluids. Pet. 25; Ex. 1004 ¶ 82. For example, this “prevent[s] the [hydraulic] fluids from intermingling with other fluids and/or damaging sensitive wellbore equipment.” Pet. 25; Ex. 1004 ¶ 82. Maersk also, according to Petitioner, provides large fluid flow paths (annotated in yellow) for isolating annular fluids from hydraulic fluids and the environment. See Pet. 25–26; Ex. 1004 ¶ 82. Based on this common purpose “to isolate fluid flow,” Petitioner asserts “it was a matter of design choice of which fluid to route through which of the isolated flow path locations.” Pet. 26–27; Ex. 1004 ¶ 84. Thus, Petitioner concludes a person of ordinary skill in the art “could have readily chosen to isolate the annular fluid through one or more of the integrated stab pathways rather than the single larger diameter pathway.” Pet. 26–27; Ex. 1004 ¶ 84.

As we stated in the Institution Decision, and we again conclude here: “Maersk’s existing structures *already* isolate hydraulic fluids and annular fluids from each other and from the environment, so achieving such isolation cannot provide the requisite motivation” for modifying Maersk to re-route the annular fluid flow. Inst. Dec. 33. Although Petitioner’s first motivation “establishes . . . that Maersk could have been modified predictably to reach the claimed invention,” “this alone is not a sufficient reasoning to support obviousness.” *Id.* Instead, “obviousness requires ‘a motivation to pick out those two references and combine them to arrive at the claimed invention,’

and ‘the amount of explanation needed will vary from case to case, depending on the complexity of the matter and the issues raised in the record.’” *Id.* (quoting *Personal Web Techs., LLC v. Apple, Inc.*, 848 F.3d 987, 991–92 & 993–94 (Fed. Cir. 2017), and also citing *InTouch Techs., Inc. v. VGo Commc’ns, Inc.*, 751 F.3d 1327, 1351–52 (Fed. Cir. 2014)). In this case, the need to isolate and retain the annular fluid within the Maersk wellhead system is not a persuasive motivation for re-routing the annular fluid flow to pass through the bore stab walls, because Maersk’s wellhead system already achieves this isolation and retention.

Petitioner responds that “the suggestion or motivation [to modify] may be derived from the prior art reference itself [and/or] from the knowledge of one of ordinary skill in the art.” Pet. Reply 22 (quoting *SIBIA Neurosciences, Inc. v. Cadus Pharm. Corp.*, 225 F.3d 1349, 1356 (Fed. Cir. 2000)). Applying that principle to this case, Petitioner argues Maersk alone establishes obviousness, because “there are only so many options [for routing] annular fluids and other fluids in the wellhead past the production stab.” *Id.* (citing Ex. 1033, 150:1–6). Petitioner asserts “Maersk discloses two of these options, routing annular fluid outside of the stab and routing hydraulic fluid in a bore through the production stab.” *Id.*

We conclude, however, that this additional obviousness analysis still falls short of the requisite motivation to establish obviousness. Petitioner establishes, at most, that Maersk *could* have been modified to practice the invention of claims 1 and 14, rather than that a person of ordinary skill in the art *would* have done so. We therefore determine Petitioner’s case for obviousness in this regard is tainted by a hindsight desire to reach the invention of claims 1 and 14. *See, e.g., InTouch*, 751 F.3d at 1348–49

(“[The expert witness’s] testimony was nothing more than impermissible hindsight; she opined that all of the elements of the claims disparately existed in the prior art, but failed to provide the glue to combine these references.”).

As a second motivation, Petitioner asserts a person of ordinary skill in the art would have known “that the annular fluid pressure increases the further below sea level the subsea well is located,” and “subsea well depths [had] increased” between Maersk’s wellhead system in 1993 and the ’921 patent’s effective filing date in 2019. Pet. 27; Ex. 1004 ¶ 85. This knowledge, Petitioner asserts, would have provided a motivation “to direct the annular fluid through the integrated stab pathways in order to provide additional protective barriers between the high-pressure annular fluid and environment.” Pet. 27; Ex. 1004 ¶ 85. Petitioner cites, in support, ANSI/API Specification 17D (“API 17D”) as “requir[ing] two barriers between the annulus bore and the environment,” thereby “suggesting that routing the annular flow path through the body of the production stab would have been preferable” over Maersk’s existing design. Pet. 27 (citing Ex. 1022, 158, § 9.2.8); Ex. 1004 ¶ 85.

Further, according to Petitioner, the proposed modification to Maersk could have been achieved with a reasonable expectation of success, because a person of ordinary skill in the art “could have readily made one or more dimensional adjustments to the stab pathways and/or wall thickness to account for the increase in the volumetric flow rate and fluid pressure of the annular fluid as compared to the hydraulic fluid.” Pet. 27, 28–29; Ex. 1004 ¶¶ 84, 86–87. Specifically: “This can be achieved in one of two ways—either by increasing the number of pathways or by increasing the diameter of

each pathway.” Pet. 28 (citing Ex. 1018; Ex. 1001, 4:49–52, Fig. 7); Ex. 1004 ¶¶ 86–87.

In opposition, Patent Owner argues Petitioner “fails to demonstrate that movement to deeper water or increased pressures would have motivated a [person of ordinary skill in the art] to modify Maersk in order to provide ‘additional’ protective barriers” to the annular fluid escaping the wellhead system. PO Resp. 31, 36; Ex. 2002 ¶¶ 26–29, 57–63. According to Patent Owner, API 17D “demonstrates the opposite—the number of barriers is not dependent on depth/pressure and does not increase with higher pressures.” PO Resp. 31, 35 (citing Ex. 1022, 158, §§ 9.2.7–9.2.8); Ex. 2002 ¶¶ 62–63. Further: “API 17D accounts for a range of tubing hanger pressures, including pressures several multiples higher than the 5000 psi specified by Maersk, never calling for ‘additional’ barriers based on this increased water depth/pressure.” PO Resp. 35; Ex. 2002 ¶¶ 62–63.

Patent Owner further asserts Maersk already “satisfies the requirement of two barriers” set forth in API 17D, and this would remain true even if a person of ordinary skill in the art were to use the Maersk design at higher pressures in deeper water. PO Resp. 31, 34; Ex. 2002 ¶¶ 26–29, 60–61. The existing barriers in Maersk, according to Patent Owner, are: (1) a ring seal; (2) an annulus isolation valve; and (3) a production packer. PO Resp. 31, 34; Ex. 2002 ¶¶ 60–61 (annotating Ex. 1019 to identify the ring seal barrier and the annulus isolation valve barrier). Patent Owner alleges “Dr. Hilbert acknowledges this.” PO Resp. 34 (citing Ex. 2003, 46:15–22).

Petitioner replies that Patent Owner mis-reads the Petition’s theory for motivation, which is that “**more** barriers are better for preventing annular fluid from escaping into the environment,” and Patent Owner merely repeats

arguments that we rejected in the Institution Decision. Pet. Reply 15 (citing Inst. Dec. 35–37). Petitioner adds that “annulus isolation valves are an active barrier, as opposed to a passive barrier” such as the additional wall barrier provided by Petitioner’s proposed modification, and a person of ordinary skill in the art would have recognized a passive barrier “reduces risk even more to the environment and is thus more favorable.” *Id.*; Ex. 1031 ¶ 33 (citing Ex. 2001). Petitioner asserts: “It is unnecessary for the barrier requirement to be directly proportional to depth/pressure for a POSITA to recognize that increasing depths/pressures would be a good reason for additional barriers between the annular fluid and environment.” Pet. Reply 15; Ex. 1004 ¶ 85; Ex. 1031 ¶ 35.

