

**UNITED STATES PATENT AND TRADEMARK OFFICE**

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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BOMBARDIER RECREATIONAL PRODUCTS INC.

Petitioner,

v.

MHL CUSTOM INC.

Patent Owner.

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Case No. IPR2024-01391

U.S. Patent No. 9,586,659

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**PETITION FOR *INTER PARTES* REVIEW OF  
U.S. PATENT NO. 9,586,659 CHALLENGING  
CLAIMS 16-23 AND 26-28**

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Bombardier Recreational Products Inc. (“Petitioner”) respectfully requests *inter partes* review (“IPR”) of claims 16-23 and 26-28 of USP 9,586,659 “’659 patent”) (Ex. 1001).

## **I. INTRODUCTION**

The ’659 patent is directed to a personal hydrofoil watercraft that is controlled by the weight shift of a user. Ex-1001-USP659, 1:14-16. The purported invention claimed by the ’659 patent was to remove the use of control surfaces of powered hydrofoil surfboards and design the hydrofoil used by the invention to provide for passive stability. Ex-1001-USP659, 2:20-23. The providing of passive stability by the hydrofoil was purportedly achieved by “a combination of airfoil design, planform design, and tailoring the span-wise twist distribution to achieve desired outcomes.” Ex-1001-USP659, 2:25-28.

For example, Figure 1, reproduced below, depicts a representative embodiment of a weight-shift controlled personal hydrofoil watercraft.

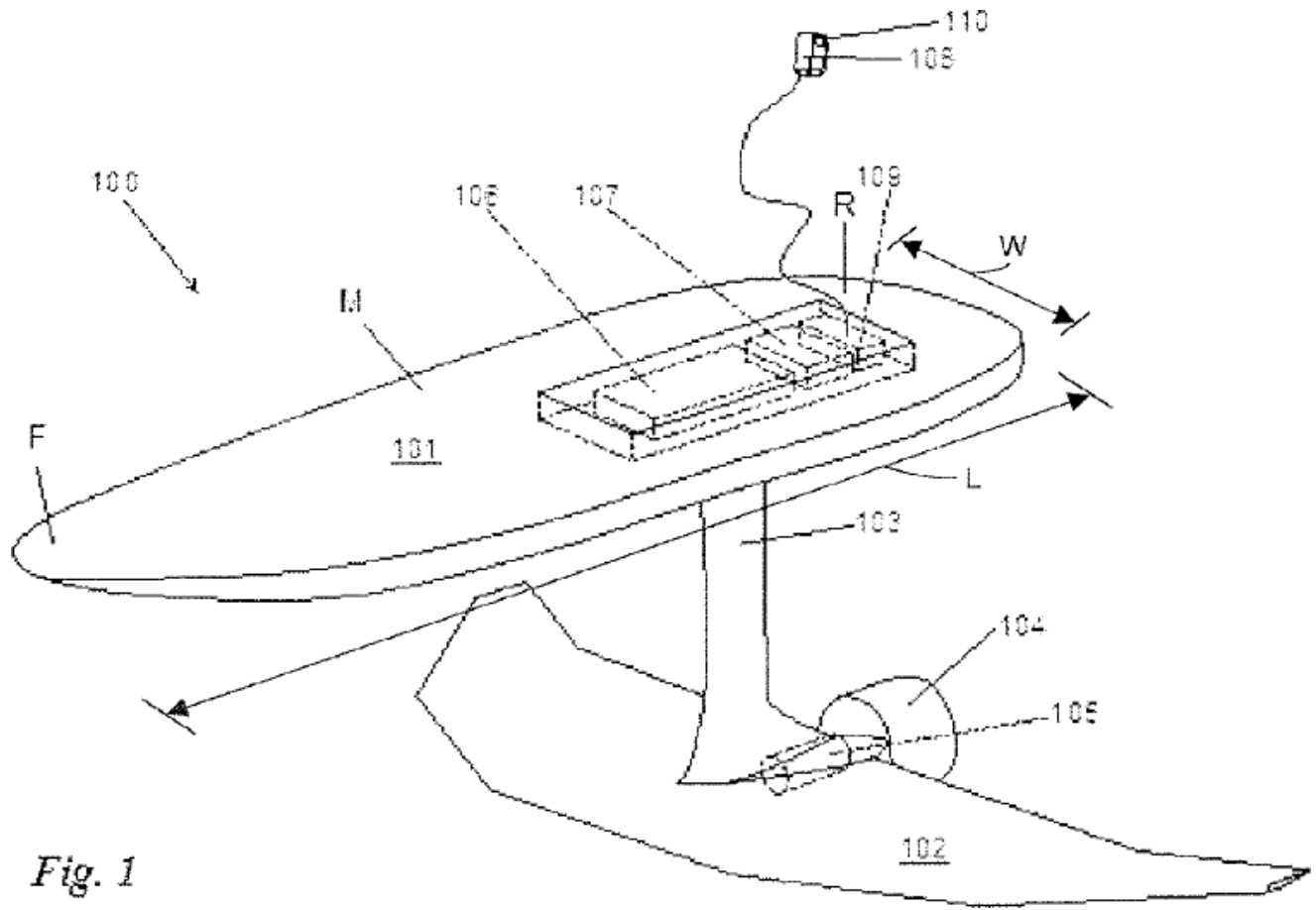
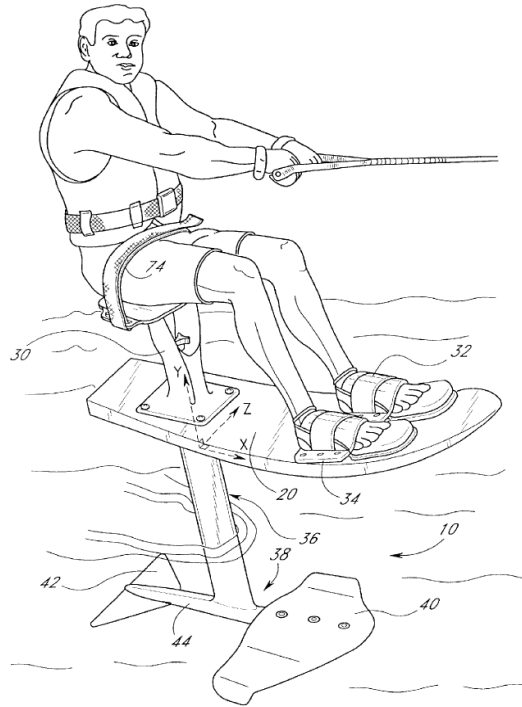


Fig. 1

*Id.*, FIG. 1. The watercraft comprises four primary elements: a floatation device 101 for the user, a fixed strut 103 connected to the floatation device, a hydrofoil 102 with no moveable surfaces connected to the lower end of the strut 103, and a propulsion system 104 that is connected to the hydrofoil 102. The combination of these four elements, along with a negative limitation disclaiming the use of a moveable steering system, form primary elements of the independent claims of the '659 patent.

However, the concept of a personal watercraft that utilized a hydrofoil providing passive static stability was already well known at the time. For example,

Woolley, a US patent entitled “Flying Ski”, disclosed a waterski of almost identical configuration to the claimed invention of the ’659 patent.



Ex-1011-Woolley, FIG.1. Furthermore, unlike the ’659 patent, Woolley provided significant disclosures relating to how to configure its hydrofoil to provide passive static stability. *See, e.g.*, Ex-1011-Woolley, Figs 6-11, 10:32-14:39.

In addition to prior patents, a Master’s Level course on Marine Design/Lightweight Design taught at Kungliga Tekniska högskolan (“KTH”) in Stockholm, Sweden developed and published information about a prototype product called Evolo. As part of the class’s efforts on the Evolo Project, they published a report online of more than 500 pages detailing their efforts to make a self-propelled personal watercraft. *See, e.g.*, Ex-1003-EvoloReport. This report received

significant press in the boating industry when a popular Swedish boating magazine with a circulation of over 125,000 readers published an article in its August 2009 issue about the Evolo project. *See, e.g.*, Ex-1019-Båtnytt. The '659 patent was recently subject to reexamination proceedings in which the patentability of the '659 patent, including amended independent claim 16 and new claims 21-28 were confirmed. This Petition challenges only the claims that were either added (claims 21-28) or amended (claim 16 and claims 17-20 by virtue of their dependency on claim 16) during reexamination. As explained below, the challenged claims of the '659 patent are unpatentable over EvoloReport—which was not considered in the reexamination—and others such as Woolley as set forth below.

## **II. MANDATORY NOTICES**

### **A. Real Party-in-Interest**

Petitioner Bombardier Recreational Products Inc. is the only real party-in-interest.

### **B. Related Matters**

According to USPTO records, U.S. Patent No. 9,586,659 (the "'659 patent") is owned by MHL Custom Inc. ("Patent Owner" or "PO"). Foil Boarding Company, Inc. Petitioned for inter partes review of claims 1, 2, 4-5, 7-11, 13, and 15 of the '659 patent filed by on October 26, 2023 ("Foil Boarding IPR"), which the Board instituted on May 28, 2024. *Foil Boarding Company, Inc. v. MHL Custom, Inc.*,

IPR2024-00085 (PTAB) Papers 2, 12 (PTAB). Both Petitioner and Shenzhen Waydoo Intelligence Technology Co., Ltd. have sought to join the Foil Boarding IPR. *Shenzhen Waydoo Intelligence Technology Co., Ltd. v. MHL Custom, Inc.*, IPR2024-00999 (PTAB) (filed June 6, 2024); *Bombardier Recreational Products Inc. v. MHL Custom, Inc.*, IPR2024-01107 (PTAB) (filed June 28, 2024)).

According to USPTO records, U.S. Patent No. 9,359,044 (the “’044 patent”) is owned by MHL Custom Inc. The ’659 patent is a continuation patent of the ’044 patent. Petitioner is challenging the ’044 patent in IPR2024-01108 (filed June 28, 2024), which seeks to join IPR2024-00086 filed by Foil Boarding Co. Inc. The ’044 Patent is also at issue in *Shenzhen Waydoo Intelligence Technology Co., Ltd. v. MHL Custom, Inc.*, IPR2024-00998 (PTAB) (filed June 6, 2024), in which Shenzhen Waydoo Intelligence Technology Co., Ltd. requested to join IPR2024-00086.

PO alleges that the ’044 patent and ’659 patent are infringed in *MHL Custom Inc. v. Waydoo USA, Inc. et al.*, Case No. 1:21-CV-00091 (D. Del) (“MHL Action”). The Court in that case found that Waydoo USA infringed certain claims of the ’044 patent and ’659 patent. Defendant Waydoo USA appealed that decision in *MHL Custom, Inc. v. Waydoo USA, Inc.*, Case No. 24-1036 (Fed. Cir.). Defendant Waydoo USA’s appeal was dismissed because the underlying judgment was non-final on April 30, 2024. Final judgment was entered on July 1, 2024 and PO and Waydoo

USA appealed (Case Nos. 24-2116, 2151). The appeals are currently pending and have been consolidated into Case No. 21-2116.

In addition, PO alleges that Foil Boarding Co. Inc. infringes the '044 Patent and the '659 patent in *MHL Custom Inc. v Foil Boarding Co. Inc.*, Case No. 3:22-CV-21258 (N.D. Fl.), which is currently stayed.

PO also alleged that Avante Innovations, LLC infringes the '044 Patent and the '659 patent in *MHL Custom, Inc. v. Avante Innovations, LLC*, Case No. 3-20-cv-01648 (S.D. Cal.), which was dismissed on December 11, 2020.

**C. Counsel**

Under 37 C.F.R. § 42.8(b)(3), Petitioner provides the following designation of counsel:

| <b><u>Lead Counsel</u></b>                                                                                                                                    | <b><u>Backup Counsel</u></b>                                                                                                                                                                            |
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**III. CERTIFICATION OF GROUNDS FOR STANDING**

Petitioner certifies pursuant to Rule 42.104(a) that the patent for which review is sought is available for IPR and that Petitioner is not barred or estopped from requesting IPR challenging the claims on the grounds identified in this Petition.

**IV. OVERVIEW OF CHALLENGE AND RELIEF REQUESTED**

Petitioner challenges claims 16-23, and 26-28 of the '659 patent.

**A. Prior Art**

The '659 patent claims the benefit of the filing date of the '044 patent, which claims priority to a provisional application filed on Oct 10, 2013. Ex-1001-USP659, p. 1-2.<sup>1</sup> Petitioner relies upon the documents:

1. Evolo Final Report<sup>2</sup> (“Evoloreport”) (Ex-1003), published April 23, 2009, as § 102(a)(1) prior art;
2. U.S. Patent 6,234,856 (“Woolley”) (Ex-1011), filed September 23, 1999, issued May 22, 2001, as § 102(a)(1) and (2) prior art;
3. U.S. Patent 8,384,780 (“Frank”), filed November 28, 2007, issued February 26, 2013, as § 102(a)(1) and (2) prior art.

**B. Grounds for Challenge**

The challenged claims are unpatentable under §§ 103 as follows:

| Ground | Claims | Reference(s) |
|--------|--------|--------------|
|--------|--------|--------------|

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<sup>1</sup> Petitioner reserves the right to argue in this or later proceedings that the claimed subject matter is unsupported by the provisional filing.

<sup>2</sup> EvoloReport was originally written and published in Swedish under the title “Slutrappport Evolo.” References herein to EvoloReport are to a certified translation of EvoloReport into English. The original Swedish language version is Ex-1005.

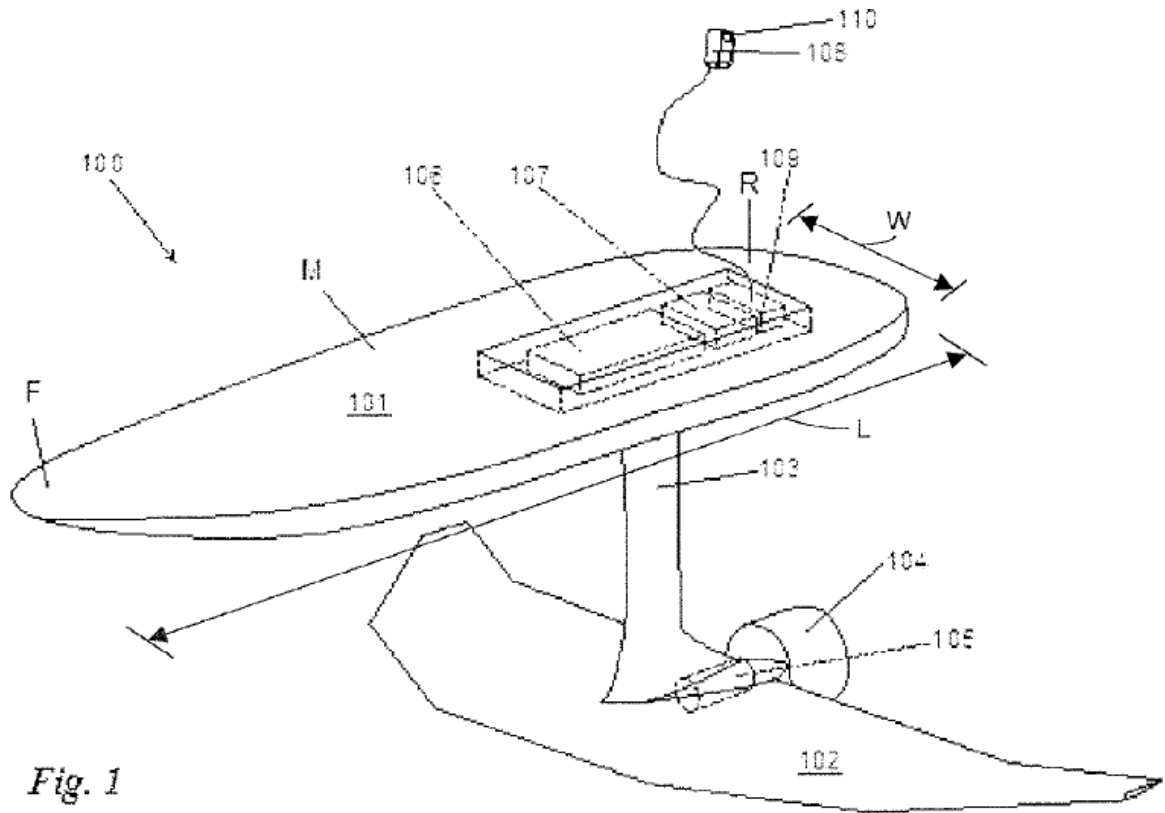
|   |              |                                 |
|---|--------------|---------------------------------|
| 1 | 16-23, 26-28 | EvoloReport and Woolley         |
| 2 | 26           | EvoloReport, Woolley, and Frank |

This Petition, supported by the declaration of Dr. Brizzolara (“Ex-1002-Brizzolara-Decl.”), demonstrates that each challenged claim is unpatentable.

## **V. BACKGROUND TECHNOLOGY AND ’659 PATENT OVERVIEW**

### **A. The Alleged Invention**

The ’659 patent describes a purported improvement upon the “powered hydrofoil surfboard[]” by providing a personal watercraft that includes a hydrofoil that provides passive stability without the use of moveable surfaces. Ex-1001-USP659, 2:17-26. Specifically, referring to Figure 1 below, the patent explains that the watercraft consists of four major components: a floatation board 101 for the user to occupy, a fixed strut 103 connected to the floatation device, a hydrofoil 102 with no moveable surfaces connected to the lower end of the strut 103, and a propulsion system 104 that is connected to the hydrofoil 102. Ex-1001-USP659, Fig 1, 3:7-4:7. Ex-1002- Brizzolara-Decl., ¶22.



