

# In the United States Court of Federal Claims

No. 12-484C

(Filed: October 9, 2013)

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<b>FASTSHIP, LLC,</b>	)	Patent case; claim construction for United
	)	States Patents Nos. 5,080,032; 5,231,946
	)	
<b>Plaintiff,</b>	)	
	)	
<b>v.</b>	)	
	)	
<b>UNITED STATES,</b>	)	
	)	
<b>Defendant.</b>	)	
	)	

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Andrew P. Zager, Trial Attorney, Commercial Litigation Branch, Civil Division, United States Department of Justice, Washington, D.C., for defendant. With him on the briefs were Stuart F. Delery, Assistant Attorney General, John J. Fargo, Director, and Scott Bolden, Assistant Director, Commercial Litigation Branch, Civil Division, United States Department of Justice, Washington, D.C.

## OPINION AND ORDER

LETTOW, Judge.

In this patent case, plaintiff, Fastship LLC, alleges that the United States (“the government”) through the Department of the Navy has infringed Claims 1 and 19 of its U.S. Patent No. 5,080,032 (“the ’032 patent”) and Claims 1, 3, 5, and 7 of its U.S. Patent No. 5,231,946 (“the ’946 patent”), and thus is liable for damages under 28 U.S.C. § 1498(a).<sup>1</sup>

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<sup>1</sup>Subsection 1498(a) of Title 28 provides in pertinent part:

Whenever an invention described in and covered by a patent of the United States is used or manufactured by or for the United States without license of the owner thereof or lawful right to use or manufacture the same, the owner’s remedy shall be by action against the United States in the United States Court of Federal Claims for the recovery of his reasonable and entire compensation for such use and manufacture.

Compl. ¶ 18. This opinion addresses claim construction for terms pertinent to the alleged infringement.

## BACKGROUND

The allegedly infringing objects of this case are Navy vessels, specifically, littoral combat ships that combine semi-planing hulls with the use of waterjets. Compl. ¶¶ 16-18. Fastship avers that the government infringed its patents in contracting with Lockheed Martin and Gibbs & Cox to design and build the Navy's Littoral Combat Ship 1 ("LCS 1") and Littoral Combat Ship 3 ("LCS 3"). Compl. ¶¶ 12-14, 18. The '032 patent was issued on January 14, 1992, and the '946 patent, a continuation of the '032 patent, was issued on August 3, 1993. Pl.'s Opening Claim Construction Br. ("Pl.'s Br.") Ex. A, Ex. B. Both patents expired on May 18, 2010. Compl. ¶ 5. At the time of expiration, LCS 1 was complete and in use by the Navy, but LCS 3 was still under construction. Hr'g Tr. 12:12-17, (June 10, 2013).<sup>2</sup>

Fastship describes its invention as a combination of a semi-planing monohull vessel, longer than 200 feet with a displacement in excess of 2,000 tons, which relies on hull design and waterjet propulsion to create a large ship capable of speeds exceeding 40 knots. *See* Compl. ¶¶ 8-9; Hr'g Tr. 28:14-19 ("Tech. Tutorial") (Aug. 27, 2013). During the prosecution of the '032 patent, the patentee distinguished the invention from prior art in part by clarifying that each claim "recites a *dual* component of lift which is produced by (1) an area of the hull which produces a high pressure area in the stern area of the hull and (2) the acceleration of the water into the waterjets which produce[s] an additional lift." Def.'s Opening Claim Construction Brief ("Def.'s Br.") Ex. D ("Applicant's Amendment" (May 17, 1991)) at 9 (emphasis in original).

The '032 patent consists of 20 claims, of which two independent claims are at issue in this action. Compl. ¶ 18. Claim 1 is a product claim, while Claim 19 is a method claim.

Claim 1 describes:

A vessel comprising:

a hull having a non-stepped profile which produces a high pressure area at the bottom of the hull in a stern section of the hull which intersects a transom to form an angle having a vertex at the intersection and hydrodynamic lifting of the stern section at a threshold speed without the hull planing across the water at a maximum velocity determined by a Froude Number,<sup>3</sup> the hull having a length in excess of 200 feet, a

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28 U.S.C. § 1498(a).

<sup>2</sup>The government asserts LCS 3 was only 49% complete at the time the patents expired. Hr'g Tr. 12:15-13:1.

<sup>3</sup>The Froude Number is the ratio of a ship's speed in knots to the square root of its length in feet and is used to understand drag by describing the physics of a ship's speed relative to its

displacement in excess of 2000 tons, a Froude Number in between about 0.42 and 0.90, and a length-to-beam ratio between about 5.0 and 7.0;

at least one inlet located within the high pressure area;

at least one waterjet coupled to the at least one inlet for discharging water which flows from the inlet to the waterjet for propelling the vessel;

a power source coupled to the at least one waterjet for propelling water from the at least one inlet through the waterjet to propel the vessel and to discharge the water from an outlet of the waterjet; and wherein

acceleration of water into the at least one inlet and from the at least one waterjet produces hydrodynamic lift at the at least one inlet which is additional to the lifting produced by the bottom of the hull in the high pressure area which increases efficiency of the hull and reduces drag.