Upon review of the foregoing, we conclude a preponderance of the evidence does not support Petitioner’s second proposed motivation for modifying Maersk to re-route annular fluid through the bore stab body. In particular, we are not persuaded that this would have been done to provide more barriers preventing the escape of annular fluid from the wellhead system, when using Maersk’s system in deeper subsea wells.

First, API 17D does not directly support this motivation. It provides requirements for a subsea tubing hanger system. See Ex. 1022, 156 (§ 9 Title). In particular, the rated working pressure of the tubing hanger, the tree, and the bore stab “shall be . . . either 34,5 MPa (5 000 psi), 69 MPa (10 000 psi), or 103,5 MPa (15 000 psi).” *Id.* at 158 (§ 9.2.7—tubing hanger and tree), 82 (§ 7.9.1—bore stab). And: “There shall be *a minimum of two seal barriers* between the production and annulus bores of the tubing hanger and the environment.” *Id.* at 158 (§ 9.2.8) (emphasis added).

API 17D thus provides that two seal barriers are sufficient for systems having rated working pressures between 5000 psi and 15000 psi. *See also* Ex. 2002 ¶ 62 (Mr. Parks testifying that “standardized pressure ratings of wellhead equipment in subsea fields . . . vary from 5,000 PSI for more shallow wells to 15,000 PSI or more for deeper wells”). We find that Maersk’s wellhead system already provides three seal barriers. Mr. Parks identifies these barriers as a ring seal, an annulus isolation valve, and a production packer. *See id.* ¶¶ 60–61. Dr. Hilbert does not dispute Mr. Parks’ testimony on this point. *See, e.g.,* Ex. 1031 ¶¶ 32–35 (discussing API 17D and adding more seal barriers); *id.* ¶¶ 13–31, 36–44 (disputing Mr. Parks’ testimony on other points relating to the proposed modification of Maersk).

Second, we are not persuaded by Dr. Hilbert’s testimony that modifying Maersk to re-route annular fluid through the bore stab, thereby adding an additional seal barrier, would have been done to accommodate the higher pressures encountered in deeper wells. Dr. Hilbert briefly refers to the Maersk wellhead system as having a rated working pressure of 5000 psi. Ex. 1004 ¶ 69; Ex. 1031 ¶ 27. He then states a person of ordinary skill in the art would have known “that the annular fluid pressure increases the further below sea level the subsea well is installed,” and so would have been “motivated to direct annular fluid through the integrated pathways [of the bore stab] in order to provide additional protective barriers between the high-pressure annular fluid and environment.” Ex. 1004 ¶¶ 85–87.

Dr. Hilbert’s conclusion, however, is not accompanied by any discussion of how far below sea level the Maersk wellhead system was installed in 1993. *See id.* ¶¶ 69, 85–87. Nor does Dr. Hilbert discuss how

wellhead system technology evolved between 1993 and the '921 patent's effective filing date in 2019 to accommodate deeper wells than the Maersk wellhead system. *See id.* Given this scant explanation, and the fact that Maersk already provides more seal barriers (three) than API 17D requires (two) for pressure ratings up to three times Maersk's pressure rating (5000 psi versus 15000 psi), Dr. Hilbert's initial motivation testimony stands on shaky ground.

Dr. Hilbert's reply testimony does not materially help. Dr. Hilbert goes to great lengths to discuss *how* Maersk could have been modified to re-route annular fluid through the bore stab, but gives short shrift to *why* this would have been done. *See* Ex. 1031 ¶¶ 13–44. On the latter issue, Dr. Hilbert points out that API 17D provides for “a **minimum** of two seal barriers” and concludes that “[d]epending on the application, a [person of ordinary skill in the art] would be motivated to add a third barrier.” *Id.* ¶ 32; *see also id.* ¶ 34 (stating “**more** barriers between the annular fluid and the environment reduce risk as depth/pressure increases”).

Dr. Hilbert then states that persons in the art differentiated between “passive” seal barriers which “are not actuated or routinely disturbed once they are in place,” and “active” seal barriers which “are designed to be routinely actuated.” *Id.* ¶ 33 (quoting Ex. 2001).⁹ Dr. Hilbert thus concludes that one of Maersk's three seal barriers, the annular isolation valve, is an active seal barrier. *See id.* He then opines that a passive barrier

⁹ Exhibit 2001 is a 3-page excerpt from International Standard ISO 13628-1, consisting of a cover page and pages 225–226. Dr. Hilbert's quotation of the definition of a “passive” seal barrier appears to be taken from previous pages which are not provided in Exhibit 2001. *Compare* Ex. 1031 ¶ 33 (quoting § J.3.2), *with* Ex. 2001 (page 225 begins with § J.3.3).

“reduces risk to the environment and [is] thus favorable” over an active barrier, thereby supporting his testimony because re-routing the annular fluid through the wall of Maersk’s bore stab would add a passive barrier. *Id.* ¶¶ 33–35.

However, Maersk’s other two seal barriers—a ring seal, and a production packer—both appear to be passive barriers. *See* Ex. 2002 ¶ 60 (annotating Ex. 1019 to identify the ring seal); Ex. 1031 ¶ 33 (stating that passive barriers “include, *inter alia* . . . packers”). Dr. Hilbert does not explain persuasively why adding a third passive barrier would materially improve the sealing versus Maersk’s three existing barriers, so as to justify the extensive modifications required to re-route the annular fluid through the bore stab. *See* Ex. 1031 ¶¶ 33–35; *id.* ¶¶ 13–44 (discussing some of the modifications required).

Further, Mr. Parks persuasively testifies, in opposition to Dr. Hilbert’s motivation testimony, that “deeper wells and increased annulus fluid pressure would *not* have led a [person of ordinary skill in the art] to modify Maersk to provide additional protective barriers.” Ex. 2002 ¶¶ 58, 60–63 (emphasis added). Some of this testimony has already been cited above.

Additionally, Mr. Parks notably served on the editorial committee for API 17D. *See id.* ¶¶ 6, 63. He testifies that a person of ordinary skill in the art would have “recognized that API 17D does not support” Dr. Hilbert’s testimony, “because *API 17D’s two-barrier requirement is not dependent on depth or pressure.*” *Id.* ¶ 62 (citing Ex. 1022, 158 (§ 9.2.7)) (emphasis added). In particular: “there are practical considerations underlying the API 17D requirement for two barriers, and the lack of any specification for more than two barriers.” *Id.* ¶ 63. This testimony is supported by API 17D,

which requires a minimum of two seal barriers for any system with a rated working pressure falling within the entire 5000–15000 psi range contemplated by API 17D. *See* Ex. 1022, 158 (§§ 9.2.7–9.2.8).

Mr. Parks further testifies: “Two barriers, appropriately specified for the water depth/pressure, provides a high level of redundancy” and “in many cases, further connections and components beyond two add complexity that can create additional failure points without meaningfully increasing reliability.” Ex. 2002 ¶ 63. He concludes there is “limited, if any, practical advantage of yet a further ‘additional’ barrier in the context of Maersk’s original system,” which is outweighed by “the increased complexity and introduction of further failure points” required of Petitioner’s proposed modification. *Id.* We are persuaded by this testimony.