Ex-1001-USP659 FIG. 1

In addition to the four main structural elements, the watercraft can include a battery 106, motor speed controller 107, and handheld throttle system 108. Ex-1001-USP659, Fig 1, 3:12-14, 4:26-28. Ex-1002-Brizzolara-Decl., ¶24.

The hydrofoil of the watercraft of the '659 patent is designed to provide passive stability to obviate the need for active control systems. Ex-1001-USP659, 6:7-9. Ex-1002-Brizzolara-Decl., ¶25. The '659 patent discloses multiple design choices that can be made with the hydrofoil to affect its ability to provide passive static stability. Ex-1001-USP659, Fig 8, 5:35-65 (disclosing the use of fixed canards, winglets, horizontal tails, and vertical tails). Ex-1002-Brizzolara-Decl., ¶26. The

'659 patent notes that the degree of passive static stability provided by the hydrofoil can vary, because greater stability impacts the ability for the watercraft to maneuver. Ex-1001-USP659, 7:10-18. Ex-1002-Brizzolara-Decl., ¶27. The '659 patent does not, however, provide an example implementation that purportedly balances passive stability with maneuverability. Rather, the '659 patent leaves the task of designing the shape, function, and features of a sufficiently stable hydrofoil up to the skill and discretion of a POSITA. Ex-1002-Brizzolara-Decl., ¶28.

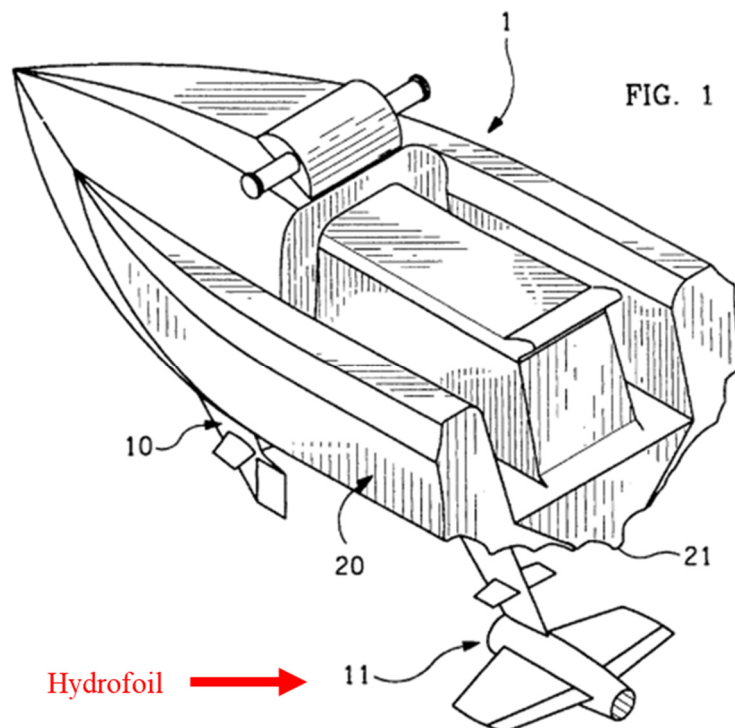
**B. Prosecution History and Reexamination**

Application No. 15/064,521, which issued as the '659 patent, was filed on March 8, 2016. Ex.1001-USP659, Cover. The '521 Application was designated a continuation application and purports claim priority to an October 10, 2013 provisional application. Ex.1001-USP659, Cover.

During prosecution, the '521 application received one single Office action, which included a double patenting rejection over parent Application No. 14/509,289 (later issued as U.S. 9,359,044). Ex-1017-659FH, 43-44. The '521 application was allowed after acceptance of a terminal disclaimer. *Id.*, 98.

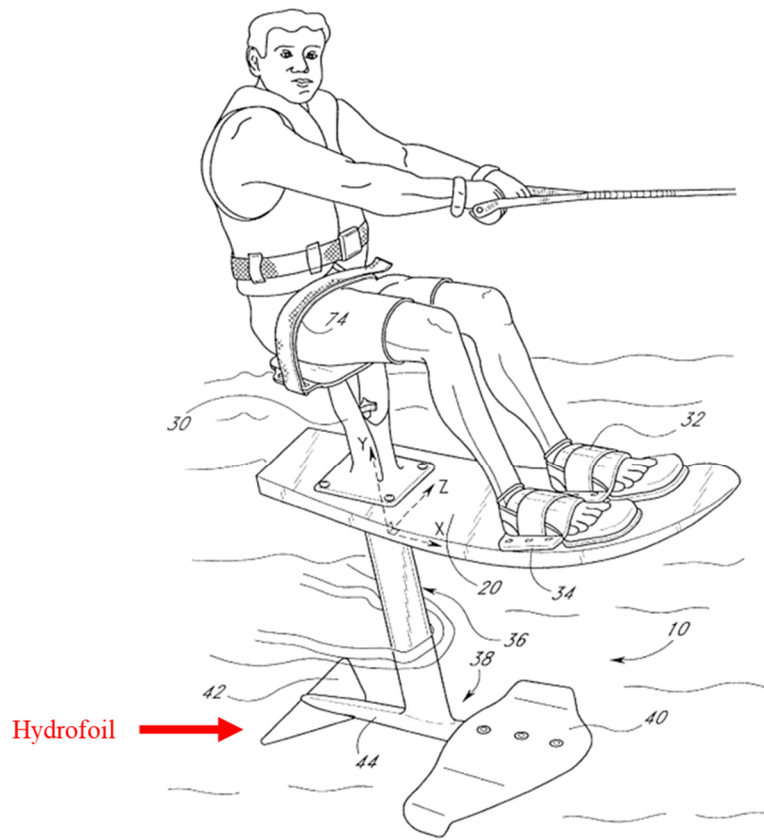
After issuance, claims 16-20 of the '659 patent were invalidated in for lack of written description in the MHL Action for failure to require the watercraft to be stable, which the patent makes clear is the alleged invention. Ex-1028-Summary-Judgment, 16-21. The '659 patent was later subject to an ex parte reexamination

request filed August 9, 2023,<sup>3</sup> which was ordered on September 7, 2023 based on substantial new questions of patentability in all five requested grounds, none of which included the EvoloReport. Ex.1024-659-Reexam, 390-394. A Non-final Office action issued on December 5, 2023, which included grounds of rejection based on US 2011/0111650 to Braden (Ex-1025) in view of either US 5,544,607 to Rorabaugh et al. (Ex-1026) or Woolley. Ex-1024-659-Reexam, 367, 369-378. Specifically, the Office action alleged it would have been obvious to add a hydrofoil from Rorabaugh or Woolley to Braden's powered surfboard (Ex-1024-659-Reexam, 373-376):



<sup>3</sup> Petitioner was not the requester.

Ex-1026-Rorabaugh FIG. 1<sup>4</sup>



Ex-1011-Woolley FIG. 1

<sup>4</sup> All annotations and emphasis added unless otherwise noted.

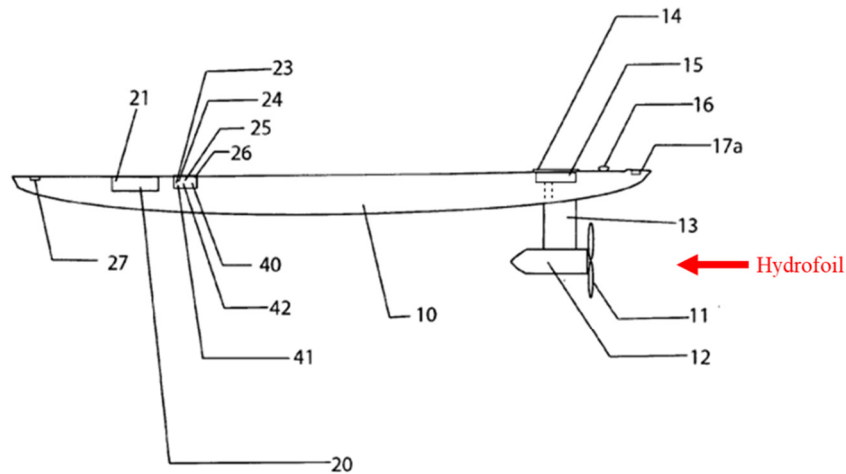


FIG 1

Ex-1025-Braden FIG. 1

PO responded by amending independent claim 16 to require a hydrofoil watercraft that is “passively stable, weight-shift controlled”—the limitation the court in the MHL Action noted was missing from the claims—and that the “hydrofoil ha[ve] no movable surface[,]” both of which were already present in original claim 1.<sup>5</sup> Ex-1024-659-Reexam, 301, 299. PO conceded that Woolley discloses a hydrofoil board and “how its planing blade 38 [(hydrofoil)] can be further modified to provide desired stability characteristics for different rider skill levels.” *Id.*, 311. However, PO nonetheless argued, citing to a declaration from the ’659 patent inventor, that it

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<sup>5</sup> PO also added new claims 21-28. Ex-1024-659-Reexam at 302-303.

would not have been obvious to add the hydrofoil from Woolley’s towrope driven watercraft to Braden’s motor-powered surfboard because “that modification would result in tremendous instability” by producing a “destabilizing torque.” *Id.*, 312. PO also argued that Braden’s motor-powered surfboard lacks Woolley’s tow rope, which purportedly serves to counteract the lift from the hydrofoil and enables the operator to steer and control the watercraft. *Id.* Accordingly, PO concluded that such combination could not be implemented as a “‘passively stable’ and ‘weight-shift controlled’” and would instead require “active” and movable “control components,” which are expressly prohibited by the claims. *Id.* (emphasis in original).<sup>6</sup> The reexamination Examiner ultimately found these arguments convincing, and a Reexamination Certificate was issued on August 6, 2024. *Id.*, 6-7, cover.

Although the Foil Boarding ’659 IPR Petition and Declaration of Dr. Brizzolara were submitted on an IDS among 12 patent references and 47 litigation-related and other non-patent documents (*Id.*, 357-363), neither were discussed during the reexamination proceeding.<sup>7</sup> Moreover, neither the EvoloReport

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<sup>6</sup> PO also submitted purported evidence of secondary considerations of non-obviousness, which are addressed in Section X.

<sup>7</sup> While “individuals are strongly encouraged to file information disclosure

translation (Ex-1003) itself nor Ex-1019-Ex-1021 submitted herewith supporting its public availability were provided to the examiner.

Unlike the Braden reference relied on by the reexamination Examiner, the EvoloReport reference relied on in the instant Petition discloses a **powered hydrofoil watercraft** that is designed for stability and weight-shifted control without the use of a tow rope. Accordingly, Woolley’s teachings of how to provide stability would have been directly applicable to EvoloReport’s hydrofoil.

## VI. CLAIM CONSTRUCTION

A claim is construed “using the same claim construction standard that would be used to construe the claim in a civil action...” 37 C.F.R. § 42.100(b). Petitioner submits that no terms need to be construed to resolve the issues raised in this Petition because the prior art discloses all limitations under any plausible construction. For example, the claims are met under any of the constructions proposed or adopted in

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statements...within two months of the date of the order to reexamine, or as soon thereafter as possible” (MPEP § 2280), PO did not submit an IDS until more than three months after the reexamination was ordered, which fell ten days after the Non-final Rejection was issued. *Id.* at 383, 367, 366, 344.

*MHL Custom Inc. v. Waydoo USA, Inc. et al.* (D.Del. 1:21-CV-00091),<sup>8</sup> reproduced below:

**Term 1 (Claims 1, 16):** “wherein a user can be disposed on the top surface of the flotation device in a prone, kneeling, or standing position”

Waydoo USA’s Proposed Construction: “Plain and ordinary meaning”

PO’s Proposed Construction: “Wherein a user can be disposed on the top surface of the flotation device in each of the following positions: lying chest down; kneeling; or standing”

Court’s Construction of Term 1: “‘Prone, kneeling, or standing’ are alternatives. Only one of them is required.”

**Term 2 (Claims 1, 16<sup>9</sup>):** “A passively stable, weight shift controlled personal hydrofoil watercraft”

Waydoo USA’s Proposed Construction: “A weight-shift controlled personal hydrofoil watercraft that is stable without mechanisms or

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<sup>8</sup> See Ex-1023-Claim-Construction-Order, Ex-1033-Proposed-Constructions, Ex-1028-Summary-Judgment at 5-7.

<sup>9</sup> This term was added to claim 16 via amendment during reexamination, and therefore was not previously construed.

active control systems”

PO’s Proposed Construction: “A watercraft having a hydrofoil, the hydrofoil having an initial tendency to return to its original condition when disturbed without the hydrofoil having any moveable components and that is controlled by weight-shift of the user”

Court’s Construction of Term 2: “a weight-shift controlled personal watercraft having a hydrofoil that does not have any moveable components and which, when disturbed, (1) has an initial tendency to return to its original condition and (2) eventually returns to its original condition”

## **VII. OVERVIEW OF THE PRIOR ART**

### **A. EvoloReport**

EvoloReport is a design document describing the work conducted by a Master’s Level course on Marine Design/Lightweight Design taught at Kungliga Tekniska högskolan (“KTH”) in Stockholm, Sweden. EvoloReport was authored by the instructors and students in the class and describes their work in designing a battery-powered electric-motor-driven hydrofoil watercraft. *See generally*, Ex-1003-EvoloReport.

EvoloReport was uploaded to [http://flygmac7.flyg.kth.se/cdio/old\\_projects/evolo](http://flygmac7.flyg.kth.se/cdio/old_projects/evolo) as of 2009. Declaration of Jakob Kутtenkeuler, ¶18 (“KутtenkeulerDecl”)

(Ex.1018). (“In 2009, shortly after receiving the final report, I published a PDF of it on the website for the Marine Design and Lightweight Design courses. The final report is available at this web address: [http://flygmac7.flyg.kth.se/cdio/old\\_projects/evolo/Evolo\\_slutrapport.pdf](http://flygmac7.flyg.kth.se/cdio/old_projects/evolo/Evolo_slutrapport.pdf)[.]”).

EvoloReport was further published when a popular Swedish boating magazine, *Båtnytt*, published an article in its August 2009 issue, which described the watercraft disclosed in EvoloReport, including several photographs of the watercraft. Ex.1018-KuttenkeulerDecl ¶¶29-30. The *Båtnytt* article shows the entire Evolo watercraft and describes its various features, including the hydrofoil and electric motor. Ex-1019-Batnytt 9 (“Evolo is **powered by an electric motor** located at the bottom of the keel, where there are also **delta-type hydrofoils**.”) As shown below, the *Båtnytt* article shows each of the main features of the Evolo watercraft; those main features being a flotation device and a strut linking the flotation device to both a propulsion system and a hydrofoil.





Ex-1019-Batnytt, 4-7.

Further, the Båtnytt article included direct links to where interested persons could find more information about the Evolo watercraft, specifically including a link

that took readers to EvoloReport. Ex-1019-Batnytt 12. (“Read more about Evolo at [www.evolo.se](http://www.evolo.se), [www.msy.se](http://www.msy.se), [http://flygmac7.flyg.kth.se/cdio/old\\_projects/evolo/](http://flygmac7.flyg.kth.se/cdio/old_projects/evolo/)”).



At the time, Båtnytt had an audience of approximately “125,000 readers per issue” and published 12 issues each year. Ex1020-Batnytt-Readership (“**125,000 readers per issue** according to Orvesto 2009:1”). Jakob Kутtenkeuler also testified that he saw the August 2009 issue of Båtnytt, the issue containing the Evolo watercraft, for sale at public newsstands. Ex-1018-KутtenkeulerDecl 5, 31 (“In the fall and winter of 2009, **I saw the August 2009 issue of Båtnytt available for sale in Stockholm at public newsstands.**”). The Båtnytt Magazine is the type of publication that a POSITA would review in order to learn about and remain up-to-date on developments in the current state of the art. Ex-1002-Brizzolara-Decl. at ¶¶33-34.

The article in Båtnytt would have served as a publicly available “research aid

that would have led a POSITA to the Evolo website, which contained the Evolo Report. *See, e.g., Blue Calypso, LLC, v. Groupon, Inc.*, 815 F.3d 1331,1350 (Fed. Cir. 2016); *Bruckelmyer v. Ground Heaters, Inc.*, 445 F.3d 1374, 1379 (Fed. Cir. 2006). The significant distribution of the Batnytt article combined with it being the type of article that a POSITA would use to keep up to date on developments in the industry illustrate that is the type of research aid contemplated by the Federal Circuit to find otherwise publicly available publications. Ex-1002- Brizzolara-Decl., ¶¶33-34.

**B. Woolley**

Woolley discloses a flying ski that provides “stability, lift and maneuverability [that] can be controlled by the rider to accommodate the rider’s particular skill level...” Ex-1011-Woolley, 1:35-38. The ski includes an elongate board 20, an elongate strut 36 extending perpendicular and downwards from the board, and a hydrofoil – or planing blade 38 – comprising a front blade 40 and rear blade 42 connected to the strut via a fuselage 44. Ex-1011-Woolley, 6:15-21. The planing blade provides a combination of “stability, lift, and responsiveness” (Ex-1011-Woolley, 10:31-33), while the front and rear blades can include stabilizing fins 120, 122 and 152, 154, respectively (*id.*, 11:6-9, 19-29, 13:38-40).