'032 patent, Claim 1.

Claim 19 discloses:

A vessel conveying method comprising the steps:

hydrodynamically lifting a stern section of a vessel hull at a threshold ship speed by virtue of a high pressure region at the bottom of the hull with the hull having a non-stepped profile, a length in excess of 200 feet, a displacement in excess of 2000 tons, a Froude Number in between about 0.42 and 0.90, and a length-to-beam ratio of about 5.0 and 7.0;

propelling the hydrodynamically lifting [h]ull via a waterjet system having water inlets in the high pressure region with the hull not planing across the water at a maximum velocity determined by the Froude Number;

accelerating water flow into the inlets to increase the pressure in the high pressure region and to produce further lifting of the hull which increases efficiency of the hull and reduces drag; and

driving the waterjet system via gas turbines.

'032 patent, Claim 19.

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size. It is analogous to the use of mach numbers to describe aviation speed. Tech. Tutorial 18:24-19:11.

The other patent at issue, the '946 patent, contains a total of eight claims, four of which are independent claims that are asserted in this action. Claims 1 and 3 are product claims, while Claims 5 and 7 are method claims. Claim 1 pertains to:

A vessel comprising:

a hull having a non-stepped profile which produces a high pressure area at the bottom of the hull in a stern section of the hull which intersects a transom to form an angle having a vertex at the intersection and hydrodynamic lifting of the stern section at a threshold speed without the hull planing across the water at a maximum velocity determined by a Froude Number, the hull having a length in excess of 200 feet, a displacement in excess of 2000 tons, and a Froude Number in between 0.42 and 0.90;

at least one inlet located within the high pressure area;

at least one waterjet coupled to the at least one inlet for discharging water which flows from the inlet to the waterjet for propelling the vessel;

a power source coupled to the at least one waterjet for propelling water from the at least one inlet through the waterjet to propel the vessel and to discharge the water from an outlet of the waterjet; and wherein

acceleration of water into the at least one inlet and from the at least one waterjet produces hydrodynamic lift at the at least one inlet which is additional to the lifting produced by the bottom of the hull in the high pressure area which increases efficiency of the hull and reduces drag.

'946 patent, Claim 1.

Claim 3 reiterates the language of Claim 1 without the hull-displacement limitation:

A vessel comprising:

a hull having a non-stepped profile which produces a high pressure area at the bottom of the hull in a stern section of the hull which intersects a transom to form an angle having a vertex at the intersection and hydrodynamic lifting of the stern section at a threshold speed without the hull planing across the water at a maximum velocity determined by a Froude Number, the hull having a displacement in excess of 2000 tons, and a Froude Number in between 0.42 and 0.90;

at least one inlet located within the high pressure area;

at least one waterjet coupled to the at least one inlet for discharging water which flows from the inlet to the waterjet for propelling the vessel;

a power source coupled to the at least one waterjet for propelling water from the at least one inlet through the waterjet to propel the vessel and to discharge the water from an outlet of the waterjet; and wherein

acceleration of water into the at least one inlet and from the at least one waterjet produces hydrodynamic lift at the at least one inlet which is additional to the lifting produced by the bottom of the hull in the high pressure area which increases efficiency of the hull and reduces drag.

'946 patent, Claim 3.

Claim 5 states:

A vessel conveying method comprising the steps:

hydrodynamically lifting a stern section of a vessel hull at a threshold ship speed by virtue of a high pressure region at the bottom of the hull with the hull having a non-stepped profile, a length in excess of 200 feet, a displacement in excess of 2000 tons, and a Froude Number in between 0.42 and 0.90;

propelling the hydrodynamically lifted hull via a waterjet system having water inlets in the high pressure region with the hull not planing across the water at a maximum velocity determined by the Froude Number; and

accelerating water flow into the inlets to increase the pressure in the high pressure region and to produce further lifting of the hull which increases efficiency of the hull and reduces drag.

'946 patent, Claim 5.

Claim 7 reiterates the language of Claim 5 without the hull-length limitation:

A vessel conveying method comprising the steps:

hydrodynamically lifting a stern section of a vessel hull at a threshold ship speed by virtue of a high pressure region at the bottom of the hull with the hull having a non-stepped profile, a displacement in excess of 2000 tons, and a Froude Number in between 0.42 and 0.90;

propelling the hydrodynamically lifted hull via a waterjet system having water inlets in the high pressure region with the hull not planing across the water at a maximum velocity determined by the Froude Number; and

accelerating water flow into the inlets to increase the pressure in the high pressure region and to produce further lifting of the hull which increases efficiency of the hull and reduces drag.

'946 patent, Claim 7.