There is a substantial amount of back-and-forth between Mr. Parks and Dr. Hilbert concerning the alleged complexity and difficulty of re-routing annular fluid to flow through Maersk’s bore stab. *See* Ex. 1004 ¶¶ 86–87; Ex. 2002 ¶¶ 64–88; Ex. 1031 ¶¶ 13–44. Putting aside the issue of reasonable expectation of success, this back-and-forth establishes, at the least, that Petitioner’s re-design of Maersk would have been a significant undertaking. *See, e.g.,* Ex. 1031 ¶¶ 25–27, 30–31, 36–44. Given the significance of this effort, and the weak evidence supporting Dr. Hilbert’s alleged improvement to modify Maersk to handle higher pressure for deeper wells, we conclude a person of ordinary skill in the art would not have been motivated to modify Maersk to re-route annular fluid flow through the bore stab. This alleged improvement was sufficient to justify institution of review (*see, e.g.,* Inst. Dec. 33–37), but now, upon consideration of a

complete evidentiary record, we conclude Dr. Hilbert's testimony does not withstand the scrutiny afforded by Mr. Parks' opposing testimony.

For the foregoing reasons, we conclude Petitioner has not articulated a sufficient motivation for modifying Maersk to route annular fluid flow through the bore stab, based on a preponderance of the evidence.

c. Conclusion as to Claims 1 and 14

For the foregoing reasons, we conclude a preponderance of the evidence does not support Petitioner's contention that claims 1 and 14 are unpatentable as having been obvious over Maersk.

3. Dependent Claims 2–11 and 15

Petitioner provides argument and evidence in support of contending dependent claims 2–11 and 15 are unpatentable as having been obvious over Maersk. *See* Pet. 49–82, 85; Pet. Reply 22–25; Ex. 1004 ¶¶ 107–170, 184–186; Ex. 1031 ¶¶ 45–50. Patent Owner opposes some of these contentions. *See, e.g.*, PO Resp. 56–72; Sur-reply 20–23; Ex. 2002 ¶¶ 91–104. Because we have concluded that a preponderance of the evidence does not support Petitioner's contention that claims 1 and 14 are unpatentable as having been obvious over Maersk, we also conclude Petitioner does not show, by a preponderance of the evidence, that dependent claims 2–11 and 15 would have been obvious over Maersk.

E. Obviousness over Broussard

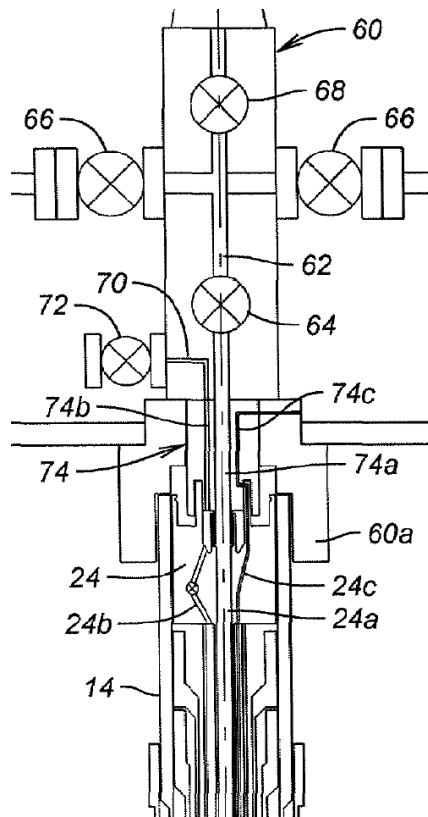
Petitioner asserts claims 1–11, 14, and 15 of the '921 patent are unpatentable under 35 U.S.C. § 103 as having been obvious over Broussard. *See* Pet. 7–8, 85–126; Pet. Reply 25–30; Ex. 1004 ¶¶ 187–272; Ex. 1031

¶¶ 51–56. Patent Owner opposes. *See* PO Resp. 78–90; Ex. 2002 ¶¶ 105–121.

For the following reasons, we conclude Petitioner has not established by a preponderance of the evidence that the challenged claims are unpatentable as having been obvious over Broussard.

1. Broussard Disclosure

Broussard discloses a tubing hanger suspension assembly for an oil and gas well completion system. *See* Ex. 1020, code (57). An excerpt of Figure 5 is reproduced below.

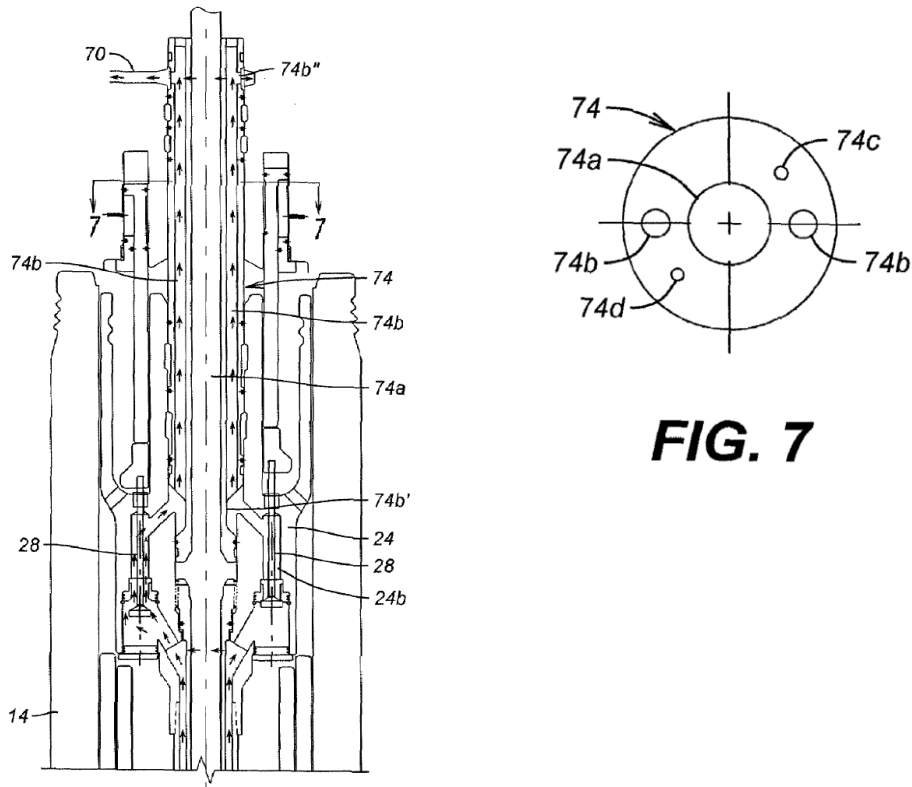


Broussard, Figure 5 (Excerpt).

Figure 5 is a schematic sectional elevation view of a subsea tree with a stab sub connected to a tubing hanger housing. *See id.* at 3:29–32. Tree assembly 60 has connector 60a adapted to seal and connect to wellhead

housing 14. *See id.* at 9:29–31. Stab sub assembly 74 provides various interconnections between tree assembly 60 and tubing hanger housing 24 within wellhead housing 14. *See id.* at 9:38–41, 9:63–64. In one connection, production fluid is conveyed from production bore 24a of tubing hanger housing 24 up and into production bore 74a of stab sub 74, which then conveys the production fluid up and into production bore 62 of tree assembly 60. *Id.* at 9:44–48. In another connection, annular fluid is conveyed from annulus bore 24b of tubing hanger housing 24 up and into annulus bore 74b of stab sub 74, which then conveys the annular fluid up and into annulus bore 70 of tree assembly 60. *Id.* at 9:28–29, 9:48–52.

An excerpt of Figure 6, and Figure 7, of Broussard are reproduced below.



Broussard, Figure 6 (Excerpt) and Figure 7.