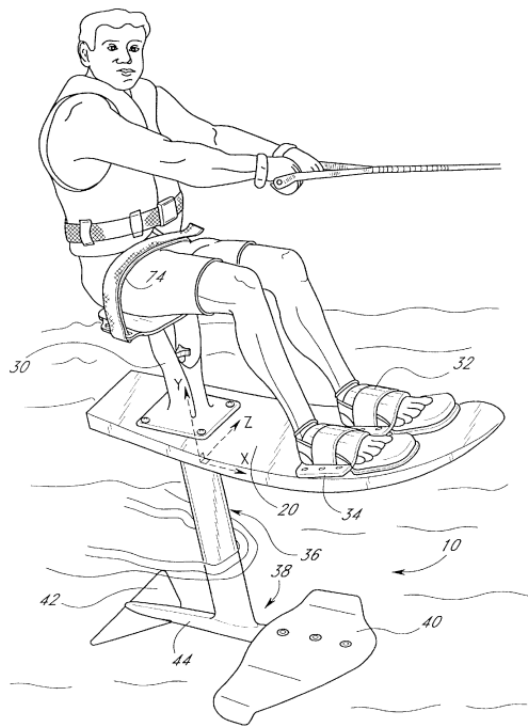


FIG. 1

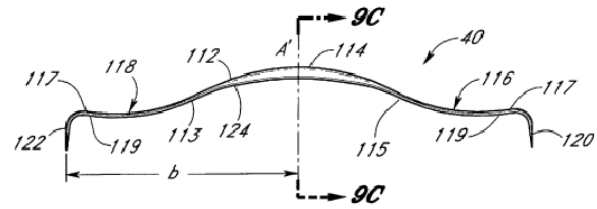


FIG. 9A

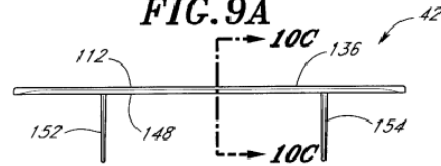


FIG. 10A

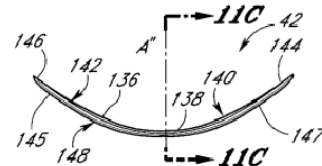


FIG. 11A

Ex-1011-Woolley, FIGs. 1, 9A, 10A, 11A. Ex-1002- Brizzolara-Decl., ¶¶35-36.

### C. Frank

Frank discloses an infrared imaging system 100A, 100B (e.g., an infrared camera) with “an image capture component 130” that can be used on watercrafts to “capture infrared images” around the perimeter of the watercraft. Ex-1027-Frank, 3:1-8, 7:26-40, 7:54-60. The infrared camera can be used to detect when a person has fallen off the watercraft. *Id.*, 19:26-34.

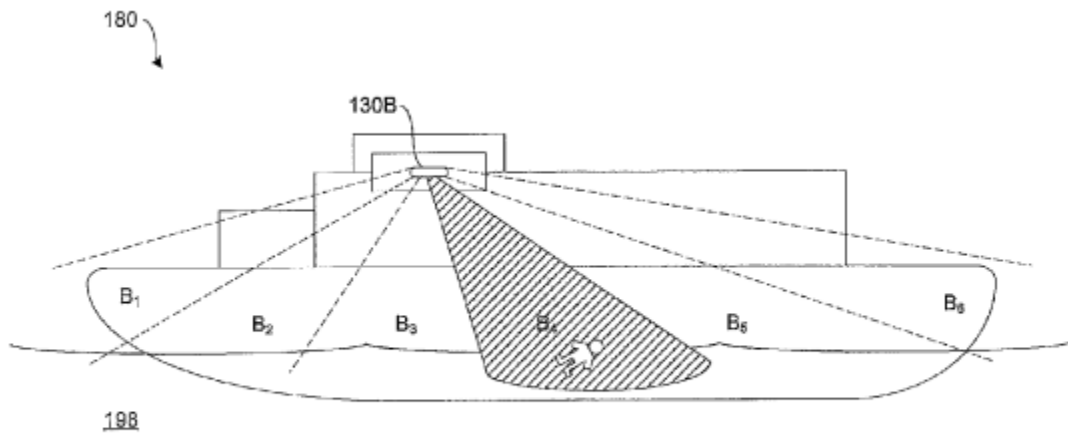


Fig. 1F

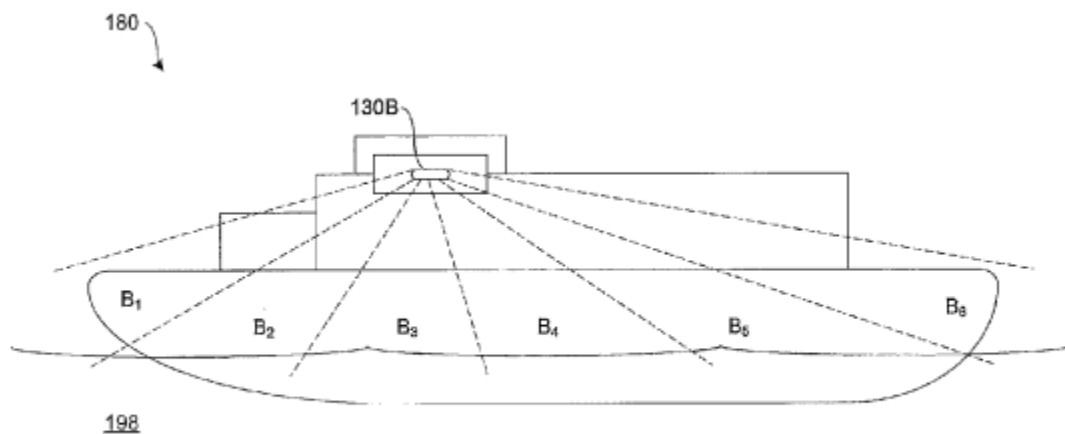


Fig. 1E

Ex-1027-Frank, FIGs. 1F, 1E. Ex-1002- Brizzolara-Decl., ¶¶37-38.

### VIII. LEVEL OF ORDINARY SKILL IN THE ART

A person of ordinary skill in the art (“POSITA”) at the time of the alleged invention would have had a master’s degree in Aerospace or Naval Engineering, or equivalent experience, and one to two years of experience in the field of watercraft

design and construction. Ex-1002-Brizzolara-Decl., ¶20.

## IX. SPECIFIC GROUNDS OF UNPATENTABILITY

### A. Ground 1

Evoloreport in combination with Woolley and the knowledge of a POSITA renders claims 16-23, and 26-28 obvious. Ex-1002-Brizzolara-Decl., ¶43.

#### 1. Claim 1<sup>10</sup>

- (a) [1Preamble] A passively stable, weight-shift controlled personal hydrofoil watercraft, comprising:

To the extent that the preamble of Claim 1 is limiting, Evoloreport discloses a weight-shift controlled personal hydrofoil water. As noted by the Evoloreport “Evoloreport is a new type of watercraft that travels on a hydrofoil and is intended for one person. It is powered by an electric motor and is controlled only by means of center of gravity movement.” Ex-1003-Evoloreport, p546. Ex-1002-Brizzolara-Decl., ¶¶45.

Evoloreport discloses that both pitch stability and rolling stability are factors in the design of the disclosed Evoloreport hydrofoil. Ex-1003-Evoloreport, 58-62

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<sup>10</sup> Petitioner is not challenging claim 1, and only addresses these limitations to challenge new claims 21-23 and 26-28. Petitioner’s allegations for claim 1 are identical to those presented in the Foil Boarding IPR.

(“The purpose of this analysis is to establish a configuration of the hydrofoil so that it is stable in pitch.”), 88-98; Ex-1002-Brizzolara-Decl., ¶46. The term “stable” as used by the EvoloReport was being used to mean passive static stability as contemplated by the ’659 patent. Ex-1003-EvoloReport, 60 (“By stable is meant that if Evolo is exposed to a disturbance, it will return to its initial position.”). Ex-1002-Brizzolara-Decl., ¶47.

A POSITA would have been motivated to combine EvoloReport with Woolley to provide for a passively stable hydrofoil. Ex-1002-Brizzolara-Decl., ¶48. Woolley discloses a hydrofoil fixedly interconnected with the lower end of a strut, the hydrofoil having no moveable surface and designed to provide passive static stability controlled solely by weight shift of the user. Ex-1002-Brizzolara-Decl., ¶48. Like EvoloReport, the primary embodiment disclosed in Woolley discloses a hydrofoil – or planing blade – comprising a front blade and rear blade interconnected by a fuselage. Ex-1011-Woolley, 6:19-21.<sup>11</sup> Ex-1002-Brizzolara- Decl., ¶48. Woolley notes that the purpose of the planing blade is to provide a combination of

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<sup>11</sup> It appears that some cites in the prior petitions against the ’659 patent cited to the column and line numbers in Woolley’s parent (U.S. Patent No. 6,234,856). The citations have been updated to refer to the corresponding portions of Ex-1011.

“stability, lift and responsiveness.” Ex-1011-Woolley, 10:32-38. Ex-1002-Brizzolara-Decl., ¶48. The ability to interchange different size front and rear planing blades in Woolley allows for providing “different stability, lift and responsiveness characteristics.” Ex-1011-Woolley, 10:40-42; Ex-1002- Brizzolara-Decl., ¶48. In addition, Woolley discloses the ability to adjust the planform and angle of attack of the rear planing blade, based upon the level stability desired between a beginner through professional rider. Ex-1011-Woolley, 16:64-20:22. Ex-1002-Brizzolara-Decl., ¶48.

Woolley discloses a front planing blade containing a chorded upper surface that tapers towards the rear so that the upper surface has a larger surface area than the lower surface, which causes an upward lifting force on the forward blade. Ex-1011-Woolley, 11:33-41. Ex-1002-Brizzolara-Decl., ¶49. In addition, Woolley discloses the use of the rear blade with a negative angle of attack, so that the rear blade creates a downward force on the rear blade. Ex-1011-Woolley, 17:20-36. Ex-1002-Brizzolara-Decl., ¶50. The use of counteracting forces between the upward force caused by the forward blade of the hydrofoil and the downward force caused by the rear blade of hydrofoil is a well-known method for increasing pitch stability. Ex-1002-Brizzolara-Decl., ¶50.

In addition to disclosing a hydrofoil that is stable in the lateral (pitch)

direction, Woolley discloses a hydrofoil designed to be passively stable in the yaw and roll. Ex-1002-Brizzolara-Decl., ¶51. As noted by the '659 patent, yaw and roll stability are generally linked in hydrofoils. Ex-1001-USP659, 6:36-7:7. The '659 patent notes that yaw and roll stability can be achieved through “a combination of sweep and dihedral and can also be influenced with the addition of winglets or a fin.” Ex-1001-USP659, 6:63-65. Woolley discloses the use of each of the features in its hydrofoil, along with the desire to achieve stability in yaw and roll. Ex-1002-Brizzolara-Decl., ¶51. The front and rear blades disclosed by Woolley are swept on at least their leading edge and on both edges in some embodiments. Ex- 1011-Woolley, FIGs. 6A, 6B, 7A, 7B, 17:28-29. Ex-1002-Brizzolara-Decl., ¶51. Woolley discloses a dihedral rear blade. Ex-1011-Woolley, FIG. 11A; Ex-1002- Brizzolara-Decl., ¶51. Finally, both the forward blades and rear blades disclosed within Woolley show the use of winglets or fins at their ends. Ex-1011-Woolley, FIGs. 6A, 9A, 10A, 11A. Ex-1002-Brizzolara-Decl., ¶52. Woolley discusses how these features are used to provide roll and yaw stability. Ex-1011-Woolley, 11:17-26 (“[t]he relatively large distance of the edge of the blade from the plane of symmetry A increases the moment created by water acting on the surface of the blade”); Ex-1002-Brizzolara-Decl., ¶52.

Woolley’s disclosure of both pitch stability along with roll and yaw stability through the use of the hydrofoil discloses a hydrofoil designed to provide passive

static stability. Ex-1011-Woolley, 13:47-53 (“When the generally planar surface...of the rear blade...operates together with the elliptical planing surface of the front blade..., these surfaces battle and counteract each other, providing the desired stability characteristics. Specifically, these surfaces resist the turning of the ski from side-to-side or up and down, which is very desirable for beginners.”); Ex-1002-Brizzolara- Decl., ¶53. Woolley’s description of how it provides passive static stability far exceeds any disclosure within the ’659 patent regarding how to design a watercraft that is passively statically stable. Ex-1002-Brizzolara-Decl., ¶54. While the ’659 patent does not disclose how to design a hydrofoil wing that is passively statically stable, it simply enunciates well known aerodynamic conditions to mathematically satisfy stability and provides numerous examples of generic design choices that may provide passive stability. *See, e.g.*, Ex-1001-USP659, 2:34-40 (“A fixed canard or horizontal tail surface can also be added to further improve passive longitudinal stability .... A fixed vertical tail can be added to improve lateral stability ....”); Ex- 1002-Brizzolara-Decl., ¶54. To the extent that the disclosed hydrofoil in Woolley could be found to not be designed to provide passive static stability, a POSITA would have sufficient knowledge to modify the disclosed hydrofoil in Woolley such that it was designed to provide passive static stability. Ex-1002-Brizzolara-Decl., ¶55.

- (b) [1A1] a floatation device that has a fore-aft length greater than a lateral width, the floatation device having a top surface and a bottom surface,

Evoloreport discloses a floatation device that has a fore-aft length greater than a lateral width, with the floatation device having a top surface and a bottom surface. Ex-1003-Evoloreport, p546-550; Ex-1002-Brizzolara-Decl., ¶56.

Evoloreport discloses the use of a floatation device described as a “floating body” as the portion of the disclosed watercraft. Ex-1003-Evoloreport, 550. Evoloreport notes that the floatation device “has sufficient volume to...stay afloat with the driver.” Ex-1003-Evoloreport, 550.

Evoloreport discloses a floatation device having an overall length (bow to stern) of C1, which is given as a length of 2313 millimeters. Ex-1003-Evoloreport, 546-547. Evoloreport discloses that its floatation device has an overall breadth (port to starboard) of A3, measuring 701 millimeters. Ex-1003-Evoloreport, 546-547. This lateral width A3 is less than the fore-aft length of C1. Ex-1002- Brizzolara-Decl., ¶59.

Evoloreport also discloses that the floatation device has a top-surface upon which a rider is disposed and a bottom-surface that is normally in the water, in non-flying condition. Ex-1003-Evoloreport, 550. Ex-1002-Brizzolara-Decl., ¶60.

- (c) [1A2] wherein a user can be disposed on the top surface of the floatation device in a prone, kneeling, or standing position,

Evoloreport discloses a watercraft that is designed for use with a “kneeling driver’s position” holding the handles on the top surface of the flotation device. Ex-1003-Evoloreport, 551. Ex-1002-Brizzolara-Decl., ¶61.

- (d) [1A3] the flotation device having a forward section, a middle section, and a rear section;

The claim terms “a forward section, a middle section and a rear section” are referenced in the ’659 patent as labels of the fore, middle, and aft sections of the flotation device. Ex-1001-USP659, 3:35-40, Fig. 1; Ex-1002-Brizzolara-Decl., ¶62. To the extent that the flotation device claimed in the ’659 patent “may be said to have” a forward section, middle section, and a rear section, Evoloreport discloses a flotation device showing such sections. Ex-1003-Evoloreport, 546; Ex-1002-Brizzolara-Decl., ¶63.

- (e) [1B] a strut having an upper end and a lower end, the upper end fixedly interconnected with the flotation device between the middle section and the rear section of the flotation device.

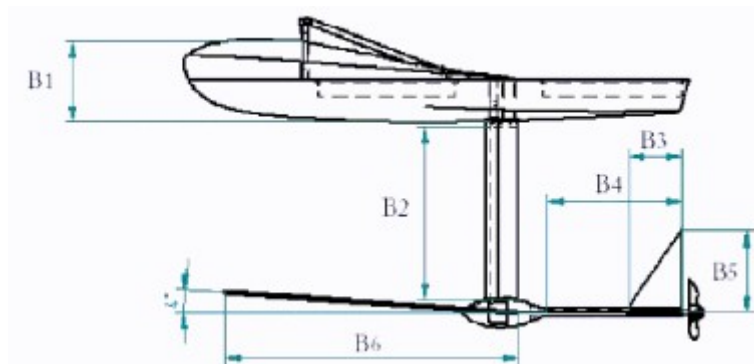
Evoloreport discloses the use of a strut having an upper end and a lower end. Ex-1003-Evoloreport, 549-550. Ex-1002-Brizzolara-Decl., ¶64.



**Figure. 10. Illustration of Evolo's strut**

Ex-1003-EvoloReport, 549, FIG. 10.

Ex-1003-EvoloReport, 549. The upper end of the disclosed strut in EvoloReport is fixedly interconnected with the floatation device. Ex-1003-EvoloReport, 211-215. Ex-1002-Brizzolara-Decl., ¶66. EvoloReport discloses the interconnection between the strut and the floatation device occurs aft of the midpoint of the floatation device.