## PROCEDURAL HISTORY

Fastship filed suit in this court on August 1, 2012, alleging patent infringement. The parties submitted briefs on claim construction in August and September 2013, conducted a technological primer for the court on August 27, 2013, and presented arguments at a *Markman* hearing held on September 13, 2013. Of the fifteen salient terms identified by the parties, only one has an agreed construction. See Joint Claim Construction Statement, ECF No. 24. For this one term, the court adopts the mutually acceptable construction proffered by the parties. For the remaining terms, the court has classified the terms into seven groups. The constructions adopted by the court for the disputed terms of the '032 and '946 patents are specified below.

## DISCUSSION

### A. Standard for Construction

“The purpose of claim construction is to ‘determin[e] the meaning and scope of the patent claims alleged to be infringed.’” *O2 Micro Int’l Ltd. v. Beyond Innovation Tech. Co.*, 521 F.3d 1351, 1360, 1362 (Fed. Cir. 2008) (quoting *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 976 (Fed. Cir. 1995) (en banc), *aff’d*, 517 U.S. 370 (1996)). The construction and meaning of claims in a patent are questions of law for the court to address. *Markman*, 517 U.S. at 388-90. Although the trial court is not required to construe every term in a patent, it must construe any term for which claim scope is disputed. *O2 Micro*, 521 F.3d at 1360. The court begins this task by first looking to the intrinsic evidence of record, as “intrinsic evidence is the most significant source of the legally operative meaning of disputed claim language.” *Vitronics Corp. v. Conceptor, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996). Intrinsic evidence consists of the “patent itself, including the claims, the specification and . . . the prosecution history.” *Id.* (citing *Markman*, 52 F.3d at 979).

To construe claim terms, a court should generally look to the ordinary and customary meanings attributed to them by those of ordinary skill in the art at the date of the invention, which is the effective filing date of the patent application. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1313 (Fed. Cir. 2005) (en banc). “That starting point is based on the well-settled understanding that inventors are typically persons skilled in the field of the invention and that patents are addressed to and intended to be read by others of skill in the pertinent art.” *Id.* Courts have recognized, however, that “a patentee may choose to be his own lexicographer and use terms in a manner other than their ordinary meaning, as long as the special definition of the term is clearly stated in the patent specification or file history.” *Vitronics*, 90 F.3d at 1582 (citing *Hoechst Celanese Corp. v. BP Chems. Ltd.*, 78 F.3d 1575, 1578 (Fed. Cir. 1996); *Hormone Research Found., Inc. v. Genentech, Inc.*, 904 F.2d 1558, 1563, (Fed. Cir. 1990), *cert. dismissed pursuant to Sup. Ct. R. 46*, 499 U.S. 955 (1991)). Therefore, a court must review the patent’s specification “to determine whether [an] inventor has used any terms in a manner inconsistent with their ordinary meaning.” *Id.* While the specification is important to claim construction, a court must avoid importing limitations from the specification into the claims. *Phillips*, 415 F.3d at 1323. Prosecution history may also be examined, with its principal purpose

being to exclude interpretations disclaimed during prosecution. *Chimie v. PPG Indus., Inc.*, 402 F.3d 1371, 1384 (Fed. Cir. 2005); *Vitronics*, 90 F.3d at 1582-83.

Extrinsic evidence, which includes “all evidence external to the patent and prosecution history, including expert and inventor testimony, dictionaries, and learned treatises,” *Markman*, 52 F.3d at 980, is “less significant than the intrinsic record” in the construction process, *Phillips*, 415 F.3d at 1317 (quoting *C.R. Bard, Inc. v. United States Surgical Corp.*, 388 F.3d 858, 862 (Fed. Cir. 2004)). Extrinsic evidence is not as reliable as intrinsic evidence, and the court should consider it only in conjunction with intrinsic evidence. Nonetheless, “it is permissible for the [court] in its sound discretion to admit and use such evidence.” *Phillips*, 415 F.3d at 1319.

#### *B. Specific Terms of the Claims Requiring Construction*

*Term 1: “a high pressure area,” “the high pressure area,” and “a high pressure region”*

Plaintiff’s Proposed Claim Construction	Government’s Proposed Claim Construction
Plain and ordinary meaning	“A region of specific shape upon which is exerted an elevated hydrodynamic pressure which is sufficient in magnitude to produce hydrodynamic lift due to forces produced by the motion of the hull through water.”
Alternatively, “a region of elevated pressure”	

Term 1 appears in Claims 1 and 19 of the ’032 patent and in Claims 1, 3, 5, and 7 of the ’946 patent. The “high pressure area” is described by these claims as located “at the bottom of the hull in a stern section of the hull.” ’032 patent, Claim 1, col. 14, lines 2-3.<sup>4</sup> Fastship avers that a person of ordinary skill in the art would understand the term according to its plain and ordinary meaning, Pl.’s Br. at 10, while the government proposes a construction that incorporates limitations regarding magnitude, source, and shape, *see* Def.’s Br. at 10-11. Among other things, the parties dispute whether “high pressure” is limited to hydrodynamic pressure and whether the patent teaches a particular degree of pressure. *See* Def.’s Br. at 15; Pl.’s Reply Claim Construction Br. (“Pl.’s Reply”) at 7-11. This disagreement cannot be resolved by plain and ordinary meaning because the plain and ordinary meaning does not answer whether the pressure referenced is purely hydrodynamic pressure nor does it define the degree of pressure required by the term. *See O2 Micro*, 521 F.3d at 1361 (holding that “[a] determination that a claim term . . . has the ‘plain and ordinary meaning’ may be inadequate when a term has more than one ‘ordinary’ meaning or when reliance on a term’s ‘ordinary’ meaning does not resolve the parties’ dispute.”). Consequently, the court must provide construction for this term.