Figure 6 is a sectional elevation view of stab sub 74 connected to tubing hanger housing 24, and Figure 7 is a sectional view taken along lines 7–7 in Figure 6. *Id.* at 3:33–38, 9:63–64. Figure 6 includes several small arrows, to identify annulus flowpath P for annular fluid to flow from two annulus bores 24b of tubing hanger housing 24, up and into two annulus bores 74b of stab sub 74, and then into annulus bore 70 of tree assembly 60. *Id.* at 3:33–36, 9:48–52, 9:64–10:19. “The lower ends of the annulus bores 74b are in fluid communication with each other by a peripheral groove or gallery 74b’.” *Id.* at 10:9–11. “Similarly, the upper ends of the annulus bores 74b are in fluid communication with each other by a peripheral groove or gallery 74b’.” *Id.* at 10:11–16.

2. *Independent Claims 1 and 14*

Petitioner provides arguments and evidence in support of contending claims 1 and 14 are unpatentable as having been obvious over Broussard. *See* Pet. 85–100 (claim 1), 123–125 (claim 14); Pet. Reply 25–30; Ex. 1004 ¶¶ 187–209 (claim 1), 259–269 (claim 14); Ex. 1031 ¶¶ 51–56. Patent Owner opposes. *See* PO Resp. 78–90; Ex. 2002 ¶¶ 105–121.

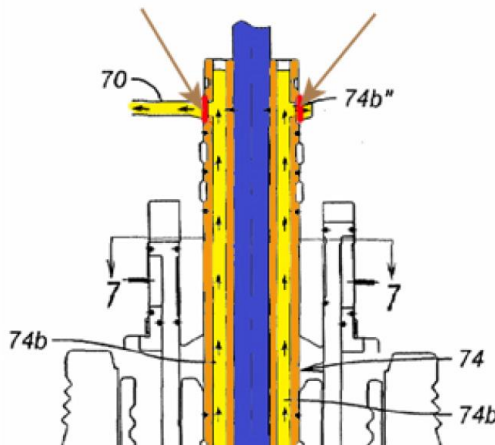
Upon review of the foregoing, we conclude a preponderance of the evidence does not support Petitioner’s unpatentability contentions, for the following reasons.

a. Broussard Does Not Disclose First Inlet/Outlets of Two Fluidly Isolated Flow Paths Positioned in a First Cylindrical Outer Surface

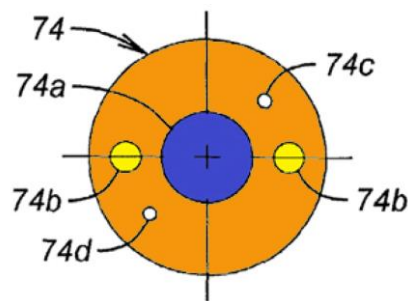
Claims 1 and 14 require the bore stab body to define “a plurality of individual fluid flow paths” with “each of the individual fluid flow paths being fluidly isolated from one another within the . . . body.” Ex. 1001,

8:2–8, 9:42–10:1. The body also must comprise “a first cylindrical outer surface,” with each flow path “comprising a first inlet/outlet . . . positioned in the first cylindrical outer surface.” *Id.* at 8:2–12, 9:43–44, 10:1–6.

Petitioner asserts Broussard’s bore stab 74 satisfies these claim requirements, and in support, Petitioner provides the following annotations to Broussard’s Figures 6 and 7.



**Broussard, Figure 6
(Excerpt, Annotated at Pet. 97).**



**Broussard, Figure 7
(Annotated at Pet. 94).**

Figure 6 is a sectional elevation view of bore stab 74, where it fluidly connects to annulus bore 70 of tree assembly 60, and Figure 7 is a sectional view taken along lines 7–7 in Figure 6. Ex. 1020, 3:33–38, 9:48–51, 9:63–64. Petitioner asserts the body of bore stab 74 is colored orange, and the claimed plurality of individual fluid flow paths (including at least the two annulus bores 74b) are colored yellow, and annulus bores 74b are fluidly isolated from one another within the body. See Pet. 87–89, 91–94; Ex. 1004 ¶¶ 191–192, 198–200. Petitioner also asserts the body comprises a first cylindrical outer surface, which is colored red, with each flow path comprising a respective first inlet/outlet positioned in the first cylindrical

outer surface, as identified by brown arrows. *See* Pet. 87–89, 94–97; Ex. 1004 ¶¶ 191–193, 201–203.

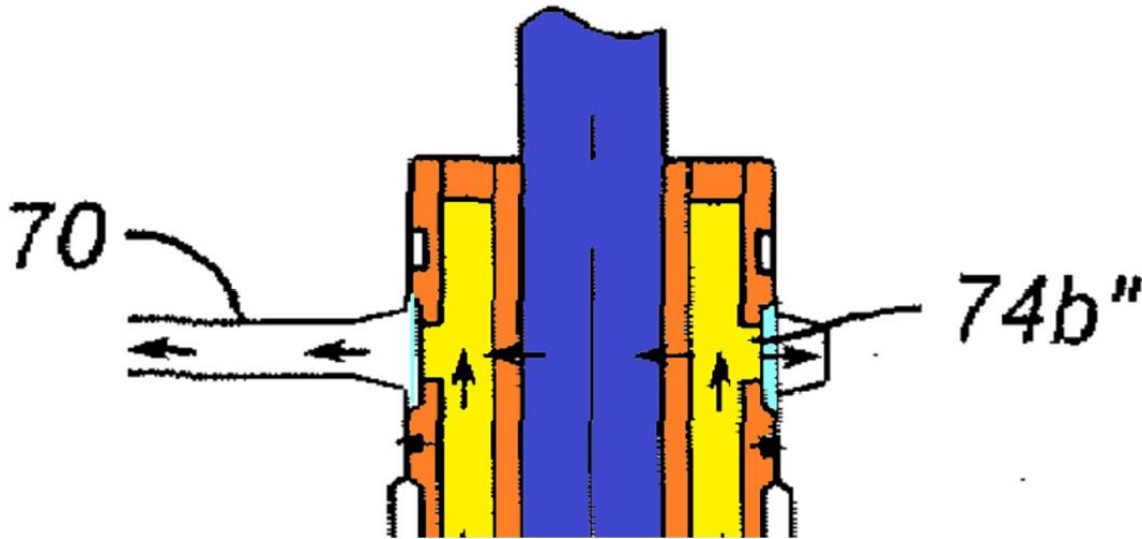
In the Institution Decision, we concluded “the Petition is ambiguous as to where, exactly, Petitioner asserts the ‘flow paths’ of claim 1 [and claim 14] are found in Broussard’s Figure 6, and specifically where the claimed ‘first inlet/outlet’ of each flow path is found.” Inst. Dec. 44. We posited two possible readings of the Petition in this regard. *Id.* at 44–45. The first reading was that “*both* of these first inlet/outlets are found at the *same* location, where groove or gallery 74b” connects to bore 70 of tree 60.” *Id.* at 44. The second reading was that “each flow path has a *separate* inlet/outlet from the other flow path, where each respective bore 74b connects to groove or gallery 74b” on diametrically opposite sides of bore stab 74.” *Id.* at 44–45. We then decided that “regardless of which reading of the Petition is applied, the viability of the Petition is doubtful.” *Id.* at 45–46.

Patent Owner essentially agrees with the conclusions reached in the Institution Decision, but focuses on the decision’s first reading of the Petition. *See* PO Resp. 78–81; Ex. 2002 ¶¶ 105–112.