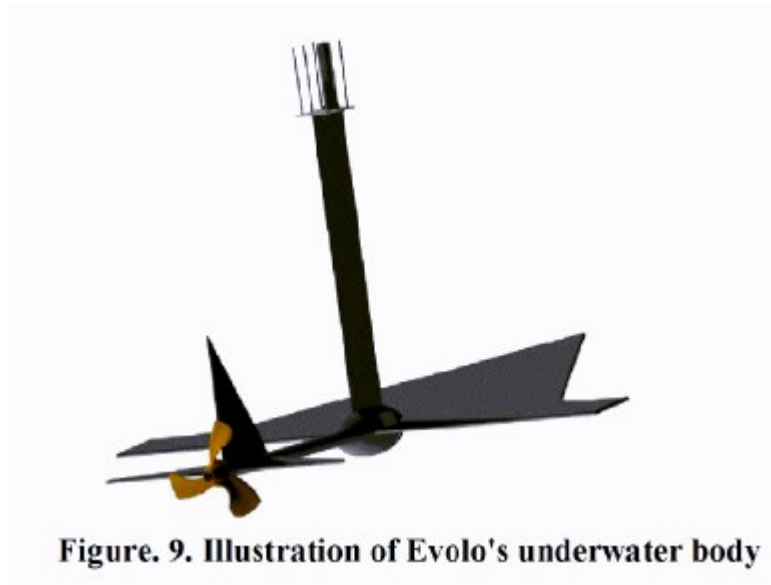


Ex-1003-EvoloReport, 546, Ex-1002-Brizzolara-Decl., ¶58.

- (f) [1C] a hydrofoil fixedly interconnected with the lower end of the strut, the hydrofoil having no moveable surface,

EvoloReport discloses a hydrofoil fixedly interconnected with the lower end

of the strut. Ex-1003-EvoloReport, 546, 549, Ex-1002-Brizzolara-Decl., ¶67.



Ex-1003-EvoloReport, 7, FIG. 9.

EvoloReport further discloses that the hydrofoil has no moveable surface.

Ex-1003-EvoloReport, 546, 549, Ex-1002-Brizzolara-Decl., ¶67.

- (g) [1D] a propulsion system for propelling the watercraft in a body of water, wherein the propulsion system is connected to the hydrofoil; and

EvoloReport discloses a propulsion system for propelling the watercraft in a body of water, wherein the propulsion system is connected to the hydrofoil. Ex-1002-Brizzolara-Decl., ¶71. EvoloReport discloses the use of an electric motor coupled with batteries and a propeller to provide a propulsion system for propelling the watercraft in a body of water. Ex-1003-EvoloReport, 551-552. Ex-1002-Brizzolara-Decl., ¶52. The propulsion system in EvoloReport is directly connected

to the hydrofoil. Ex-1003-EvoloReport, 549. Ex-1002-Brizzolara- Decl., ¶71.

(h) [1E] the watercraft having no movable steering system.

The watercraft disclosed by EvoloReport has no movable steering system.

Ex-1002-Brizzolara-Decl., ¶64. EvoloReport discloses the use of a fixed, unmovable handle for the rider to hold onto the watercraft and apply weight shifting.

Ex-1003-EvoloReport, 551. Ex-1002-Brizzolara-Decl., ¶72.

## 2. Claim 16

(a) [16Preamble] A passively stable, weight-shift controlled personal hydrofoil watercraft, comprising:

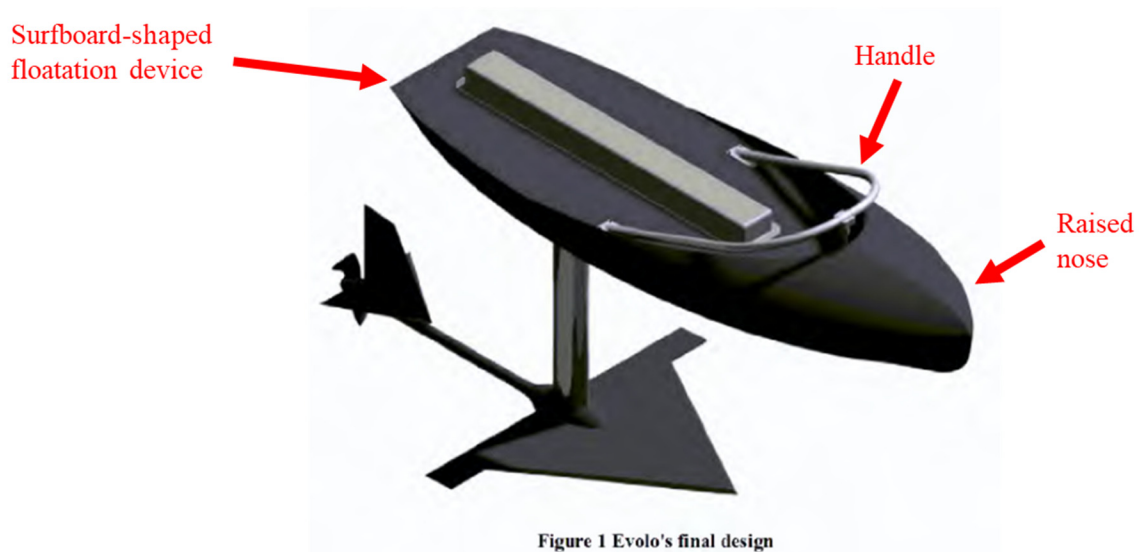
As discussed previously in Section IX.A.1.a, EvoloReport and Woolley disclose a passively stable, weight-shift controlled personal hydrofoil watercraft. Ex-1002-Brizzolara-Decl., ¶73.

(b) [16A1] a surfboard-shaped flotation device that has a fore-aft length greater than a lateral width, the flotation device having a top surface and a bottom surface.

As discussed previously in Section IX.A.1.b, EvoloReport discloses a flotation device (“floating body”) that has a fore-aft length greater than a lateral width, the flotation device having a top surface and a bottom surface. Ex-1002-Brizzolara-Decl., ¶74.

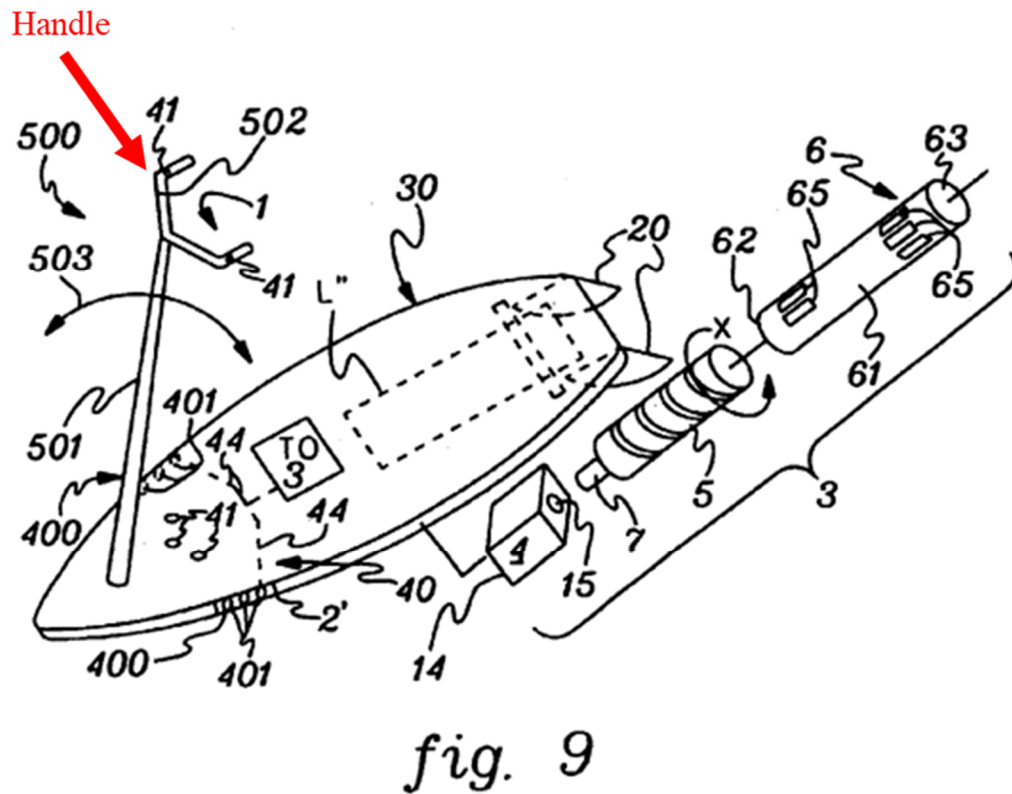
The EvoloReport flotation device has a surfboard-shape. For example, the fl body shown below is in the shape of a surfboard with an additional handle and a

raised nose portion:

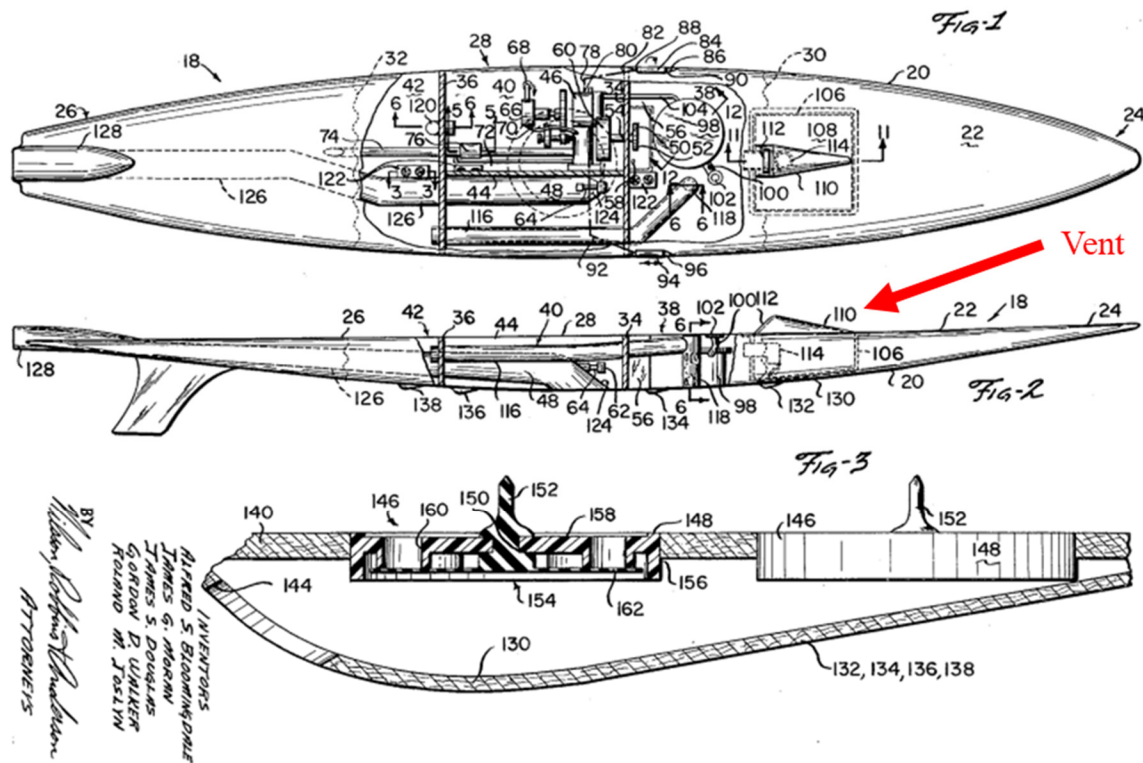


Ex-1003-EvoloReport, 3, FIG. 1. Like a surfboard, a user could stand on top surface aft of the handle. Ex-1002-Brizzolara-Decl., ¶75.

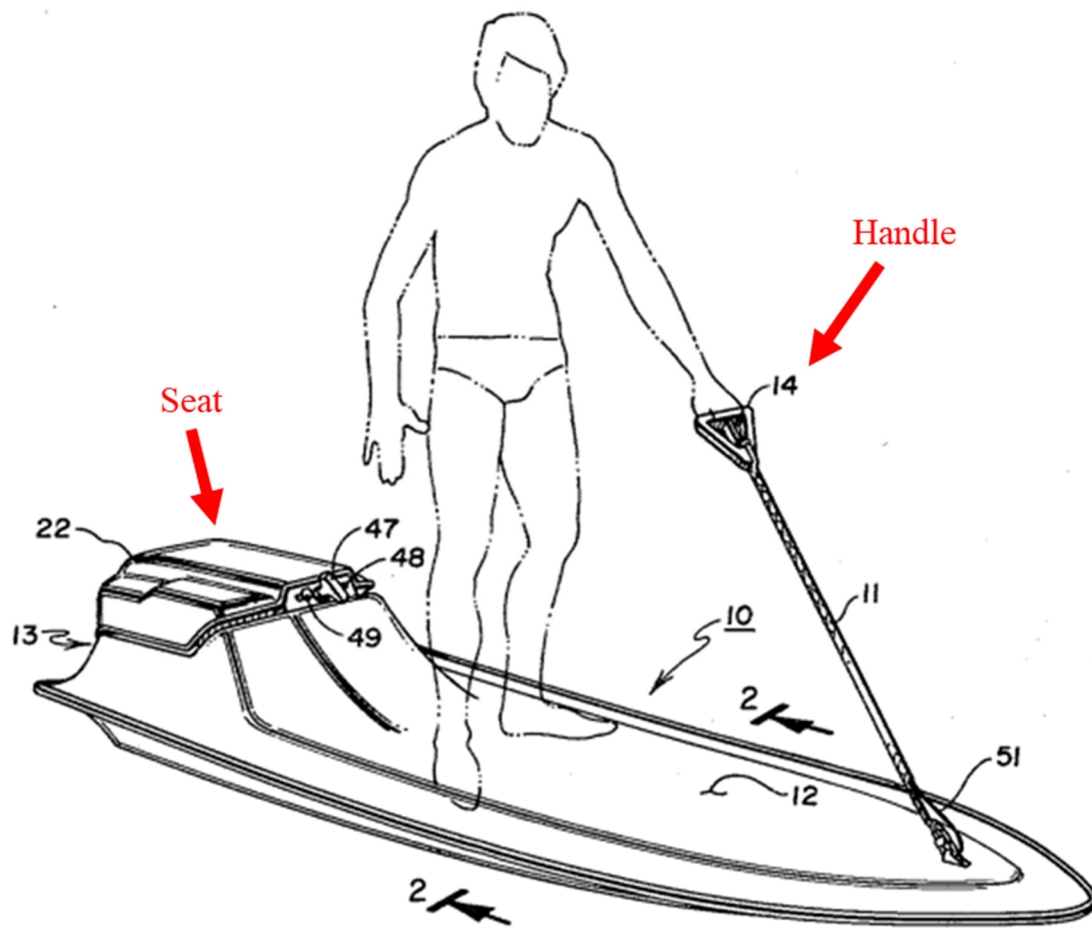
The '659 patent refers to similarly shaped flotation devices in the prior art as surfboards, including those with additional handles and protrusions on the upper surface:



Ex-1029-Jung, FIG. 9; Ex-1001-USP659, 1:32-35 (“Powered surfboards have been developed...as personal watercraft (U.S. Pat. No. 6,702,634 B2 Jung...).”).



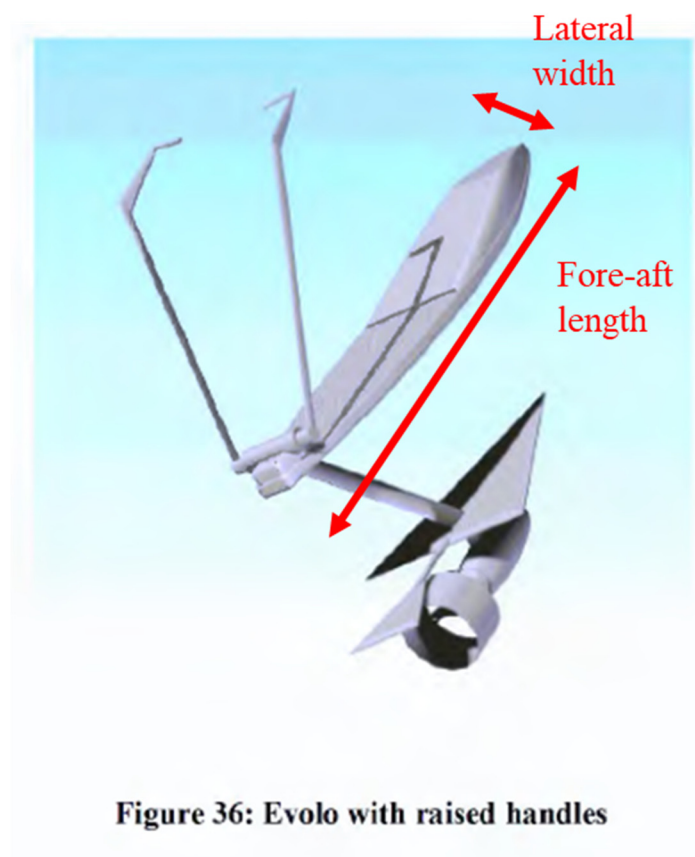
Ex-1030-Bloomingdale, FIG. 1; Ex-1001-USP659, 1:32-35 (“Powered surfboards have been developed...as personal watercraft (...U.S. Pat. No. 3,262,413 A Bloomingdale et al....).”).