The term “high pressure” is used at various points in the patent specification. Each time, the term teaches that the shape of the vessel’s hull is a cause of the high pressure. *See* ’032 patent, col. 3, lines 13-23 (“The shape of [a planing hull] is such that high pressure is induced under the hull.”), col. 5, lines 14-21 (“Since it is advantageous for waterjet propulsion systems to

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<sup>4</sup>Because the ’946 patent is a continuation of the ’032 patent, the specifications of both patents are almost identical. When the court cites to a specification, it will cite to the ’032 patent specification rather than to both specifications.

have an area of higher pressure in the vicinity of the water inlet and since a larger flat transom area is required to install the jet units, the [semi-planing] hull form is ideally suited for waterjet propulsion.”). The specification compares the high pressure area of a semi-planing hull with corresponding low pressure areas created by ordinarily configured displacement hulls. *See* ’032 patent, col. 4, lines 8-14. This is consistent with the teaching of the technical tutorial. During the tutorial, each party’s representative explained that when moving at speed, a vessel with a conventional displacement hull will experience low pressure in the area at the stern of the ship, creating a suction force, pulling the stern downwards. Tech. Tutorial at 16:9-14, 33:3-5. This low pressure, coupled with higher pressure at the bow, will result in a tendency for displacement vessels to squat at the stern when sailing. Tech. Tutorial at 16:15-23.<sup>5</sup> Therefore, the term “high pressure area” refers to higher pressure at the stern of a semi-planing hull as contrasted to the lower pressure at the stern of a displacement hull.<sup>6</sup> The government’s construction containing the words “elevated hydrodynamic pressure” indicates that the government believes the term “high pressure” is compared to non-elevated levels of hydrodynamic pressure. This is in part correct, but the “high pressure” necessarily reflects both hydrostatic as well as hydrodynamic pressures, and the term specifically compares the pressure experienced at the stern of a semi-planing hull to that at the stern of a conventional displacement hull.

The government’s construction also adds the limitation that the “high pressure” area is “a region of specific shape.” In this respect, the government reads a limitation from the specification into the claim language. The term “specific shape” appears only once in the specification and refers to a small planing hull (shorter than 200 feet or under 200 tons) rather than a large semi-planing hull. *See* ’032 patent, col. 3, lines 16-19. Additionally, the size and shape of the high pressure area cannot be constant, even for the same hull configuration. The hydrodynamic pressure on the hull is dependent upon the speed of the vessel as well as the configuration of the hull. *See* Odd M. Faltinsen, *Hydrodynamics of High-Speed Marine Vehicles* 247 (2005). At the *Markman* hearing, the government conceded this point. *See* Hr’g Tr. (“*Markman* Hearing”) 57:1-5 (Sept. 13, 2013) (“And, of course, presumably, that specific shape can vary between different embodiments of the vessel. . . . [I]t might even change depending on the speed.”). Therefore, the court cannot construe the high pressure area to be limited to any specific shape or size.

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<sup>5</sup>Accordingly, the trim of the vessel will change at speed. Trim means the “[d]ifference, or relationship, between the forward and after draughts of a floating vessel.” Captain A. Miller, *Dictionary of Nautical Words and Terms*, 409 (Revised 4th ed. 1998). Specifically, the change in trim was described in the technical tutorial as the tendency of the bow to rise and the stern to sink as a vessel with a conventional displacement hull increases speed. Tech. Tutorial 16:15-18.

<sup>6</sup>Also pertinent are hydrostatic forces, characterized by Archimedes’s principle of buoyancy. Tech. Tutorial 11:24-12:3. Hydrostatic forces necessarily apply to the vessel both at rest and during movement over water. When moving at speed, hydrodynamic forces on the bottom and sides of the hull, characterized by Bernoullian equations, act on all vessels, generating both drag and lift, particularly creating lift in planing and semi-planing hulls. *See* Tech. Tutorial 12:7-13, 19:22-20:1.