Petitioner’s Reply focuses on the Institution Decision’s second reading of the Petition, and provides more detail in this regard, in an effort to establish that Broussard discloses first inlet/outlets of two fluidly isolated flow paths positioned in a first cylindrical outer surface. *See* Pet. Reply 25–28; Ex. 1031 ¶ 51. For example, the Reply asserts Broussard’s gallery 74b” is “*not considered a part of the stab* but [is] defined just outside of it,” and “it is *not* the galleries that form the inlet/outlets at the outer surface of the stab.” Pet. Reply 25 (emphases added); Ex. 1031 ¶ 51. Thus,

the Reply expressly disavows reliance on the Institution Decision’s first reading of the Petition, in which the first inlet/outlets of the bore stab flow paths might both be found in Broussard where gallery 74b” connects to bore 70 of tree 60. We therefore do not discuss the first reading further here.

Concerning the Institution Decision’s second reading of the Petition, the Reply asserts that the first inlet/outlets of Broussard’s bore stab 74 are formed at “the radial portions of each annular bore [74b].” Pet. Reply 25; Ex. 1031 ¶ 51. Petitioner provides the following annotations to an excerpt of Figure 6 of Broussard to illustrate this contention.



Broussard’s Figure 6 (Excerpt, Annotated at Pet. Reply 26).

Figure 6 is a sectional elevation view of Broussard’s bore stab 74, where it fluidly connects to annulus bore 70 of tree assembly 60. See Ex. 1020, 3:33–36, 9:48–51. Dr. Hilbert testifies that a person of ordinary skill in the art “would understand that annulus fluid flowing from the tree annulus bore 70 would flow into the upper ends of the stab sub annulus bores through *individual ports located on the upper cylindrical surface of the stab sub.*” Ex. 1031 ¶ 51 (emphases added). According to Dr. Hilbert,

gallery 74b” “is not a part of the stab sub but rather [is] the space defined between the outer stab surface and the inner surface of the subsea tree,” as colored cyan in Petitioner’s illustration. *Id.*; *see also* Pet. Reply 25 (asserting Broussard’s Figure 6 “illustrates the galleries (cyan) as a space between the outer surface of the stab (orange) and the inner surface of the tree (white)”).

Dr. Hilbert further testifies that gallery 74b” “is in fluid communication with the individually isolated annulus fluid bores (annotated yellow . . .) in the outer surface of the [bore stab] within the subsea tree and the ‘gallery’ consists of circular ports in the cylindrical surface of the upper end of [the bore stab], which are in fluid communication with the individually isolated annulus fluid bores.” Ex. 1031 ¶ 51; *see also* Pet. Reply 25–26 (asserting Broussard’s Figure 6 shows “[a] radial portion of the annular bores (yellow) meet with the outer surface of the stab (brown arrows)”). Dr. Hilbert concludes this alleged structure in Broussard is “akin to” and “consistent with” the ’921 patent’s description of fluid collection chamber 116A, as shown in its Figure 10, which is allegedly “defined *between* the body 102 and the equipment 114 (i.e., tree) and not a part of either.” Ex. 1031 ¶ 51 (citing Ex. 1001, 5:5–15).

Patent Owner responds that “even if Petitioner relies on the ‘radial portions of each annular bore’ as purportedly disclosing the first inlet/outlets . . . Petitioner fails to demonstrate that the radial portions are ‘positioned in the first cylindrical outer surface’” of the bore stab as recited in claims 1 and 14. Sur-reply 24–25. For example, according to Patent Owner, Broussard’s Figure 6 “does not illustrate the geometry of the interior

wall that the bore is formed in” so “Petitioner’s characterization that such a surface is ‘cylindrical’ is speculation.” *Id.* at 25.

Upon consideration of the foregoing, we find that Dr. Hilbert’s testimony in support of Petitioner’s argument is not persuasive, because it is contradicted by Broussard’s description of its own device, and because it mis-applies the claims. On the first point, Broussard clearly describes upper gallery 74b” as being part of bore stab 74, because Broussard uses various variants of reference number 74 to identify various structural details of bore stab 74. *See* Ex. 1020, 9:38–10:16. Thus, bore stab 74 includes production bore 74a, two annulus bores 74b, hydraulic control lines 74c, lower groove or gallery 74b’, and upper groove or gallery 74b”. *See id.* at Figs. 5–7, 9:44, 9:48–49, 9:52–54, 10:5–6, 10:9–13. It is also significant that the references for the annular fluid flow passages within bore stab 74 are all variants of “74b” (i.e., in the direction of fluid flow, lower gallery 74b’, two bores 74b, and upper gallery 74b”). *See id.* Further, immediately after identifying upper groove or gallery 74b”, Broussard provides: “Alternatively or additionally, the tree assembly 60 *may also include a peripheral groove,*” again suggesting groove or gallery 74b” is part of bore stab 74 just like the mating groove or gallery is part of the tree assembly. *Id.* at 10:13–16 (emphasis added).

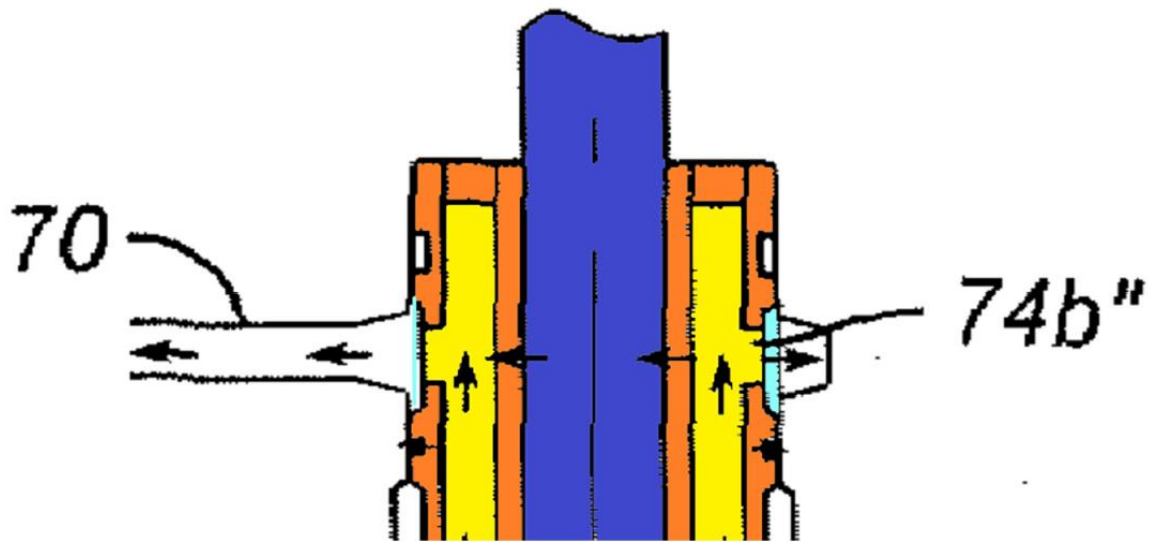
Based on those disclosures, we disagree with Dr. Hilbert’s testimony that upper gallery 74b” “*is not a part of*” bore stab 74, and rather is a “space *defined between* the outer stab surface and the inner surface of the subsea tree.” Ex. 1031 ¶ 51 (emphases added). We instead are persuaded by Mr. Parks’ opposing testimony that “it is this single ‘gallery 74b’” that forms the ‘portion of the annulus bore 74b that interfaces with the tree annulus

bore 70' identified in the Petition as being the first fluid inlet/outlet.”

Ex. 2002 ¶ 110. We acknowledge that Broussard states “the stab sub assembly 74 . . . includes an annulus bore 74b in sealed engagement with the tree annulus bore 70” (Ex. 1020, 9:48–50), but this statement must be read in the context of Broussard’s overall disclosure, which indicates upper gallery 74b” is the part of annulus bore(s) 74b that intervenes between the two separate bores illustrated in Figures 6 and 7 and tree annulus bore 70. See Ex. 1020, Figs. 6 and 7, 10:5–13.