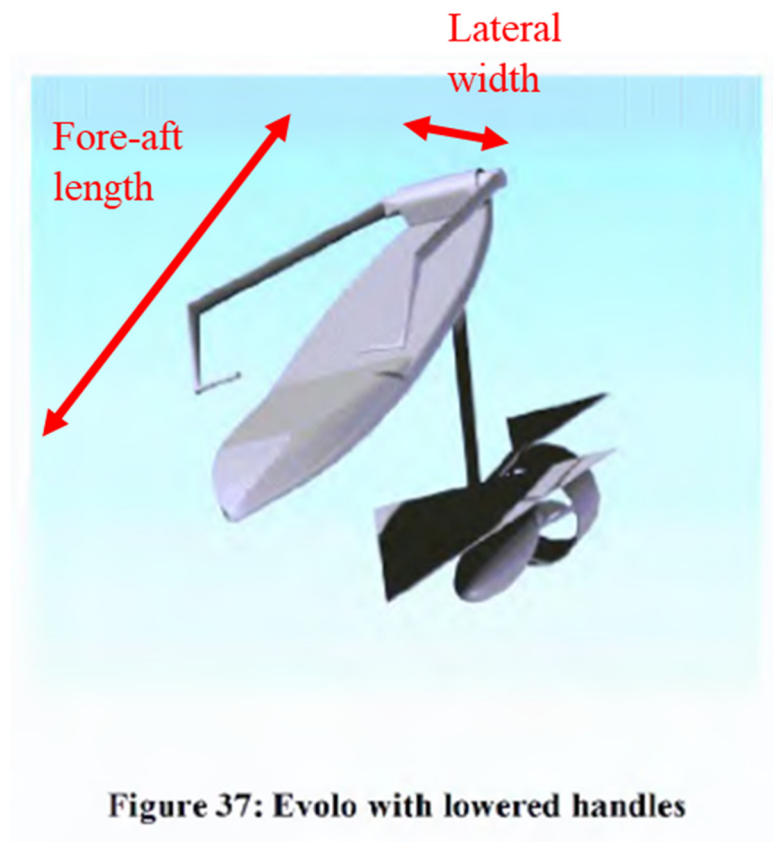


Ex-1031-Dawson, FIG. 1; Ex-1001-USP659, 1:32-35 (“Powered surfboards have been developed...as personal watercraft (...U.S. Pat. No. 4,274,357 A Dawson...).”). Ex-1002-Brizzolara-Decl., ¶76.

Alternatively, EvoloReport discloses using other surf-board shaped floatation devices that lack additional handles and/or protrusions on the upper surface and have a fore-aft length greater than a lateral width. Ex-1003-EvoloReport, 44 (“So far, the conclusion is that the **surfboard shape** pointed out in the report conceptual design

can be used.”), 331 (“According to the requirements specification, the craft must be able to float and balance in a stationary position with the driver and be able to be steered by means of a center of gravity shift. Surveys regarding the target group show that close contact with the water and physical exertion are among the general features that water sports practitioners appreciate. A floating body in the form of a surfboard is easy to associate with these properties and **the shape of Evolo’s floating body has therefore been chosen to resemble a surfboard.**”). This is shown in Figures 36 and 37 below.





Ex-1003-EvoloReport, 332-333; *see also id.*, 539 (“Evolo is equipped with a **shortboard-like surfboard** (see figure 1). The board is adapted for the intermediate to advanced **surfer**. The size is determined so that the craft will not be too large and clumsy, nor too small so that it becomes difficult to balance, especially in the case of a hydrofoil.... To be able to steer in the desired way, the driver has the option to **stand or sit** and lean in the desired direction.”), 401 (“Floating body of foam-filled polyester plastic, (old surfboard)”), 410 (same), 419 (“[T]his time the front part from an old surfboard with a length of about 2 m and a width of 0.7 m was used.”), 424 (“The same test rig was used as in experiment X8 [

1 ], i.e. a surfboard as a floating body as this floating body was considered to make the Evolo significantly easier to control.”), 538-539 (“Craft in the form of a **surfboard** seems to be able to fulfill many of these [desirable] requirements. In simple terms, **surfboards** can be divided into four different types based on their shape and size[]: • Longboards (Malibu) • Fish • Funboards • Shortboards”).



Figure 1. Shortboard<sup>2</sup>

Ex-1003-EvoloReport, 539, FIG. 1.



Figure 1. Evolo before attempt 4

*Id.*, 419, FIG. 1.



Figure 42. Test rig for experiment 5.

*Id.* 424, FIG. 42.

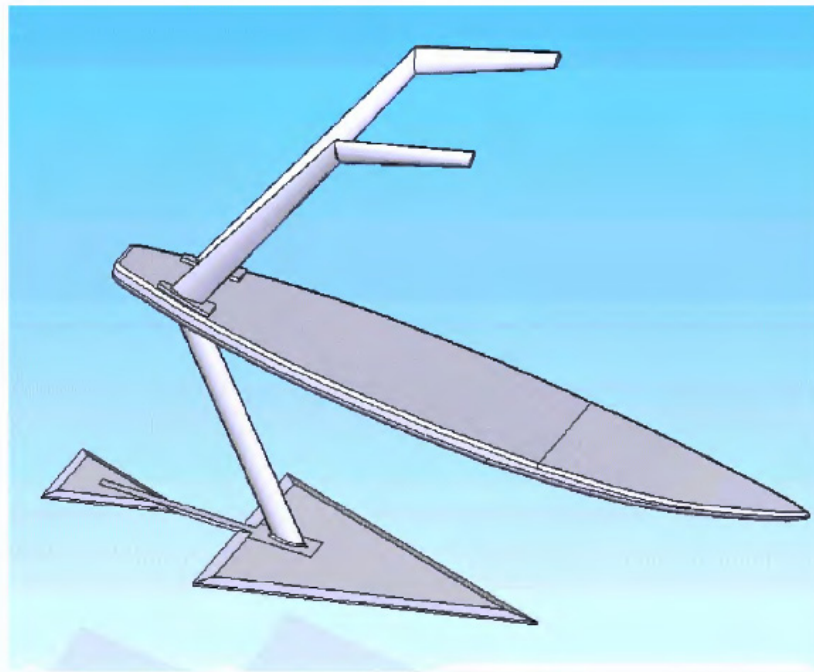


Figure 52. Evolo equipped with hydrofoil and handle

*Id.*, 540, FIG. 52. Ex-1002-Brizzolara-Decl., ¶77.

A POSITA would have been motivated to use one of these alternative surfboard-shaped floatation devices in a hydrofoil watercraft based on EvoloReport's express teaching to use a shortboard-like or other surfboards as a floatation device in a hydrofoil watercraft. Ex-1003-EvoloReport, 44, 50, 331, 401, 404, 410, 419, 424, 523, 530, 538, 539. EvoloReport emphasizes myriad benefits to using a surfboard shape, such as familiarity to surfers, manageable size, hydrodynamics, and easy steerability in a standing position. *Id.*, 539 (“**The board is adapted for the intermediate to advanced surfer.** The size is determined so that the craft will not be too large and clumsy, nor too small so that it becomes difficult

to balance, especially in the case of a hydrofoil. The drift nose is pointed for good maneuvering and hydrodynamics and it is angled upwards so as not to cut into the waves below the surface of the water. To be able to steer in the desired way, the driver has the option to **stand or sit and lean in the desired direction.**”), 331 (“According to the requirements specification, the craft must be able to float and balance in a stationary position with the driver and be able to be steered by means of a center of gravity shift. Surveys regarding the target group show that close contact with the water and physical exertion are among the general features that water sports practitioners appreciate. A floating body **in the form of a surfboard** is easy to associate with these properties and the shape of Evolo’s floating body has therefore been chosen to resemble a surfboard.”). Furthermore, a POSITA would have recognized that flotation device designs that lack handles or protrusions on their upper surfaces would be easier to manufacture and take up less space. Moreover, powered hydrofoil watercrafts with surfboard-shaped flotation devices had already been known for more than a decade. *See, e.g.*, Ex-1032-Chen, Abstract, FIGs. 1-7. Weighing these design considerations, a POSITA would have found it obvious to use one of the alternative Evolo designs that lack protrusions or handles, over the final Evolo design. Ex-1002-Brizzolara-Decl., ¶¶78-82.

A POSITA would have had a reasonable expectation of success in doing so,

at least because surfboard-shaped flotation devices were successfully tested and shown to make the watercraft easier to control. Ex-1003-EvoloReport, 424 (“The same test rig was used as in experiment X8 [ 1 ], i.e. **a surfboard as a floating body** as this floating body was considered to make the Evolo **significantly easier to control.**”), 419 (“However, a new configuration was used on the Evolo. Instead of the previous floating body, this time the front part from an old surfboard with a length of about 2 m and a width of 0.7 m was used.”). Ex-1002-Brizzolara-Decl., ¶82.

- (c) [16A2] wherein the top surface has a substantially horizontal supporting surface configured to support a user in a prone, kneeling, or standing position,

EvoloReport discloses a surfboard-shaped flotation device wherein the top surface has a substantially horizontal supporting surface. Ex-1003-EvoloReport, 3 (Figure 1 Evolo’s final design), 4 (Figure 2 General arrangement of Evolo). As discussed previously in Section IX.A.1.c, EvoloReport discloses a watercraft that is designed for use with a “kneeling driver’s position” holding the handles on the top surface of the flotation device. Ex- 1003-EvoloReport, 551. As shown below, the floating bodies discussed above have substantially horizontal supporting surfaces that can be used in a prone, kneeling, or standing position. Ex-1002-Brizzolara-Decl., ¶¶83-84.

Substantially horizontal  
supporting surface

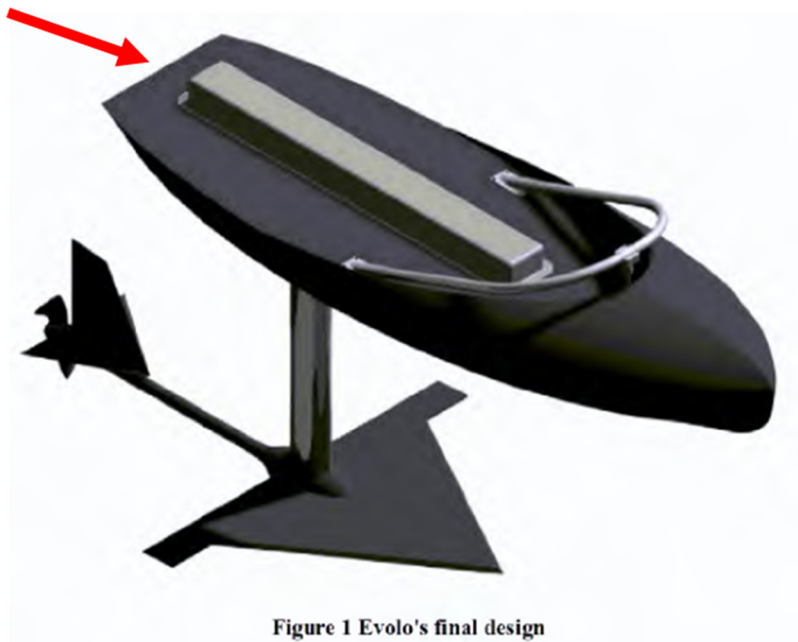
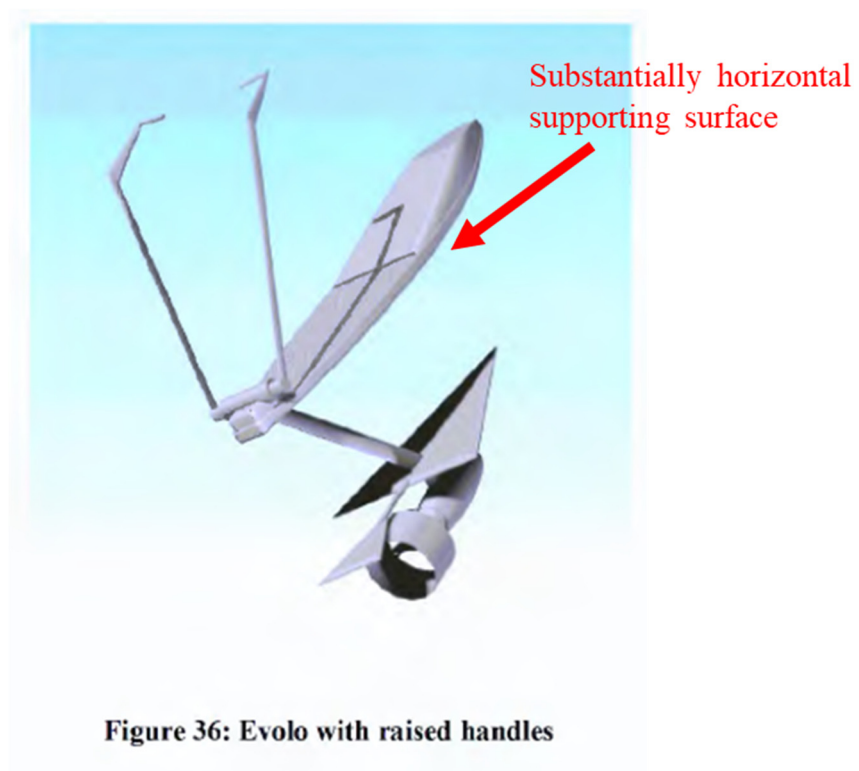
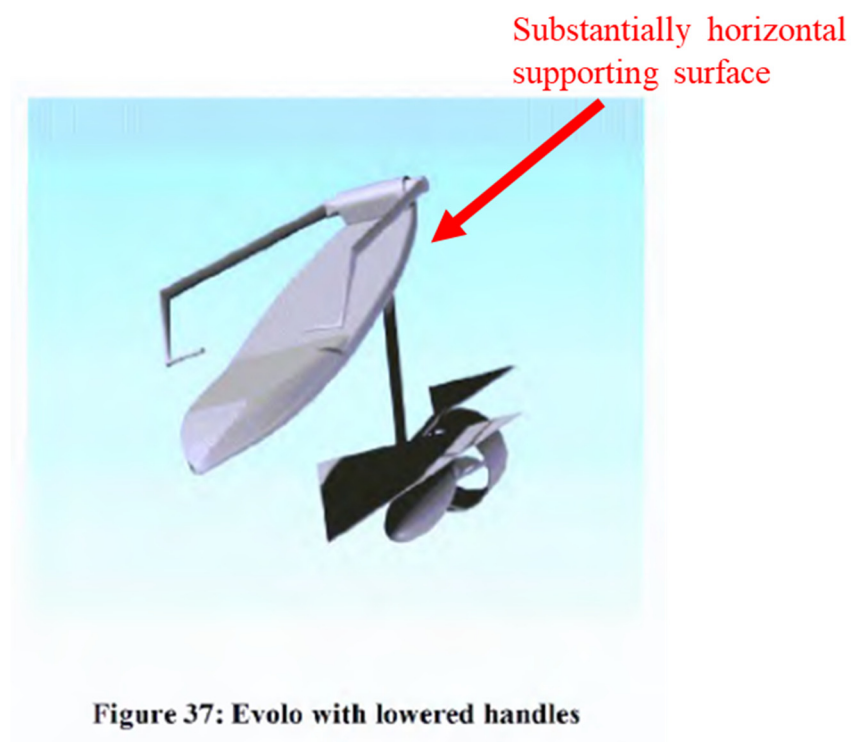


Figure 1 Evolo's final design

Ex-1003-EvoloReport, 3, FIG. 1.



*Id.*, 332, FIG. 36.



*Id.*, 333, FIG. 37.



Substantially horizontal  
supporting surface

Figure 1. Shortboard<sup>2</sup>

*Id.*, 539, FIG. 1.



Substantially horizontal  
supporting surface

Figure 1. Evolo before attempt 4

*Id.*, 419, FIG. 1.



Figure 42. Test rig for experiment 5.

*Id.*, 424, FIG. 42.

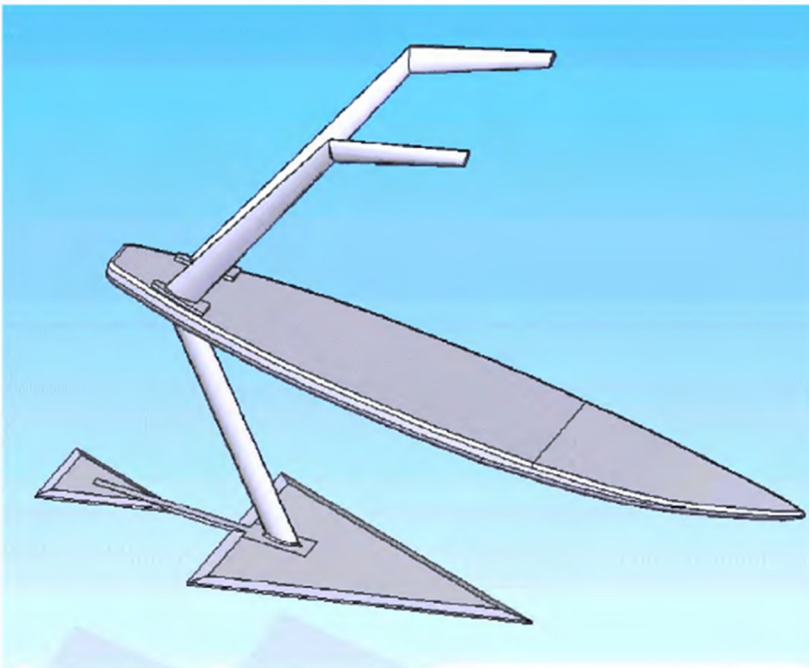


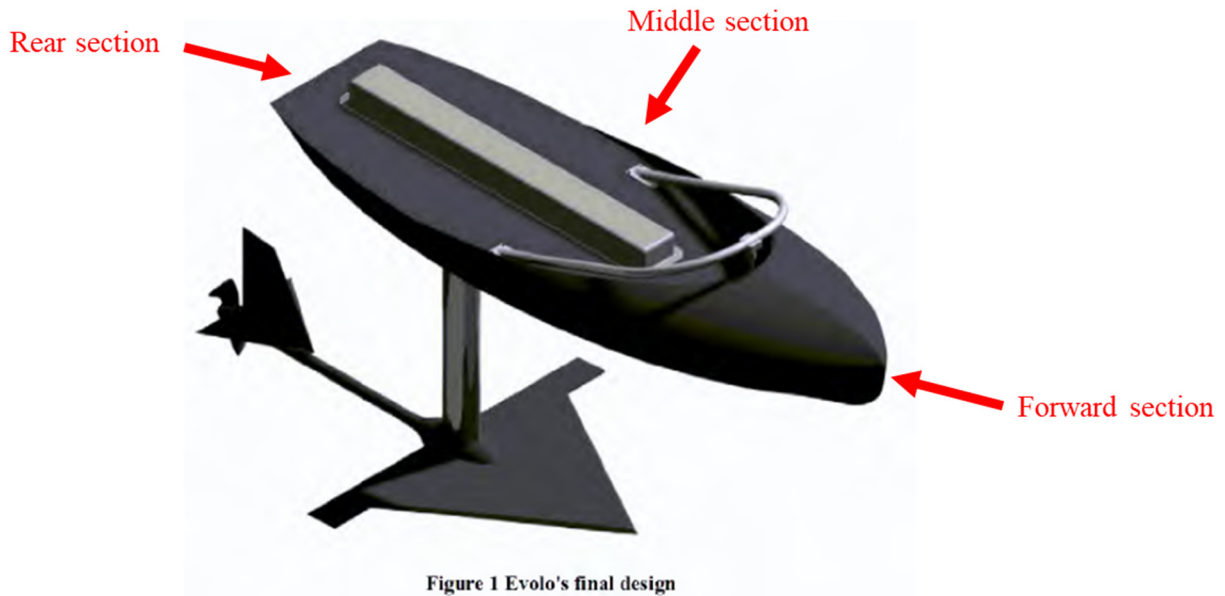
Figure 52. Evolo equipped with hydrofoil and handle

*Id.*, 540, FIG. 52. Ex-1002-Brizzolara-Decl., ¶84.