The claim language provides additional characteristics of the “high pressure area.” Claim 19 of the ’032 patent states that the “high pressure region” is responsible for hydrodynamic lift in the stern section of the vessel at a threshold ship speed. ’032 patent, Claim 19, col. 15, line 19 to col. 16, line 1.<sup>7</sup> This characteristic is also detailed in the other claims containing the term. *See* ’032 patent, Claim 1, col.14, lines 1-7; *see also* ’946 patent, Claim 1, col.13, line 66 to col. 14, line 3, Claim 3, col. 14, lines 26-32, Claim 5, col. 14, lines 55-59, Claim 7, col. 15, lines 8-11. These aspects of the claims are reflected in the specification. *See* ’032 patent, col. 3, lines 19-22 (“The [semi-planing vessel] develops hydrodynamic lift above a certain threshold speed as a result of the presence of high pressure at the aft part of the hull.”), col. 5, lines 63-66 (“A hull of the fast semi-planing type experiences lift due to the action of [hydro]dynamic forces and operates at maximum speeds in the range of Froude Numbers 0.3 to 1.0.”). The upward lift component of hydrodynamic pressure is understood in the art as an upward force vector. *See* Tech. Tutorial 21:4-6 (using the force-vector definition with relation to acceleration); *see also* Jonathan Wickart & Kemper Lewis, *An Introduction to Mechanical Engineering* 132 (3rd ed. 2013) (“Forces are vector quantities since their physical action involves both direction and magnitude.”).

For the reasons stated, the court adopts the following construction for Term 1: “a high pressure area” is **an area with hydrodynamically generated pressure sufficient in magnitude to produce an upward rather than a downward force vector**. Similarly, “the high pressure area” is **the area with hydrodynamically generated pressure sufficient in magnitude to produce an upward rather than a downward force vector**; “a high pressure region” is **a region with hydrodynamically generated pressure sufficient in magnitude to produce an upward rather than a downward force vector**.

*Term 2: “to increase the pressure”*

Plaintiff’s Proposed Claim Construction	Government’s Proposed Claim Construction
Plain and ordinary meaning	“An increase in hydrodynamic pressure which is additional to any hydrodynamic pressure on the hull produced by the motion of the hull through water.”

This term is used in Claim 19 of the ’032 patent and Claims 5 and 7 of the ’946 patent. In both patents, the term is used in identical clauses. *See* ’032 patent, Claim 19, col. 16, lines 11-14 (“accelerating water flow into the inlets *to increase the pressure* in the high pressure region and to produce further lifting of the hull which increases efficiency of the hull and reduces drag” (emphasis added)); *see also* ’946 patent, Claim 5, col. 14, lines 67-68, Claim 7, col. 16, lines 6-7. Fastship seeks adoption of the plain and ordinary meaning of the term, Pl.’s Br. at 19, while the government urges a construction that distinguishes between hydrodynamic pressure produced by

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<sup>7</sup>The parties concur that for purposes of claim construction of these patents, the words “high pressure area” are functionally equivalent to “high pressure region.” *See, e.g.,* Def.’s Br. at 15 (treating both sets of words as the same); Pl.’s Reply at 10 (same).

the hull and hydrodynamic pressure produced by the waterjets, Def.’s Br. at 11.<sup>8</sup> The government’s construction imports unnecessary limitations into the term. The language preceding the term indicates that the increase in pressure is due to action of waterjets, and therefore references to the means creating the increase in pressure are unnecessary.<sup>9</sup>

The claims and specification do not indicate that the patentee desired a specialized meaning for this term. The court need not resort to anything more complicated than the common meaning of the words when their meaning is evident and not contradicted by the claims or specification. *See Phillips*, 415 F.3d at 1314 (“In some cases, the ordinary meaning of claim language as understood by a person of skill in the art may be readily apparent even to lay judges, and claim construction in such cases involves little more than the application of the widely accepted meaning of commonly understood words.”). Here, the term “to increase the pressure” plainly means **to generate a greater pressure**.

*Term 3: “hydrodynamic lifting,” “hydrodynamically lifting,” “hydrodynamic lift,” and “hydrodynamically lifted”*

Plaintiff’s Proposed Claim Construction	Government’s Proposed Claim Construction
Plain and ordinary meaning	<p>For “hydrodynamic lifting” and “hydrodynamically lifting,” “one of two separate components of hydrodynamic lift produced as a result of a high pressure region on the hull”</p> <p>For “hydrodynamic lift,” “a second of two separate components of hydrodynamic lift on the hull produced as a result of accelerated water flow at or around the inlets”</p>

Term 3 appears in Claims 1 and 19 of the ’032 patent and Claims 1, 3 and 5 of the ’946 patent. Fastship proposes that the plain and ordinary meaning should apply to the term. Pl.’s Br. at 14, 21. The government separates the term “hydrodynamic lift” from “hydrodynamic lifting”

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<sup>8</sup>The government groups this term with Term 1 in its brief. Def.’s Br. at 11. The court separates Term 1 and Term 2 because the words are not sufficiently similar in context to warrant grouping.