This intervention of upper gallery 74b” between the two separate bores within bore stab 74 and tree annulus bore 70 is important within the context of claims 1 and 14. Broussard describes how “the upper ends of the annulus bores 74b *are in fluid communication with each other* by a peripheral groove or gallery 74b”.” *Id.* (emphasis added). Broussard therefore lacks the claimed plurality of fluid flow paths defined entirely within the body of bore stab 74 that are fluidly isolated from one another within the body. See Ex. 1001, 8:3–8 (claim 1), 9:47–10:1 (claim 14). Instead, the flow paths of the two separate bores illustrated in Figures 6 and 7 merge into upper gallery 74b”, before the fluid flow exits bore stab 74 into tree annulus bore 70.

Dr. Hilbert’s testimony finding two first inlet/outlets being positioned in the same first cylindrical outer surface also is not supported by Broussard’s disclosure, and mis-applies claims 1 and 14. We reproduce Petitioner’s illustrative annotations to Broussard’s Figure 6 here.



Broussard, Figure 6 (Excerpt, Annotated at Pet. Reply 26).

Figure 6 is a sectional elevation view of Broussard's bore stab 74, where it fluidly connects to annulus bore 70 of tree assembly 60. See Ex. 1020, 3:33–36, 9:48–51. Dr. Hilbert testifies that the two yellow-colored passages are fluidly isolated from each other within the bore stab body, because the radially extending offshoots from the vertical passages are in fact “individual ports” that separately lead to the common upper gallery 74b'' which is colored cyan. Ex. 1031 ¶ 51. However, Broussard contradicts this testimony, because the reference lead line for common upper gallery 74b'' within Figure 6 points directly to one of the two yellow-colored passages that Dr. Hilbert testifies is fluidly isolated from the other yellow-colored passage. Thus, as described by Broussard, upper gallery 74b'' includes *both* the cyan-highlighted portion *and* the yellow-colored radially extending offshoots.

Further, even if Dr. Hilbert is correct that the yellow-colored radially extending offshoots are individual ports that separately connect to common upper gallery 74b'', Dr. Hilbert mis-applies claims 1 and 14 to find that these

separate inlet/outlets are positioned in a cylindrical outer surface of bore stab 74, as claimed. These inlet/outlet ports, instead, are positioned in the bottom surface of upper gallery 74b'' (where the yellow and cyan colors meet above), not the cylindrical outer surface of the bore stab (the outer surface of the orange walls above).

Moreover, Dr. Broussard's alleged structure in Broussard is different from Figure 10 of the '921 patent, in which first inlet/outlet 103A is *not* positioned at the bottom of an annular gallery formed within outer cylindrical wall 102X of bore stab body 102. See Ex. 1001, Figs. 6 and 10, 4:53–5:15. To the extent Figure 10 of the '921 patent forms an annular gallery akin to Broussard's upper gallery 74b'', the gallery is completed by seals 122 and 128, which are not part of body 102. See *id.* And, annulus fluid flow gallery 116A is formed in equipment 114, not bore stab body 102. See *id.* at 4:62–5:1. Thus, the '921 patent's first inlet/outlet 103A is positioned in cylindrical outer surface 102X of body 102, a claim requirement that is not met by Broussard's alleged structure.

We conclude a preponderance of the evidence does not support Petitioner's contention that Broussard discloses first inlet/outlets of two fluidly isolated flow paths positioned in a first cylindrical outer surface. Further, Petitioner does not provide an alternative motivation for modifying Broussard to have this claimed structure. See Pet. 87–95; Pet. Reply 25–28. Therefore, Broussard's lack of disclosure in this respect is fatal to Petitioner's case for obviousness.

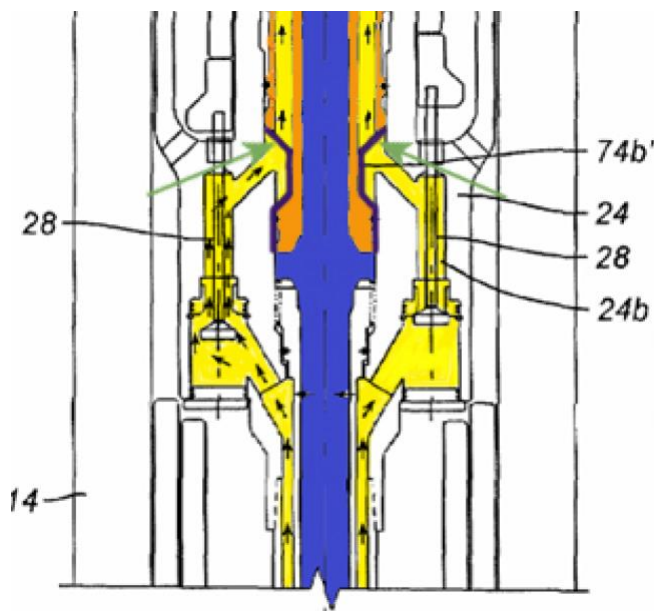
b. Second Inlet/Outlets of Two Fluidly Isolated Flow Paths, Positioned in a Second Cylindrical Outer Surface

Claims 1 and 14 further require the bore stab body to comprise “a second cylindrical outer surface,” with each of the fluidly isolated individual flow paths “comprising . . . a second inlet/outlet . . . positioned in the second cylindrical outer surface.” Ex. 1001, 8:2–14, 9:42–44, 10:1–7.

Petitioner firstly argues Broussard discloses these claim requirements (see Pet. 87–90, 94–97) and secondly argues, absent such disclosure, a person of ordinary skill in the art would have been motivated to modify Broussard to satisfy these claim requirements (see *id.* at 90–91). We consider each alternative in turn.

(i) Broussard Does Not Disclose Second Inlet/Outlets of Two Fluidly Isolated Flow Paths, Positioned in a Second Cylindrical Outer Surface

Petitioner asserts Broussard’s bore stab 74 satisfies the claim requirements for the second inlet/outlets, and in support, Petitioner provides the following annotations to Broussard’s Figure 6.



Broussard, Figure 6 (Excerpt, Annotated at Pet. 97).

Figure 6 is a sectional elevation view of bore stab 74, where it fluidly connects to tubing hanger housing 24. Ex. 1020, 3:33–36, 9:63–64. Petitioner asserts the body of bore stab 74 is colored orange, and the claimed plurality of individual fluid flow paths (including at least the two annulus bores 74b) are colored yellow, and annulus bores 74b are fluidly isolated from one another within the body. See Pet. 87–89, 91–94; Ex. 1004 ¶¶ 191–192, 198–200. Petitioner also asserts the body comprises a second cylindrical outer surface, which is colored purple, with each flow path comprising a respective second inlet/outlet positioned in the second cylindrical outer surface, as identified by green arrows. See Pet. 89–90, 94–97; Ex. 1004 ¶¶ 194, 201–203.