(d) [16A3] the flotation device having a forward section, a

*middle section, and a rear section;*

As discussed previously in Section IX.A.1.d, EvoloReport discloses a flotation device that has a forward section, a middle section, and a rear section. The forward, middle, and rear sections are also present on the flotation devices that lack handles and/or protrusions discussed with reference to limitation. Ex-1002-Brizzolara-Decl., ¶85.



Ex-1003-EvoloReport, 3, FIG. 1.

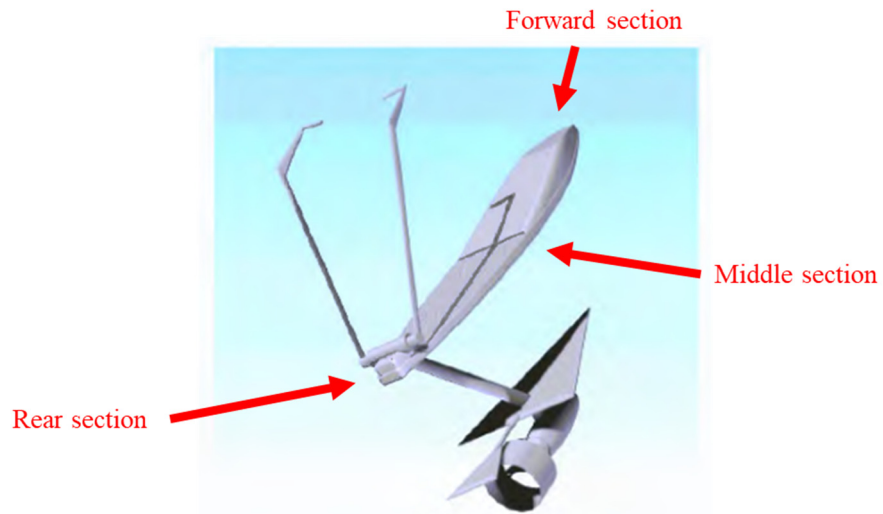


Figure 36: Evolo with raised handles

Ex-1003-EvoloReport, 332, FIG. 36.

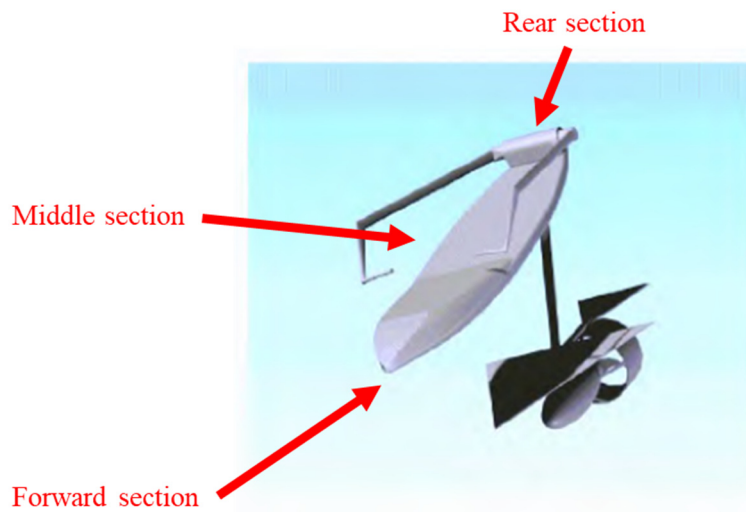
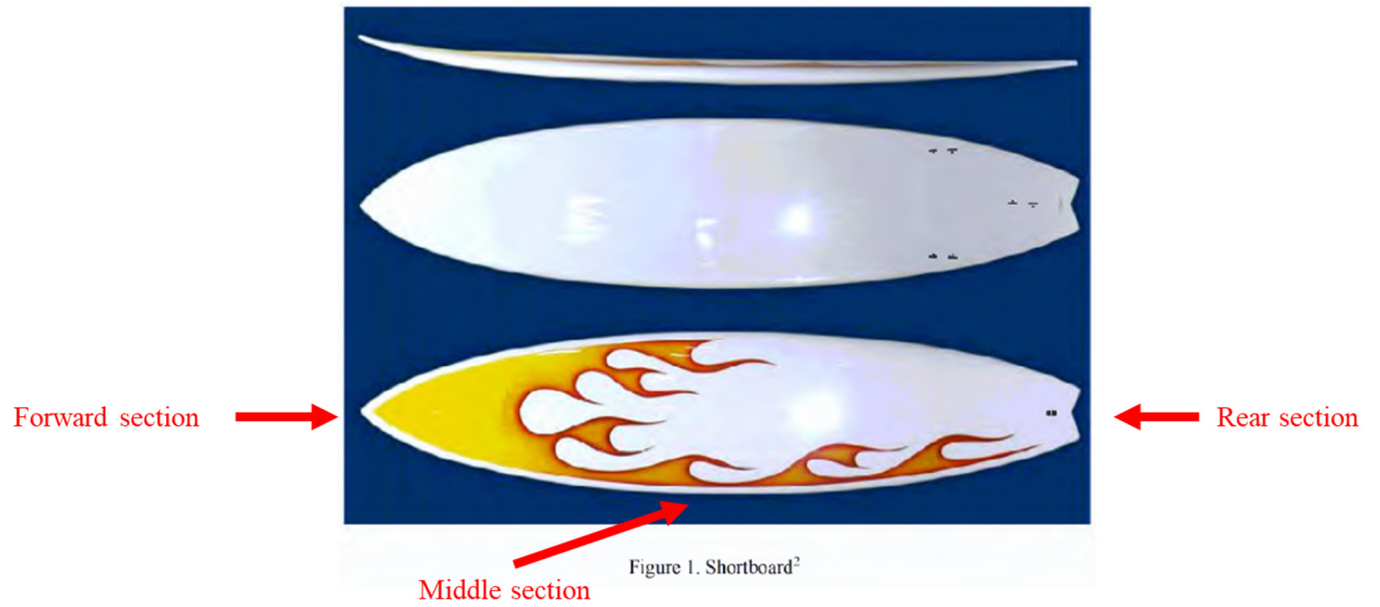


Figure 37: Evolo with lowered handles

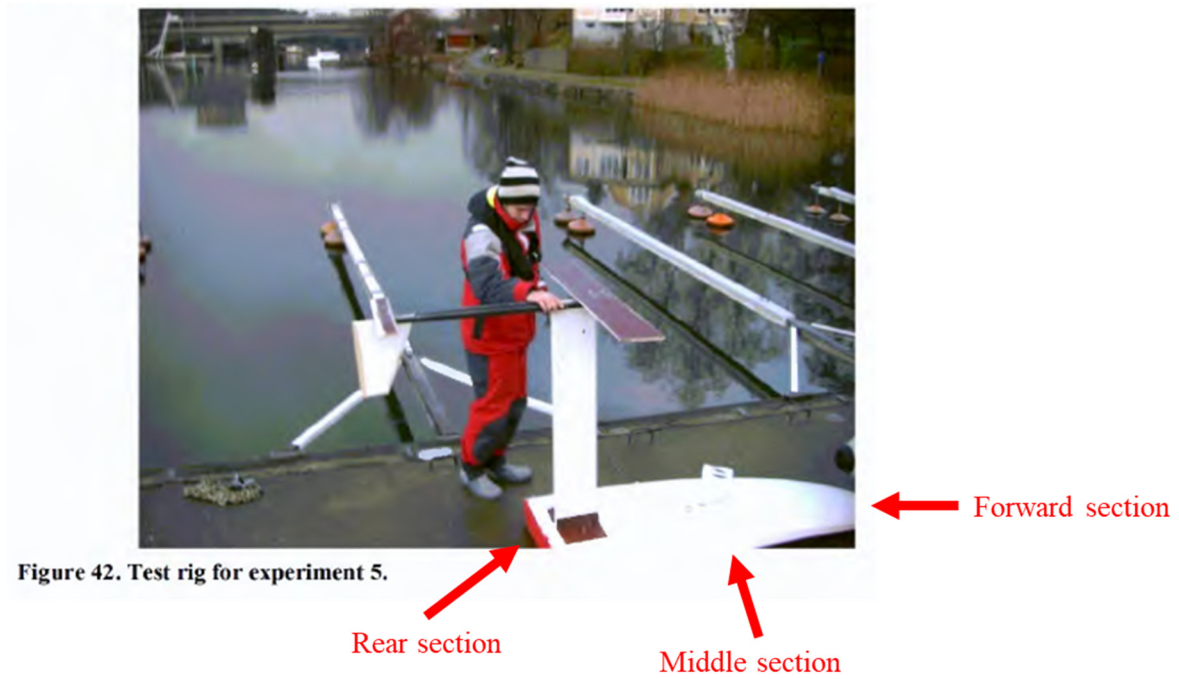
*Id.*, 333, FIG. 37.



*Id.*, 539, FIG. 1.



*Id.*, 419, FIG. 1.



*Id.*, 424, FIG. 42.

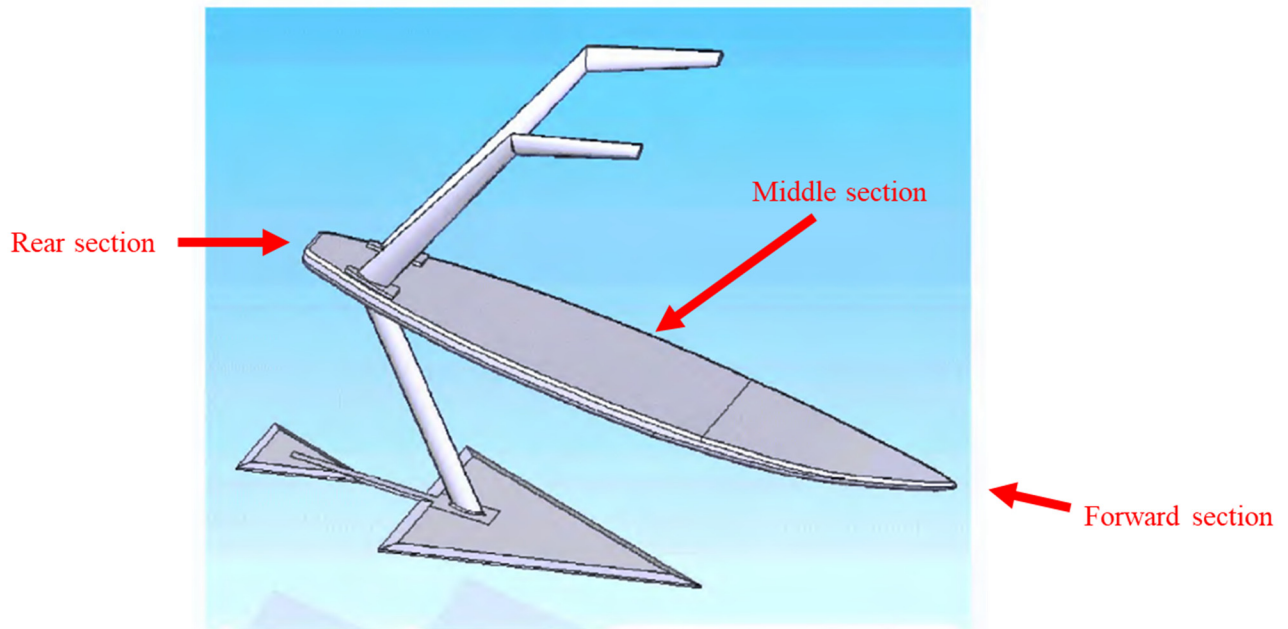


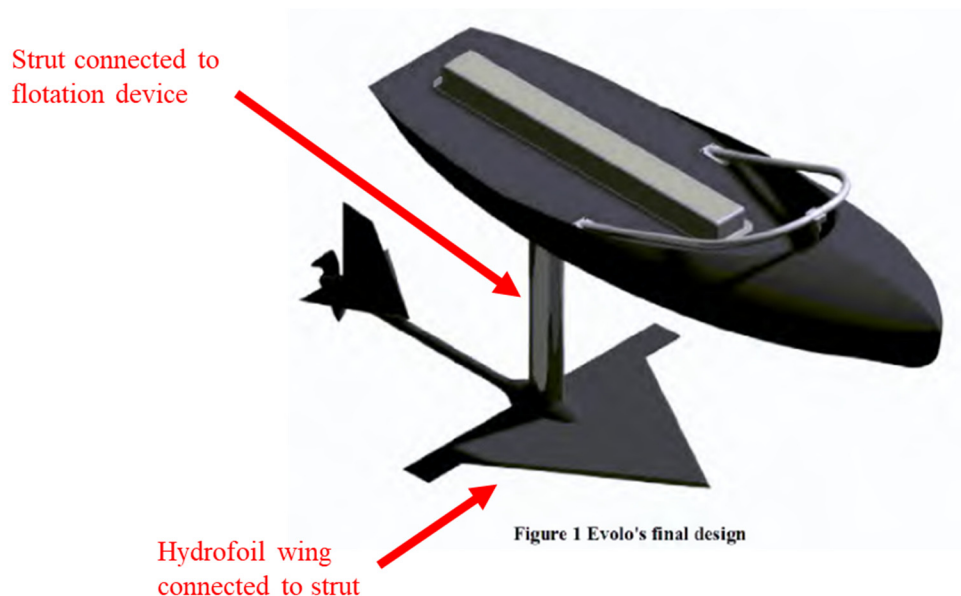
Figure 52. Evolo equipped with hydrofoil and handle

*Id.*, 540, FIG. 52. Ex-1002-Brizzolara-Decl., ¶85.

(e) [16B] a hydrofoil interconnected with the surfboard-

shaped flotation device, the hydrofoil having a strut and a first hydrofoil wing, an upper end of the strut being fixedly interconnected with the surfboard-shaped flotation device, the hydrofoil having no movable surface;

Evoloreport discloses a hydrofoil interconnected with a surfboard-shaped flotation device. For example, as discussed in Sections IX.A.1(e)-(f), Evoloreport discloses a strut having an upper end fixedly interconnected with the flotation device between the middle section and the rear section of the flotation device and a hydrofoil (e.g., hydrofoil wing) fixedly interconnected with the lower end of the strut.



Ex-1003-Evoloreport, 3, FIG. 1.

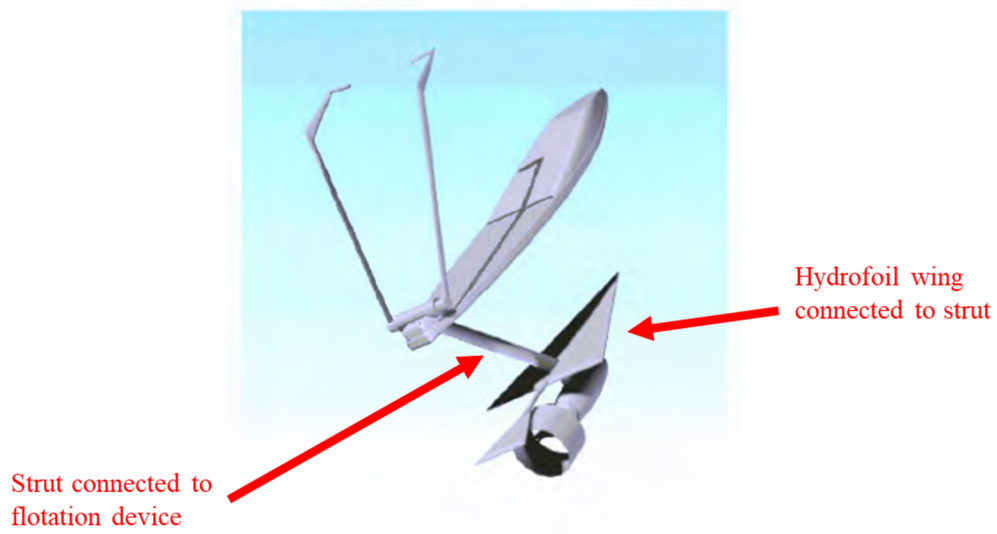


Figure 36: Evolo with raised handles

*Id.*, 332, FIG. 56.