<sup>9</sup>The government’s construction also creates problems grammatically when inserted into the claim language. With the government’s construction, this portion of the claim would read: “accelerating water flow into the inlets *an increase in hydrodynamic pressure which is additional to any hydrodynamic pressure on the hull produced by the motion of the hull through water* in the high pressure region and to produce further lifting of the hull which increases efficiency of the hull and reduces drag.”

and “hydrodynamically lifting,” assigning different definitions to these terms. Def.’s Br. at 16.<sup>10</sup> The parties’ disagreement focuses on whether the patent teaches two separate components of hydrodynamic lift, one produced by the movement of water under the shaped hull and another produced by the waterjets. Although the claims and specifications do not state that hydrodynamic lift has components, the prosecution history provides pertinent details. When writing a response to the patent examiner’s initial rejection of the patent application, counsel for the patentee distinguished the application from the prior art by stating that “each of the claims recites a *dual* component of lift which is produced by (1) an area of the hull which produces a high pressure area in the stern of the hull and (2) the acceleration of the water into the waterjets which produce[s] an additional lift which *increases* efficiency of the hull and *reduces* drag.” Applicant’s Amendment at 9 (emphasis in original).<sup>11</sup> The government is correct that this statement made during prosecution of the application has relevance in determining the scope of the claim in the patent as issued. *See* Def.’s Br. at 19 (citing *Microsoft Corp v. Multi-Tech Sys.*, 357 F.3d 1340, 1350 (Fed. Cir. 2004) (stating that “a patentee’s statements during prosecution, whether relied on by the examiner or not, are relevant to claim interpretation”)). The government nonetheless goes too far in asserting that the patentee claimed two *separable* components of hydrodynamic lift. *See* Def.’s Br. at 19. While the prosecution history recognizes “dual” components of hydrodynamic lift, it does not claim that the components are functionally independent. Therefore, the court recognizes that the patent teaches dual components of lift but that these components cannot be separated in functional effect.

When construing terms, the court seeks to construe terms to be consistent both with the specification and with other claim terms. *See Phillips*, 415 F.3d at 1314 (“The construction that stays true to the claim language and most naturally aligns with the patent’s description of the invention will be, in the end, the correct construction.” (quoting *Renishaw PLC v. Marposs Societa’ per Azioni*, 158 F.3d 1243, 1250 (Fed. Cir. 1998))). These phrases are grouped together because it would be incorrect to ascribe a divergent interpretation to the phrases “hydrodynamic lifting” and “hydrodynamically lifting” as contrasted to “hydrodynamic lift” and “hydrodynamically lifted” because all of these terms are used interchangeably throughout the claims and specifications. *See* ’032 patent, Claim 1, col. 14, lines 5, 24-25, Claim 19, col. 15, line 20, and col. 16, line 6; *see also* ’946 patent, Claim 1, col. 14, lines 19-20, Claim 3, col. 14, lines 31, 48-49, Claim 5, col. 14, lines 56, 62, Claim 7, col. 15, line 9 and col. 16, line 1. Therefore, the court chooses to construe these phrases harmoniously. Thus, “hydrodynamic lift” is used throughout to patent to mean **generation of an upward force vector by hydrodynamic means**. Similarly, “hydrodynamically lifting” and “hydrodynamic lifting” mean **generating an**

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<sup>10</sup>The closely related term “hydrodynamically lifted” appears in the ’946 patent, Claim 5, at col. 14, line 62, and Claim 7, at col. 16, line 1, but has not been addressed by the parties in conjunction with construction of the associated terms. For consistency, the court has included it in this grouping.

<sup>11</sup>This application would become the ’032 patent. *See* Def.’s Reply Claim Construction Br. Ex. H. The patentee also averred that “[the prior art] does *not* teach the dual components of (1) a high pressure zone in the stern of the hull and (2) the acceleration of water into the inlet of a waterjet.” Applicant’s Amendment at 10 (emphasis in original).

**upward force vector by hydrodynamic means.** “[H]ydrodynamically lifted” means **raised by hydrodynamic means.**

*Term 4: “further lifting” and “additional”*

Plaintiff’s Proposed Claim Construction	Government’s Proposed Claim Construction
Plain and ordinary meaning	“A second of two separate components of hydrodynamic lift on the hull produced as a result of accelerated water flow at or around the inlets”

This term appears in the ’032 patent, Claim 1 (as “additional”) and Claim 19 (as “further lifting”) and in the ’946 patent, Claims 1 and 3 (as “additional”) and Claims 5 and 7 (as “further lifting”). In these instances, the term teaches that the waterjet propulsion system produces hydrodynamic lift causing *further lifting* or *additional* lifting compared to the lift produced by the hull. *See* ’032 patent, Claim 1, col. 14, lines 23-29, Claim 19, col. 16, lines 11-14. Fastship proposes the plain and ordinary meaning of the term, Pl.’s Br. at 21, while the government proposes a detailed construction to distinguish this term from Term 3, the previous term concerning hydrodynamic lifting, Def.’s Br. at 16-17. The parties’ disagreement over this term is the same as the disagreement over Term 3.