In the Institution Decision, we concluded Petitioner’s analysis fails to establish that Broussard discloses a second inlet/outlet for “*each*’ of the fluid flow paths” that is “positioned in the second cylindrical outer surface” as claimed. Inst. Dec. 47–48. We posited two possible readings of the Petition in this regard. *Id.* at 48. The first reading was that “the flow paths include groove or gallery 74b’, so the second inlet/outlets are found where groove or gallery 74b’ connects to annulus passageways 24b of tubing hanger housing 24.” *Id.* The second reading was that “the flow paths are limited to the two annulus bores 74b and do not include groove or gallery 74b’.” *Id.* We then decided that, regardless of which reading of the Petition is applied, Petitioner’s argument was not persuasive. *Id.*

Patent Owner essentially agrees with the conclusions reached in the Institution Decision (see PO Resp. 82–85), except Patent Owner maintains our second reading of the Petition was “never articulated in the Petition” (*id.* at 84); Ex. 2002 ¶¶ 113–116. Patent Owner nonetheless applies the second

reading, and agrees with the Institution Decision’s determination that “neither of the second inlet/outlets is ‘positioned in [a] second cylindrical outer surface’ of bore stab 74” because the inlet/outlets “instead are positioned in ‘a **conical** surface that slants at a nearly 45° angle relative to the vertical axis.’” Inst. Dec. 48; PO Resp. 84–85; Ex. 2002 ¶¶ 115–116.

Petitioner’s Reply focuses on the Institution Decision’s second reading of the Petition, and provides more detail in this regard, in an effort to establish that Broussard discloses second inlet/outlets of two fluidly isolated flow paths positioned in a second cylindrical outer surface. See Pet. Reply 28–29; Ex. 1031 ¶ 52. For example, the Reply asserts Patent Owner incorrectly characterizes lower gallery 74b’ as the second inlet/outlet of claims 1 and 14, because Petitioner instead argues “the pair of lower galleries 74b’ are defined between the outer stab surface (orange) and the inner tubing hanger surface and are not a part of the stab.” Pet. Reply 28 (citing Pet. 94–95); Ex. 1031 ¶ 52. Thus, the Reply expressly disavows reliance on the Institution Decision’s first reading of the Petition, in which the second inlet/outlets of the bore stab flow paths might both be found in Broussard where lower gallery 74b’ connects to annulus passageways 24b of tubing hanger housing 24. We therefore do not discuss the first reading further here.

Concerning the Institution Decision’s second reading of the Petition, the Reply asserts Broussard’s “annulus bores [74b] form the second inlets/outlets,” as shown by the green arrows in Petitioner’s annotations to Broussard’s Figure 6 reproduced above. Pet. Reply 28; Ex. 1031 ¶ 52. Dr. Hilbert testifies in support that “[t]he annulus fluid only ‘mixes’ after it exits the” bore stab through these second inlet/outlets. Ex. 1031 ¶ 52; Pet.

Reply 28 (arguing “[t]he galleries 74b’ begin outside the stab and therefore ‘each’ of the fluid flow paths have a ‘second inlet/outlet’”).

The Reply further asserts these second inlet/outlets are positioned in a second cylindrical outer surface of the bore stab as recited in claims 1 and 14, not a conical outer surface as we found in the Institution Decision. *See* Pet. Reply 28–29; Ex. 1031 ¶ 53; Inst. Dec. 48. This argument relies, in part, on Petitioner’s claim construction of the term “cylindrical.” *See* Pet. Reply 28–29; Ex. 1031 ¶ 53; *supra* Section V.C.2 (addressing claim construction). Thus, in Petitioner’s view, although the outer surface of Broussard’s bore stab “includes grooves and tapering created by the groove or gallery 74b’,” the outer surface is nonetheless “cylindrical.” Pet. Reply 28–29 (citing Ex. 1020, Fig. 6); Ex. 1031 ¶ 53.

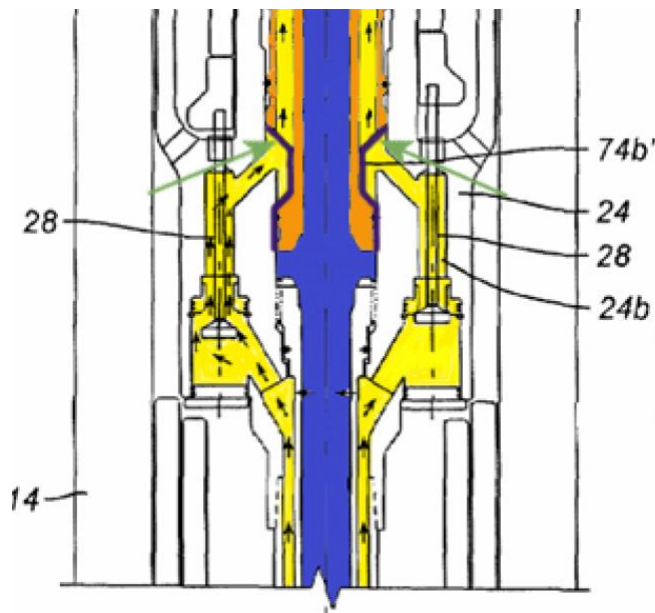
Patent Owner responds that, applying the Institution Decision’s second reading of the Petition, “there is . . . no dispute that the second inlet/outlets are positioned in a conical surface that slants at a nearly 45 angle relative to the vertical axis.” Sur-reply 26. In Patent Owner’s view, such an outer surface cannot be a cylindrical surface. *See id.*

Upon consideration of the foregoing, we find Dr. Hilbert’s testimony in support of Petitioner’s argument is not persuasive, because it is contradicted by Broussard’s description of its own device, and because it mis-applies the claims. On the first point, Broussard clearly describes lower gallery 74b’ as being part of bore stab 74, for essentially the same reasons discussed above in connection with upper gallery 74b”. *See supra* Section V.E.2(a); Ex. 1020, Figs. 5–7, 9:38–10:16. Based on those disclosures, we disagree with Dr. Hilbert’s testimony that “[t]he annulus fluid only ‘mixes’ after it exits the” bore stab at its lower interface with

tubing hanger housing 24. Ex. 1031 ¶ 52. We instead are persuaded by Mr. Parks’ opposing testimony that the “lower ends of the annulus bores 74b are in fluid communication with each other by a peripheral groove or gallery 74b’” formed within bore stab 74, to fluidly communicate with tubing hanger housing 24. Ex. 2002 ¶ 114.

This intervention of lower gallery 74b’ between the two separate bores within bore stab 74 and tubing hanger housing 24 is important within the context of claims 1 and 14. Broussard describes how “[t]he lower ends of the annulus bores 74b *are in fluid communication with each other* by a peripheral groove or gallery 74b’.” Ex. 1020, 10:9–11 (emphasis added). Broussard therefore lacks the claimed plurality of fluid flow paths defined entirely within the body of bore stab 74 that are fluidly isolated from one another within the body. See Ex. 1001, 8:3–8 (claim 1), 9:47–10:1 (claim 14). Instead, the flow paths of the two separate bores illustrated in Figures 6 and 7 merge into lower gallery 74b’, where the fluid flow enters bore stab 74 from tubing hanger housing 24.

Dr. Hilbert’s testimony finding two second inlet/outlets being positioned in the same second cylindrical outer surface also is not supported by Broussard’s disclosure, and mis-applies claims 1 and 14. We reproduce Petitioner’s illustrative annotations to Broussard’s Figure 6 here.



Broussard, Figure 6 (Excerpt, Annotated at Pet. 97).

Figure 6 is a sectional elevation view of bore stab 74, where it fluidly connects to tubing hanger housing 24. Ex. 1020, 3:33–36, 9:63–64.

Dr. Hilbert testifies that the two yellow-colored passages within bore stab 74 (colored orange) are fluidly isolated from each other within the bore stab body, and have respective inlet/outlets positioned in a purple-colored second cylindrical outer surface of bore stab 74. See Ex. 1004 ¶¶ 191–192, 194, 198–203, 208.