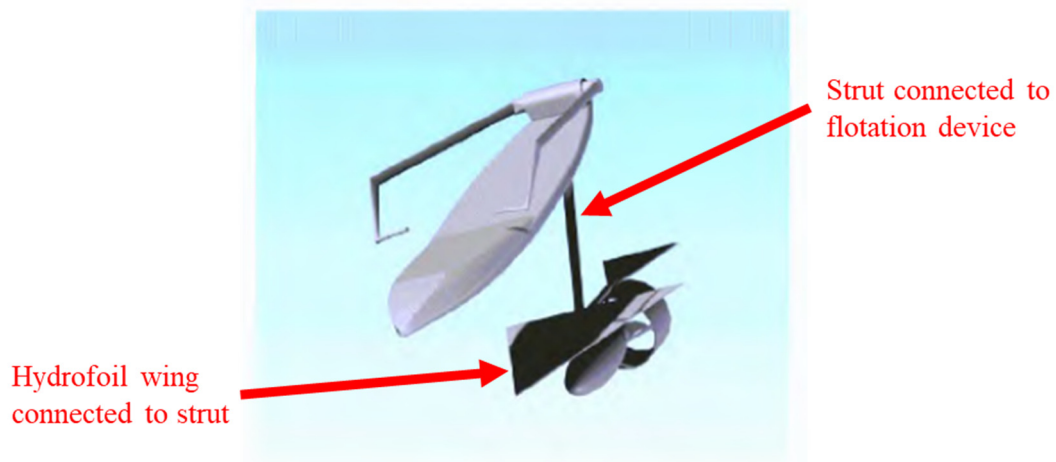


Figure 37: Evolo with lowered handles

*Id.*, 333, FIG. 37.

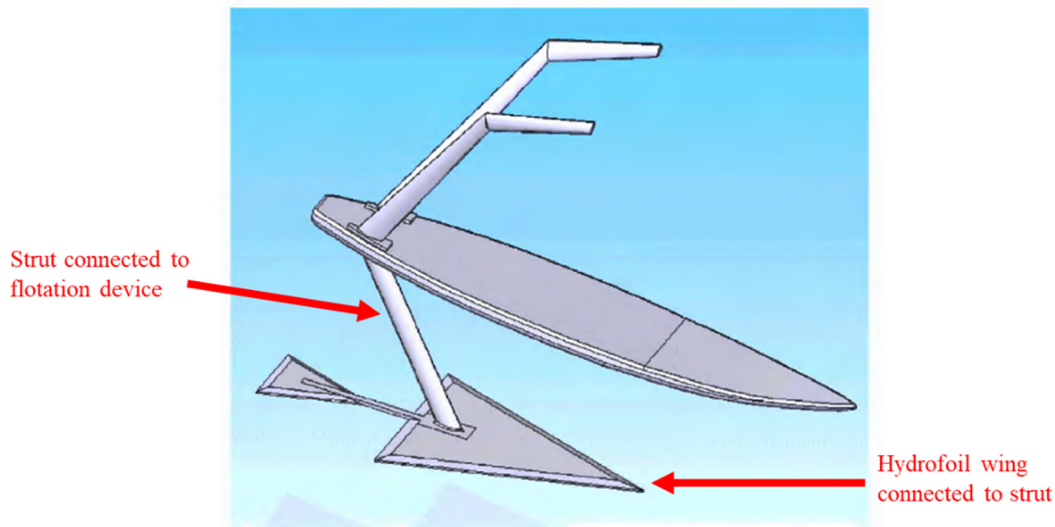


Figure 52. Evolo equipped with hydrofoil and handle

*Id.*, 540, FIG. 52. *See also* Ex-1003-EvoloReport, 7 (“The strut is the part that connects the floating body and the hydrofoil. ...“only the carbon fiber cover layer is seen as supporting [the floating body and the hydrofoil].....”), 211-214 (discussing connection of strut to wing), 276 (“The longer bolts join the base plate [of the strut] with the floating body and are slightly shorter than the thickness of the floating body, which allows nuts to be set into the floating body.”), 227 (“The mounting of the aft hydrofoil in the strut between the hydrofoils will need to connect from a panel (wing) to a strut lying in the same plane, see figure 1. This means that a **fixed mounting** similar to that of Figure 1 with some changes is preferred. This is illustrated in Figure 6, where a cover layer is laid over the entire mounting to the strut. This will also need to be oversized to withstand torque loads.”). The hydrofoil is therefore interconnected with the surfboard-shaped flotation device. Ex-1002-Brizzolara-

Decl., ¶86.

As discussed in Section IX.A.1(f), the hydrofoil wing lacks moveable parts. The strut is a solid “carbon fiber cover layer” fixed to the hydrofoil wing and the floatation device, and therefore also lacks moveable parts. Ex-1003-EvoloReport, 7. Therefore, the hydrofoil—including the hydrofoil wing and strut—has no moveable surface. Ex-1002-Brizzolara-Decl., ¶87.

- (f) [16C1] a propulsion system attached to the surfboard-shaped floatation device for propelling the watercraft in a body of water.

As discussed previously in Section IX.A.1.g, EvoloReport discloses a propulsion system for propelling the watercraft in a body of water. As discussed above, the propulsion system is connected to the hydrofoil (*see* Section IX.A.2.e) and the hydrofoil is fixed to the surfboard-shaped floatation device. Therefore, the propulsion system is attached to the surfboard-shaped floatation device through the hydrofoil. Ex-1002-Brizzolara-Decl., ¶88.

- (g) [16C2] the propulsion system comprising a battery, an electric motor, a motor speed controller, and a propulsor, wherein the propulsor is selected from a propeller, a ducted propeller, or a pump-jet.

EvoloReport discloses a watercraft having a propulsion system comprising a battery, an electric motor, a motor speed controller, and a propulsor, the propulsor selected from a propeller, a ducted propeller, or a pump-jet. Ex-1003-EvoloReport,

9 (in order to power the chosen “*electric motor, new batteries were purchased for the project*”); *id.* (“In order to have an advantageous propulsion system for Evolo ... a standard propeller [can be] used or a propeller...is manufactured”); Ex-1003-EvoloReport, 498 (“The motor is controlled by varying the frequency of the input voltage by varying a control voltage to a control system...indicates which speed or torque is desired...”); Ex-1002-Brizzolara-Decl., ¶¶88-89.

The final design in EvoloReport uses the Torqeedo 4.0 R, an electric motor, to rotate a propeller to propel the watercraft through the water. Ex-1003-EvoloReport, 498 (“[A]n asynchronous motor that is now being investigated in the project, Torqeedo Cruise 2.0.”). Ex-1002-Brizzolara-Decl., ¶90. Evolo-Report discloses using the Torqeedo 2.0 R and the Torqeedo 4.0 R at different design stages due to the availability of the 4.0 R motor; however, both Torqeedo motors are electric motors. Ex-1003-EvoloReport, 498 (“Since most industrial and marine motors on the market, eg Torqeedo, are asynchronous motors...”). Ex- 1002-Brizzolara-Decl., ¶91. The watercraft further includes a motor speed controller (e.g., either an inverter or pulse modeler) that controls the speed of the motor. Ex-1003-EvoloReport, 498 (“The motor is **controlled by varying the frequency of the input voltage by varying a control voltage to a control system, a so-called inverter or pulse modeler...**”). Ex-1002-Brizzolara-Decl., ¶91.

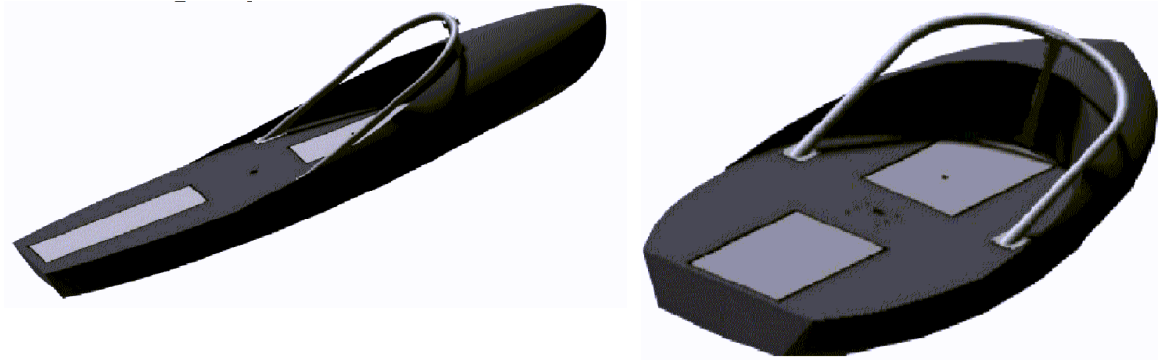
Evoloreport discloses that the electric motor is powered by batteries. Ex-1003-Evoloreport, 9 (“In order to be able to use the selected electric motor, **new batteries** were purchased for the project.”). Ex-1002-Brizzolara-Decl., ¶92. The electric motor provides rotation to a propeller that drives the watercraft through the water. Ex-1003-Evoloreport, 9 (“The **finished propeller** is shown in Figure 9.”). Ex-1003-Evoloreport, 9, FIG. 9. Ex-1002-Brizzolara-Decl., ¶92.



Figure 9 Propeller manufactured for Evolo

- (h) [16C3] and the battery and motor speed controller are contained in a watertight compartment integrated into the flotation device;

Evoloreport discloses a watercraft having a watertight compartment integrated into the flotation device. Ex-1002-Brizzolara-Decl., ¶93. The watertight compartment of Evoloreport is shown by the grey plates in the below Figures 11 and 12. Ex-1003-Evoloreport, 550, 327 (“[T]his throttle control should be placed **inside the waterproof battery container** that encloses the top of the mounting of the strut.... This is the critical point of the cable routing due to the fact that **the battery container must be waterproof.**”).



Ex-1003-EvoloReport, 550. These watertight compartments house the batteries.

Ex-1003-EvoloReport, 550 (“The floating body...**should also have room for batteries.**”). Ex-1002-Brizzolara-Decl., ¶93.

EvoloReport further discloses including additional electronics (i.e., the throttle, lanterns, and a display screen) in the watertight battery compartment. Ex-1003-EvoloReport, 327 (“[T]his throttle control should be placed **inside the waterproof battery container** that encloses the top of the mounting of the strut.”); Ex-1003- EvoloReport, 524 (“A slightly larger volume is also required for other reasons **such as containing batteries and electronics.** The vision is that **this volume should also be able to contain a waterproof storage compartment, a clear LCD screen with information about speed, battery level, depth, position, etc., and lanterns.**”). Although EvoloReport discusses incorporating both the throttle and batteries into the watertight compartment, EvoloReport specifically chooses to use a Torqeedo motor largely because the Torqeedo was already

available and was provided with all the required components in a preassembled package. Ex-1003- EvoloReport, 180 (“The motor available today is a Torqeedo Cruise 2.0R....The **advantages of this system are that it is a complete driveline. Control systems are available and can be modified to work on Evolo.**”); Ex-1003-EvoloReport, 491 (“There are several options on the market today in terms of **ready-made electric motor concepts** for marine use. The method would be to source a product... then **remove the excess parts to build the motor and electrical system into the Evolo’s design.**”); Ex-1002-Brizzolara-Decl., ¶¶94-95.

EvoloReport does not specifically disclose whether the motor speed controller is contained within the watertight motor pod or within the watertight battery container as EvoloReport drafters purposely chose the already completed Torqeedo motor unit. Ex-1003-EvoloReport, 8 (“[The throttle] is designed like a bicycle brake, see Appendices 20 and 44, and **its wiring is passed through the strut down to the motor and its control unit.**”); Ex-1003-EvoloReport, 181 (“When it comes to controlling the motors, there is no major difference as **Torqeedo’s options include complete systems** and VIAB’s **only need some form of potentiometer to regulate the current.**”); Ex-1003-EvoloReport, 498 (“Since **most industrial and marine motors on the market, eg Torqeedo, are asynchronous motors,** there is a need to summarize their function and control...

Since the motor control of asynchronous motors is of a control technology type and that the skills required to manufacture an own system are not available in the project today, **it is strongly recommended to purchase an already completed system**, adapted to the motor that is finally chosen for Evolo.... **Due to the complexity of motor control of asynchronous motors, it is strongly recommended to use the motor manufacturer’s own control system.”**); Ex-1002-Brizzolara-Decl., ¶96.

EvoloReport discloses obtaining alternative engine systems and that a control unit would need to be obtained and connected with the chosen motor. Ex-1002-Brizzolara-Decl., ¶97. Ex-1003-EvoloReport, 189 (“The purpose of this study is to make a benchmarking of what opportunities there are to develop your own motor solution instead of modifying an existing one and what consequences and opportunities it gives the project.... **Another challenge is that such an motor requires control. This is not built yourself.”**); Ex-1003-EvoloReport, 193 (“The company could also sell a control unit for about 350 dollars plus shipping.... **The advantage of these motors is that they are completely ready and ‘only’ to integrate and connect with a control unit.”**). EvoloReport also discusses integrating a control unit (i.e., a potentiometer) near the handle mounted throttle control. Ex-1002-Brizzolara-Decl., ¶98. Ex-1003-EvoloReport, 184 (“This has a

great advantage in view of the fact that **the potentiometer, or control unit for the motor, can be placed separately from the handle** and that the handle can then be moved more easily.... The cable to the potentiometer can be selected as a regular bicycle brake cable. **If the motor is a torquedo, the wiring to the motor bulb,** which is an ordinary telephone cable with connectors, the ends, can be easily spliced and extended, which **provides easy movement and separation of handles, control unit and motor.**”); Ex-1003-EvoloReport, 185-186 (“The components are easy to procure or manufacture and **allow a wide variety of final placement.** However, **the control itself should not be made too far** as it will then be pulled obliquely if you do not apply the throttle in the middle of the control.”). Ex-1002-Brizzolara-Decl., ¶¶97-98.

Further, EvoloReport states that the throttle control for the Torquedo motor, should logically be located in the waterproof battery container to ensure that the throttle control will always be dry. Ex-1003-EvoloReport, 327 (“Preliminarily, this **throttle control should be placed inside the waterproof battery container** that encloses the top of the mounting of the strut. This means that **the throttle control will always be dry and is currently the logical choice....** This is the critical point of the cable routing due to the fact **that the battery container must be waterproof** and the cable must be pulled in such a way that they do not destroy

it.”). Ex-1002-Brizzolara-Decl., ¶99. EvoloReport thus teaches that it is important to keep sensitive electronics, such as the batteries and throttle controls, dry to prevent water damage. Ex-1002-Brizzolara-Decl., ¶99.

Accordingly, a POSITA would have been motivated, based on EvoloReport’s own teachings, to incorporate the motor speed controller into the watertight compartment of the flotation device if a preassembled waterproof engine were not used. Ex-1002-Brizzolara-Decl., ¶100.

(i) [16D] the watercraft having no movable steering system;

As discussed previously in Section IX.A.1.h, EvoloReport discloses the watercraft having no movable steering system.

(j) [16E] a handheld controller having a throttle; and

EvoloReport discloses or renders obvious a handheld controller having a throttle. Ex-1002-Brizzolara-Decl., ¶102. Ex-1003-EvoloReport, 524 (“The handles have controls for the engine and dead man’s switch. For even greater freedom, you should be able to remove the stays for the handles completely and disconnect the handles, **which can then regulate the motor wirelessly.**”)

Although wireless control of the motor was not implemented in the final design of EvoloReport, it was clearly contemplated in the early design stages of the project. Therefore, the authors of EvoloReport, who each possessed less skill than a

POSITA, were motivated to incorporate a wirelessly controlled motor. Ex-1002-Brizzolara-Decl., ¶102.

A POSITA would have had the knowledge and experience to incorporate a wirelessly controlled motor via a handheld controller with a throttle. In doing so, a POSITA would have implemented a handheld transmitter with a throttle and throttle interface receiver as this is the primary way to incorporate a wireless control device to operate an electric motor. Ex-1002-Brizzolara-Decl., ¶103. Therefore, a POSITA would have been motivated to modify the watercraft of Evolo to incorporate the wireless motor control that is discussed in Evolo-Report's conceptual design to yield predictable results (a wirelessly controlled watercraft). Ex-1002-Brizzolara- Decl., ¶103. A POSITA would have a reasonable expectation of success given that remote control technology was well known, the time and incorporating a remote control is well within the skill of a POSITA. Ex-1002-Brizzolara-Decl., ¶103.

- (k) [16F] a throttle interface, wherein the throttle is adapted to send electronic signals to the throttle interface that cause an output of the propulsion system to change.

As discussed previously in Section IX.A.2.j, EvoloReport discloses or renders obvious a wireless handheld controller with a throttle, and that such a controller would have been implemented in conjunction with a throttle interface

that receives wireless control signals to control the motor. Therefore, the throttle would have been adapted to send electronic signals to the throttle interface that cause an output of the propulsion system to change. Ex-1002-Brizzolara-Decl., ¶104.

This is consistent with how others, such as Manning, implemented powered surfboards with wireless control. Ex-1013-Manning, 4:66-5:7 (discussing wireless transmitter/receiver), 11:51-65 (discussing transceiver). This confirms a POSITA would have understood how to implement a wireless control system in Evolo with a throttle interface for receiving electronic signals. Ex-1002-Brizzolara-Decl., ¶105.