The government, using prosecution history, had sought to narrow aspects of Term 3 to relate only to hydrodynamic lift caused by the shape of the hull. Similarly, the government uses the same prosecution history to aver that the proper construction of Term 4 is limited to the hydrodynamic lift caused by the waterjets. Def.’s Br. at 18-19. As the court recognized in the construction for Term 3, however, the prosecution history states that there are dual components of lift but does not teach that these components are independent in function. Term 4 indicates that the lift generated by the waterjets is compounded with the lift caused by the bottom of the hull. *See* ’032 patent, Claim 1, col. 14, lines 24-28. In short, the patent does not teach that the lift from the waterjets can be readily separated from the lift caused by the bottom of the hull. The specifications do indicate that the lift caused by both the waterjets and the hullform is greater than lift generated by a vessel with only one of these two sources. *See* ’032 patent, col. 5, lines 6-13 (“A principal advantage of the integrated [semi-planning] hull and waterjet system is that . . . the accelerated flow at the intakes also produces higher pressure and greater lift to reduce drag on the hull even further.”), col. 6, lines 16-24 (“[T]he acceleration of flow created by the [waterjets] produces additional dynamic lift. . . . The result is an improvement in overall propulsive efficiency compared to a hull with a conventional propeller propulsion system.”). For these reasons, the court construes the terms “further lifting” and “additional” to mean **a greater upward force vector than that attributable to a single means.**

*Term 5: “acceleration of water into” and “accelerating of water flow into”*

Plaintiff’s Proposed Claim Construction	Government’s Proposed Claim Construction
Plain and ordinary meaning	“An increase in the velocity of water created by the pumps”

Term 5 appears in Claims 1 and 19 of the '032 patent and Claims 1, 3, 5, and 7 of the '946 patent. Fastship again advocates adoption of the plain and ordinary meaning, Pl.'s Br. at 17, while the government proposes a construction which states that any acceleration is due to a change in velocity created by the pumps, Def.'s Br. at 20. In effect, the parties disagree over the technical definition of acceleration taught in the patent and about the source of the acceleration. During the *Markman* hearing, Fastship pointed out that acceleration is not merely an increase in velocity but rather depends also upon direction. *Markman* Hearing at 31:13-17 (referencing Tech. Tutorial at 21:3-6). The government acknowledges that acceleration can incorporate direction but correctly points out that the specification only discusses acceleration as an increase in velocity. *See Markman* Hearing at 62:17-20. Each time the word "acceleration" or a variation of the word is used in the specification, the patent is addressing the waterjet propulsion system, which increases the velocity of the water flowing through it. *See, e.g.,* '032 patent, col. 5, lines 6-13, col. 6, lines 16-18, col. 10, lines 34-38. Although Fastship is correct that acceleration reflects a force vector applying power in a direction, *see* Tech. Tutorial at 21:3-9, the claims of the patents appear either to assume a mid-line direction of the inlet and outlet or to assume that direction is not material to construction of the term, *see* '032 patent, Fig. 15, col. 10 and lines 34-38.

The second point of contention is whether the patent teaches a particular source of acceleration. The government avers that it does, specifically that the pumps are the sole source of water-flow acceleration. *See* Def.'s Br. at 20 (citing '032 Patent col. 6, lines 16-18 ("the acceleration of flow created by the pumps at or around the inlet produces additional dynamic lift")). The patent indicates that the pumps do generate acceleration of the water, but the claims do not limit acceleration to the action of the pumps. Instead, the inlets of the waterjet propulsion system are also directly tied to the acceleration of water flow. *See* '032 patent, Claim 1, col. 14, lines 23-24 ("acceleration of water into the at least one inlet and from the at least one waterjet"), Claim 19, col. 16, lines 11-14 ("accelerating water flow into the inlets to increase the pressure"). In particular, the design of the inlet makes a difference in the acceleration of the water flow. A change in the design or location of the inlet can make the waterjet more or less efficient by affecting the way water flows into the inlet. Tech. Tutorial at 34:15-22, 35:7-13.<sup>12</sup> Therefore, the acceleration of water flow is affected by the pumps and other factors, such as inlet design and placement. For the reasons stated, the court construes the term "acceleration of water into" to mean **an increase in the speed of the flow of water into** and "accelerating of water flow into" to mean **increasing the speed of the flow of water into**.

*Term 6: "a threshold speed" and "a threshold ship speed"*

Plaintiff's Proposed Claim Construction	Government's Proposed Claim Construction
Plain and ordinary meaning	"The minimum level of speed required to produce hydrodynamic lift under the stern portion of the hull"

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<sup>12</sup>The patent does not require any particular design or placement of the inlet, except placement of the inlet in the high pressure area at the bottom of the hull. *See* '032 patent, Claim 1, col. 14, lines 14-15 ("at least one inlet located within the high pressure area").