We find, however, that Broussard’s disclosure is simply too scant to determine precisely where each of the two separate annulus bores 74b fluidly connects to the common lower gallery 74b’. See, e.g., Ex. 1020, Figs. 6–7. It is only in the single view of Figure 6 that Broussard might provide the structural details of this connection, and Figure 6 does not provide enough detail to support Dr. Hilbert’s testimony. Because of this evidentiary uncertainty as to the exact location where each of the two separate annulus bores 74b fluidly connects to the common lower gallery 74b’, we are unable to find by a preponderance of the evidence that

Broussard discloses fluidly isolated second inlet/outlets positioned in a second cylindrical outer surface of the bore stab, as recited in claims 1 and 14.

Further, even if we were to accept Petitioner's purple-colored identification as being the surface in which the fluidly isolated second inlet/outlets might be found, Dr. Hilbert mis-applies claims 1 and 14 to find that the purple surface is a cylindrical outer surface of bore stab 74, as claimed. We are persuaded by Mr. Parks' testimony that this surface instead is "a conical surface that slants at a nearly 45° angle relative to the vertical axis." Ex. 2002 ¶ 115 (annotating Petitioner's illustration to identify the conical portion of Petitioner's purple-colored identification of the surface). Such a sharply angled conical surface is not cylindrical.

Thus, we conclude a preponderance of the evidence does not support Petitioner's contention that Broussard discloses second inlet/outlets of two fluidly isolated flow paths positioned in a second cylindrical outer surface.

(ii) Insufficient Motivation to Modify Broussard so the Second Inlet/Outlets are Positioned in a Second Cylindrical Outer Surface

Petitioner alternatively contends, if "Broussard does not expressly disclose that the second outer surfaces are cylindrical," then "it would have been obvious . . . based on Broussard alone, to modify the second outer surfaces [to be cylindrical] based on *a simple substitution of one known element for another.*" Pet. 90 (emphasis added); Ex. 1004 ¶ 195. Petitioner points to Broussard's alleged first cylindrical outer surface at upper gallery 74b", and asserts "it would have been obvious . . . to substitute the geometry of the second outer surfaces with that of the first outer surfaces." Pet. 90; Ex. 1004 ¶ 195. This could be achieved with a reasonable

expectation of success, according to Petitioner, because Broussard’s “second outer surfaces are located in a region where a portion of the cylindrical [bore stab] has been machined out to accommodate a protruding portion of the tubing hanger annulus bore 24b,” and a person of ordinary skill in the art “could have readily designed the interface between the tubing hanger and the stab annulus bore to interface in a similar manner as the first outer cylindrical surfaces.” Pet. 90; Ex. 1004 ¶ 195.

In the Institution Decision, we were not persuaded by Petitioner’s proffered motivation for modifying the lower end of Broussard’s bore stab 74 to have a cylindrical outer surface. *See* Inst. Dec. 50. In particular: “Petitioner’s motivation, at best, establishes Broussard could have been modified predictably to reach the claimed invention, and does not provide a rational underpinning for why this would have been done.” *Id.* (citing *Personal Web*, 848 F.3d at 991–92 & 993–94; *InTouch*, 751 F.3d at 1351–52).

Patent Owner essentially agrees with the conclusions reached in the Institution Decision. *See* PO Resp. 86–87; Ex. 2002 ¶ 117. Patent Owner adds that “the Petition’s terse analysis ignores the different functions of” the upper and lower interfacing structures found in Broussard’s bore stab 74, and “never provid[es] evidence these surfaces were interchangeable” to be a “simple substitution” one for the other. PO Resp. 87–89; Ex. 2002 ¶¶ 117–121. In particular, according to Patent Owner, the lower interface must have “a geometry configured to ‘automatically mate’ remotely when landed into the wellhead housing during the difficult subsea installation.” PO Resp. 87–88; Ex. 2002 ¶¶ 118–119 (citing Ex. 1020, Fig. 6, 1:39–42, 9:41–45, 10:42–47, 11:57–13:29). Patent Owner argues this injects a degree

of complexity to Petitioner's proposed modification that is overlooked by Petitioner and Dr. Hilbert. See PO Resp. 89–90; Ex. 2002 ¶¶ 120–121.

Petitioner's Reply reiterates that “substituting the upper end of [Broussard's] stab vs. the lower end would be a simple modification,” as set forth in the Petition. Pet. Reply 29 (citing Pet. 90). In particular, Petitioner asserts: “The mating configurations at the upper and lower ends of the stab were *mere design choices* and a [person of ordinary skill in the art] would have been just as motivated and could just as readily have designed the lower end to mate with the wellhead in a similar manner to the upper end.” *Id.* (emphasis added); Ex. 1031 ¶¶ 54–56. Petitioner adds that this could have been accomplished with a reasonable expectation of success. Pet. Reply 29–30; Ex. 1031 ¶¶ 55–56.

Patent Owner replies that Petitioner's Reply “still fails to articulate any sufficient motivation for its proposed modification, asserting at best that a [person of ordinary skill in the art] ‘could’ have made the proposed modification” which “is insufficient.” Sur-reply 26.

Upon consideration of the foregoing, we are not persuaded by Petitioner's proffered motivation for modifying the lower end of Broussard's bore stab 74 to have a cylindrical outer surface. The fact that Broussard would have allowed for the claimed invention, or possibly could be modified to reach the claimed invention, is not a sufficient reasoning to support obviousness. See *Personal Web*, 848 F.3d at 991–92 & 993–94; *InTouch*, 751 F.3d at 1351–52. Petitioner's motivation, at best, establishes Broussard could have been modified predictably to reach the claimed invention, and does not provide a rational underpinning for why this would have been done. See, e.g., *InTouch*, 751 F.3d at 1348–49 (“[The expert witness's] testimony

was nothing more than impermissible hindsight; she opined that all of the elements of the claims disparately existed in the prior art, but failed to provide the glue to combine these references.”).

Thus, we are not persuaded by the Petition’s argument that it would have been obvious to modify Broussard so that the second inlet/outlets of its two fluidly isolated flow paths would be positioned in a second cylindrical outer surface. To be clear, the difficulty with Petitioner’s case relates to the proffered motivation for modifying the lower end of Broussard’s bore stab 74 to have a cylindrical outer surface, not to a reasonable expectation of success in doing so.

c. Conclusion as to Claims 1 and 14

For the foregoing reasons, we conclude a preponderance of the evidence does not support Petitioner’s contention that claims 1 and 14 are unpatentable as having been obvious over Broussard.

3. Dependent Claims 2–11 and 15

Petitioner provides argument and evidence in support of contending dependent claims 2–11 and 15 are unpatentable as having been obvious over Broussard. See Pet. 101–123, 125–126; Ex. 1004 ¶¶ 210–258, 270–272. Because we have concluded that a preponderance of the evidence does not support Petitioner’s contention that claims 1 and 14 are unpatentable as having been obvious over Broussard, we also conclude Petitioner does not show, by a preponderance of the evidence, that dependent claims 2–11 and 15 would have been obvious over Broussard.

VI. SUMMARY OF CONCLUSIONS

In summary, we determine a preponderance of the evidence does not establish claims 1–11, 14, and 15 of the '921 patent are unpatentable, as shown in the following table:

Claims	35 U.S.C. §	Reference(s)/ Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1–11, 14, 15	103	Maersk		1–11, 14, 15
1–11, 14, 15	103	Broussard		1–11, 14, 15
Overall Outcome				1–11, 14, 15

VII. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that claims 1–11, 14, and 15 of the '921 patent have not been proven by a preponderance of the evidence to be unpatentable; and

FURTHER ORDERED that, because this is a final written decision, parties to this proceeding seeking judicial review of our Decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

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Patent 10,689,921 B1

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