Term 6 appears in Claims 1 and 19 of the '032 patent and Claims 1, 3, 5, and 7 of the '946 patent. Fastship avers that the term should be given its plain and ordinary meaning, Pl.'s Br. at 24-25, and the government proposes a specific construction for the term, Def.'s Br. at 21. The specification defines this term as the minimum speed at which a semi-planing ship develops hydrodynamic lift as a result of the high pressure generated at the aft part of the ship. '032 patent, col. 3, lines 19-22 ("The [semi-planing] ship develops hydrodynamic lift above a certain threshold speed as a result of the presence of high pressure at the aft part of the hull."). This definition is consistently used throughout the claims and specification. See '032 patent, col. 9, lines 23-27 ("It is this hull configuration which produces at a threshold speed a hydrodynamic lift under the aft section to reduce drag in relation to conventional displacement hulls as demonstrated in FIG. 14."), col. 9, lines 32-37 ("Although there is presently no agreed upon method for determining the onset of hydrodynamic lift as a result of the size and shape of this hull [embodiment], it has been suggested that such lift takes place at a threshold speed of about 26.5 knots at a displacement of 22,000 tons, in the case of this ship."). These references indicate that the patentee sought to be his own lexicographer by defining this term. See *Vitronics*, 90 F.3d at 1582. The court accordingly construes this term as chosen by the patentee to mean **a minimum speed when a semi-planing vessel develops hydrodynamic lift as a result of the high pressure generated at the aft part of the vessel.**

*Term 7: "increases efficiency of the hull"*

Plaintiff's Proposed Claim Construction	Government's Proposed Claim Construction
Plain and ordinary meaning	"An increase in the ratio of useful energy produced by a hull and the total energy delivered to such a hull when compared to conventional vessels"
Alternatively, "increases speed"	

Term 7 is found in Claims 1 and 19 of the '032 patent and Claims 1, 3, 5, and 7 of the '946 patent. Fastship urges adoption of the plain and ordinary meaning but provides an alternative construction. Pl.'s Br. at 26. The government provides a different construction based upon a naval dictionary. Def.'s Br. at 23-25. The parties disagree on the basic meaning of "efficiency" as used in the patent. The parties make two important observations in their briefs. First, the term "efficiency" is used throughout the specification, but Term 7 is specific to "efficiency of the hull." See Def.'s Br. at 23 (noting that six different definitions of efficiency appear in a publication, Lloyd's Register, *Warship Hull Design Inquiry* (1983), submitted in the '032 prosecution history, one of which is specific to "efficiency, hull").<sup>13</sup> Second, the specification and claims discuss drag along with efficiency but do not combine the two into a single concept. Pl.'s Br. at 27. The chief measure of utility cited in the specification is speed. See '032 patent, col. 1, lines 36-39 (discussing the speed limitations of traditional displacement hulls), col. 2, lines 37-42 (describing the planing hull in terms of achievable speed), col. 5, lines 1-5 (explaining efficiency in terms of speed), Fig. 11 (plotting ship speed versus shaft

<sup>13</sup>This publication was submitted by Fastship's patent prosecution counsel along with other materials as part of a "Design Inquiry Report," attendant to amendment of the patent application on May 17, 1991. See Def.'s Br. Ex. E (Disclosure Statement Pursuant to 37 C.F.R. § 1.56 (May 17, 1991)), Ex. F (Non-Patent Publication (submitted May 17, 1991)).

horsepower), Fig. 12 (comparing the speed and resistance plots of a semi-planing hull and a displacement hull).

Nonetheless, the efficiency of a hull is more than a measure of speed. The specification continually compares efficiency in terms of both speed and power delivered. It devotes four figures to demonstrate how variations in speed and horsepower impact semi-planing hulls compared to other vessels. *See* '032 patent, Fig. 9, Fig. 10, Fig. 11, Fig. 12. This understanding is more specific than the one offered by the government, which is derived from the *Warship Hull Design Inquiry*. *See* Def.'s Br. at 23 (citing Def.'s Br. Ex. F at G00000480). While both parties are correct in aspects of their construction of this term, neither construction is comprehensive. Fastship ignores that efficiency is a relative term, as seen in the patent's comparison of the semi-planing hull to conventional displacement hulls. *See* '032 patent, col. 5, lines 56-60 (comparing the "hydrodynamic efficiency of a [semi-planing hull] at speeds where traditional [displacement] hulls squat"). The government's construction ignores the patent's emphasis on speed rather than reference to a general definition for efficiency. *See* '032 patent, col. 5, lines 1-5. For these reasons the court adopts an amalgam of the parties' definitions, construing "increases efficiency of the hull" to mean **allows achievement of speed through application of less power than would be required for comparable or even lower speeds with a conventional displacement hull**.

#### *C. Terms of the Claims as to Which Construction Is Agreed*

##### *Term 8: "reduces drag"*

Term 8 appears in Claims 1 and 19 of the '032 patent and Claims 1, 3, 5, and 7 of the '946 patent. The parties agree that the term retains its **plain and ordinary meaning**. Def.'s Br at 8. The court accepts this mutually agreed construction.

### **CONCLUSION**

For the reasons provided, the eight terms identified by the parties shall be construed as stated.

It is so ORDERED.

s/ Charles F. Lettow  
Charles F. Lettow  
Judge