**3. Claim 17: A watercraft in accordance with claim 16, wherein the hydrofoil comprises a plurality of hydrofoil wings including the first hydrofoil wing and a second hydrofoil wing, the first and second hydrofoil wings being connected by way of a strut.**

EvoloReport discloses a watercraft having a hydrofoil comprising a plurality of wings including the first hydrofoil wing (front hydrofoil) and second hydrofoil wing (rear or “aft” hydrofoil) that are interconnected by way of a strut. Ex-1002-Brizzolara-Decl., ¶106. Specifically, EvoloReport discloses a watercraft having a front hydrofoil and a rear (“aft”) hydrofoil that are connected by way of a carbon fiber strut (e.g., the stay). Ex-1003-EvoloReport, 7 (“As can be seen in Figure 6

below, it was chosen to integrate the motor in **the front hydrofoil** and that the propeller is placed **behind the aft hydrofoil**. The propeller shaft runs from the motor to the propeller **inside a carbon fiber stay.**").

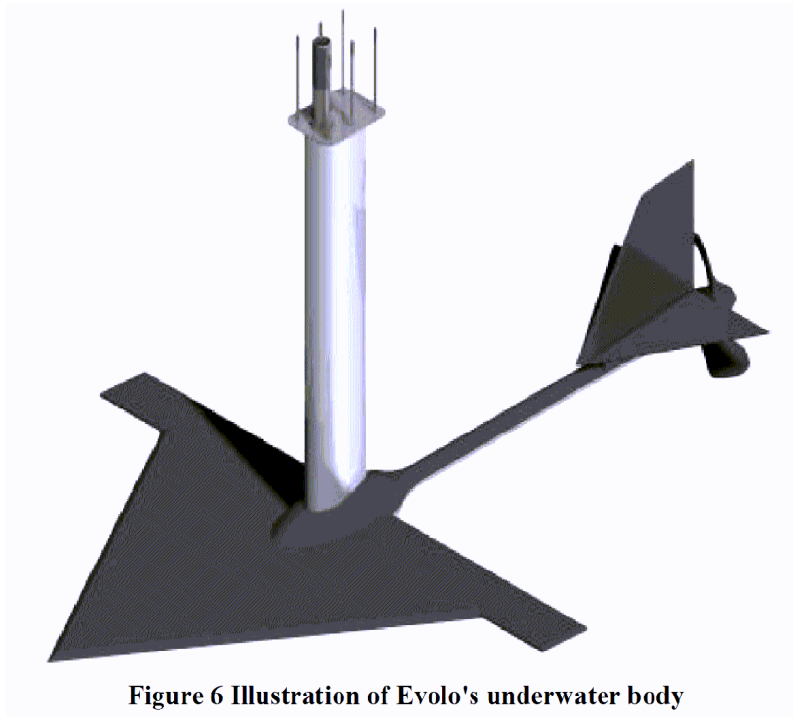


Figure 6 Illustration of Evolo's underwater body

Ex-1003-EvoloReport, 7, FIG. 6. Ex-1002-Brizzolara-Decl., ¶106.

As the front hydrofoil and the rear hydrofoil are connected via the motor pod and the rear strut, the front hydrofoil is interconnected to the rear hydrofoil by way of a strut. Ex-1002-Brizzolara-Decl., ¶106.

Furthermore, Woolley discloses a hydrofoil comprised of two wings – its front blade and rear blade – interconnected by way of a strut. Ex-1002-Brizzolara-Decl., ¶107.

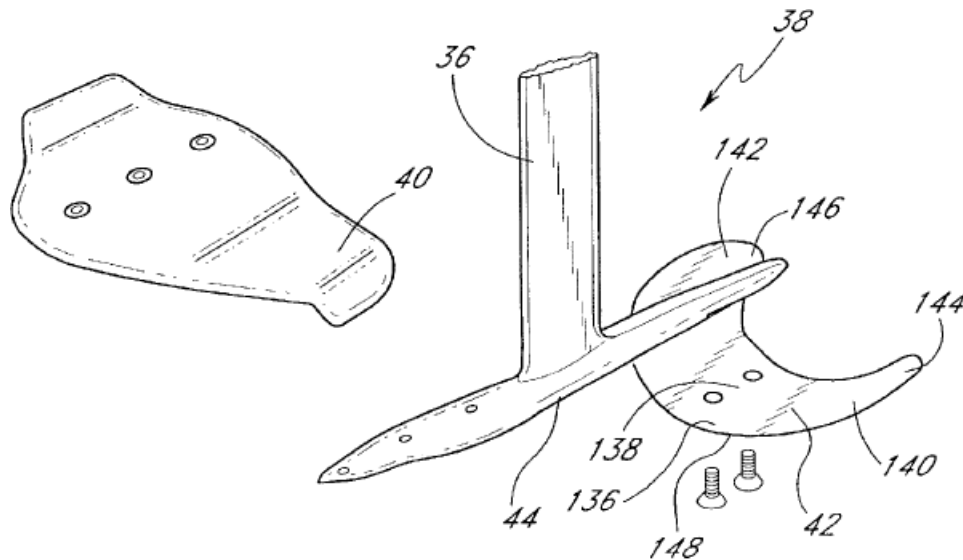


**FIG. 7A**

x-1011-Woolley, Fig 7A. Forward blade 40 and aft blade are interconnected via strut 44. Ex-1011-Woolley, 10:38-40 (“The planing blade or blade assembly 38 advantageously has a front blade 40 and a rear blade 42 interconnected by a fuselage 44.”). Ex-1002-Brizzolara-Decl., ¶107. Accordingly, POSITA would have found claim 7 rendered obvious by EvoloReport in combination with Woolley. Ex-1002-Brizzolara-Decl., ¶108.

**4. Claim 18: A watercraft in accordance with claim 16, wherein the watercraft comprises a cooling system for cooling the electric motor.**

EvoloReport discloses a watercraft having an electric motor integrated in a waterproof, streamlined pod. Ex-1002-Brizzolara-Decl., ¶109; *see also* Ex-1003-EvoloReport, 492, Fig. 2.



In EvoloReport, the structure of the Torqeedo motor is altered such that only the waterproof pod housing and vertical steel rod that houses the cables are retained from the stock image of the Torqeedo motor shown above. Ex-1003-EvoloReport, 491 (“There are several options on the market today in terms of **ready-made electric motor concepts for marine use**. The method would be to source a product... then **remove the excess parts to build the motor and electrical system into the Evolo’s design**.”); Ex-1002-Brizzolara-Decl., ¶109. EvoloReport retains the waterproof, streamlined pod of the Torqeedo motor and removes the lower fin, propeller, and upper controls to allow the motor to be integrated into the motor pod mountings. Ex-1002-Brizzolara-Decl., ¶109.

Additionally, the disclosed Torqeedo 4.0 R includes a cooling system to cool the electric motor. Ex-1003-EvoloReport, 257 (“...holes in the mold must be left around the center of the motor because **the cooling to the motor is there....**aluminum plates must be cast into the mold around **the motor’s cooling**

**part.”);** Ex-1002-Brizzolara-Decl., ¶110. EvoloReport further discloses constructing a streamlined, watertight housing having a cooling system for the motor in the event a completed marine motor was unavailable. Ex-1003-EvoloReport, 515 (“If an option not initially adapted to drive a propeller in water is chosen, **the motor must be built into some kind of watertight housing.** Construction of such must be verified, **both in terms of strength and resistance contribution to the craft but also in terms of function such as cooling** and that it holds tight.”). Ex-1002- Brizzolara-Decl., ¶110.

EvoloReport therefore discloses a cooling system for cooling the electric motor. Ex-1002-Brizzolara-Decl., ¶110.

**5. Claim 19: A watercraft in accordance with claim 16, wherein the strut has an internal passage and electrical wires extend from the electric motor to the watertight compartment inside the strut through the internal passage for controlling electric motor.**

EvoloReport discloses that the strut contains an internal passage to allow electrical wires to extend from the electric motor to the waterproof compartment through the internal passage. Ex-1002-Brizzolara-Decl., ¶111. Ex-1003-EvoloReport, 7 (“The metal rod **is part of the original motor structure** and is retained as it has a guaranteed waterproof link down to the motor bulb.”) The strut includes a hollow steel rod that extends from the motor to the motor controls and

shown below in Figure 2, forms the core of the strut that links the floatation device to the motor and hydrofoil. Ex-1003-EvoloReport, 276 (“As the motor cannot be detached from the shaft, the profile and any other parts must be put on the shaft from above.”); *id.* (“In this figure, the motor represents the square plate.”) (referring to Figure 2, below). This rod links the electric motor to the battery compartment. Ex-1003-EvoloReport, 276.



**Figure 2. Steel shaft from motor.**

Ex-1003-EvoloReport, 276, FIG. 2. Ex-1002-Brizzolara-Decl., ¶111.

The strut is then connected to the flotation device by bolting a base plate to the flotation device. Ex-1003-EvoloReport, 275 (“The existing motor construction consists of the motor unit which is linked to the steering by means of a 750 mm long steel shaft with an outer diameter of 35 mm, **through which shaft control cables and power cables run.**”); Ex-1003-EvoloReport, 276 (“**Note the hole for the cables at the aft towards the battery boxes [3],** as well as the threaded upper part of the shaft....The function of the base plate is to transmit the forces and torques absorbed by both the shaft and the profile to the floating body.”); Ex-1002-Brizzolara-Decl., ¶112. As shown below, the rod contains a passage to allow for

cables to be routed from the motor to the battery and controls to provide power and control signals to the motor. Ex-1003-EvoloReport, 276.

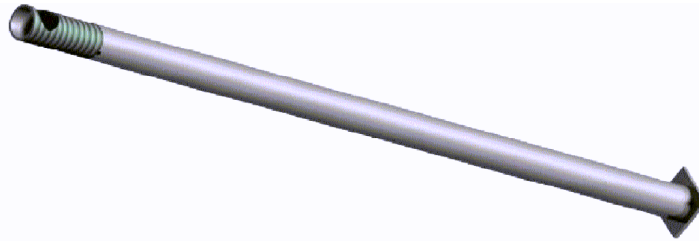


**Figure 2. Steel shaft from motor.**

Ex-1003-EvoloReport, 276. EvoloReport therefore discloses a watercraft having a strut with an internal passage and electrical wires extending from the electric motor to the waterproof compartment inside the strut through the internal compartment for controlling the electric motor. Ex-1002-Brizzolara-Decl., ¶112-114.

- 6. Claim 20: A watercraft in accordance with claim 16, wherein the handheld controller comprises a wireless transmitter operatively coupled to the throttle and the throttle interface includes a receiver, the transmitter being adapted to send wireless signals to the receiver in response to actuation of the throttle that cause an output of the propulsion system to change.**

EvoloReport discloses or renders obvious a watercraft comprising a wireless handheld controller having a transmitter, and a throttle interface having a receiver, wherein the transmitter is adapted to send wireless signals to the receiver that cause an output of the propulsion system (motor) to change. Ex-1002-Brizzolara-Decl., ¶115. Ex-1003-EvoloReport, 524 (“The handles have controls for the engine and

dead man's switch. For even greater freedom, you should be able to remove the stays for the handles completely and disconnect the handles, **which can then regulate the motor wirelessly.**"). Although wireless control of the motor was not implemented in the final design of EvoloReport, it was clearly contemplated in the early design stages of the project. Therefore, the authors of EvoloReport, who each possessed less skill than a POSITA, were motivated to incorporate a wirelessly controlled motor. Ex-1002-Brizzolara-Decl., ¶116.

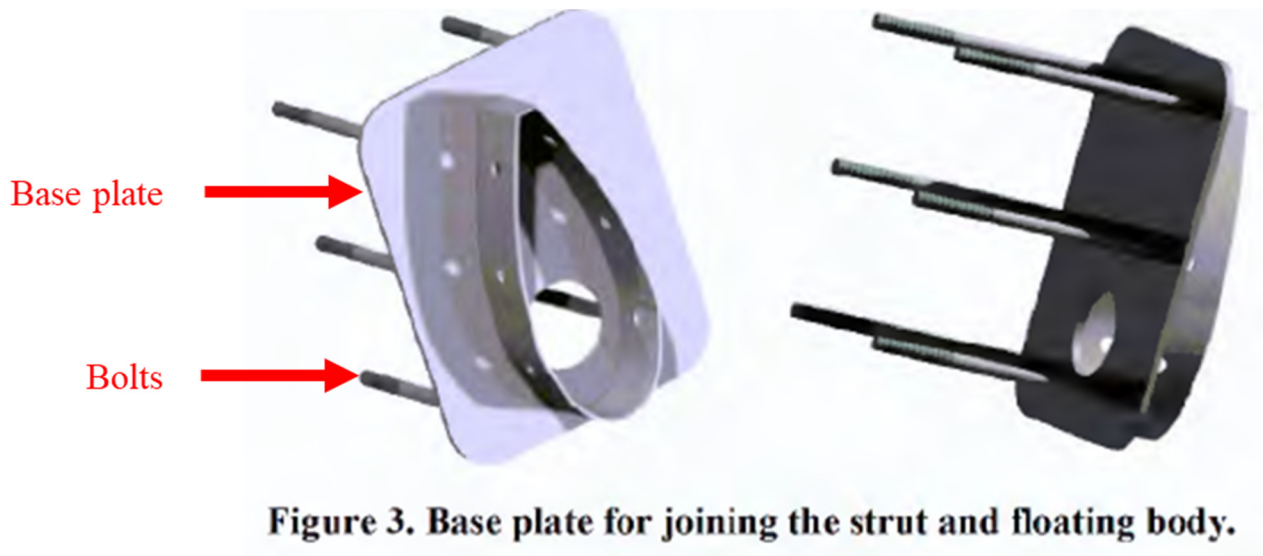
A POSITA would have had the knowledge and experience to incorporate a wirelessly controlled motor via a handheld transmitter and throttle interface receiver as this is the primary way to incorporate a wireless control device to operate an electric motor. Ex-1002-Brizzolara-Decl., ¶117. Therefore, a POSITA would have been motivated to modify the watercraft of Evolo to incorporate the wireless motor control that is discussed in Evolo-Report's conceptual design to yield predictable results (a wirelessly controlled watercraft). Ex-1002-Brizzolara-Decl., ¶92. A POSITA would have a reasonable expectation of success given that remote control technology was well known at the time and incorporating a remote control is well within the skill of a POSITA. Ex-1002-Brizzolara-Decl., ¶117.

This is consistent with Manning, which also discloses a surfboard apparatus with a wireless control system having a similar transmitter and receiver. Ex-1013-

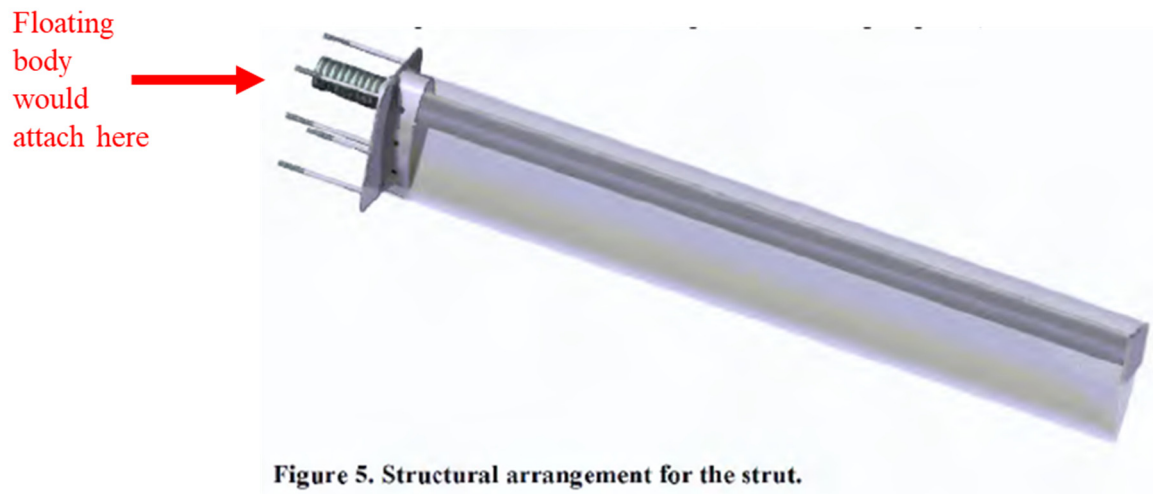
Manning, 4:66-5:7 (discussing wireless transmitter/receiver), 11:51-65 (discussing wireless transceiver). Ex-1002-Brizzolara-Decl., ¶118.

**7. Claim 21: A watercraft in accordance with claim 1, wherein the upper end of the strut is fixedly interconnected with the flotation device via a detachable fitting.**

Evoloreport discloses the upper end of the strut is fixedly interconnected with the flotation device via a detachable fitting. For example, Evoloreport discloses that the end of the strut is mounted to the floating body via a base plate (fitting) that is secured with screws or bolts. Ex-1003-Evoloreport, 295 (“The mounting number 2, which is between the strut and the floating body, must be mounted in accordance with [2]. The important areas to study in this mounting are where the base plate is screwed into the floating body and where the wing profile is to be riveted and/ or glued to the base plate”), 276 (“The longer bolts join the base plate with the floating body and are slightly shorter than the thickness of the floating body, which allows nuts to be set into the floating body.”), 276 (“Figure 3. Base plate for joining the strut and floating body”).



Ex-1003-EvoloReport, 276, FIG. 3.



*Id.*, 277, FIG. 5. Ex-1002-Brizzolara-Decl., ¶119.

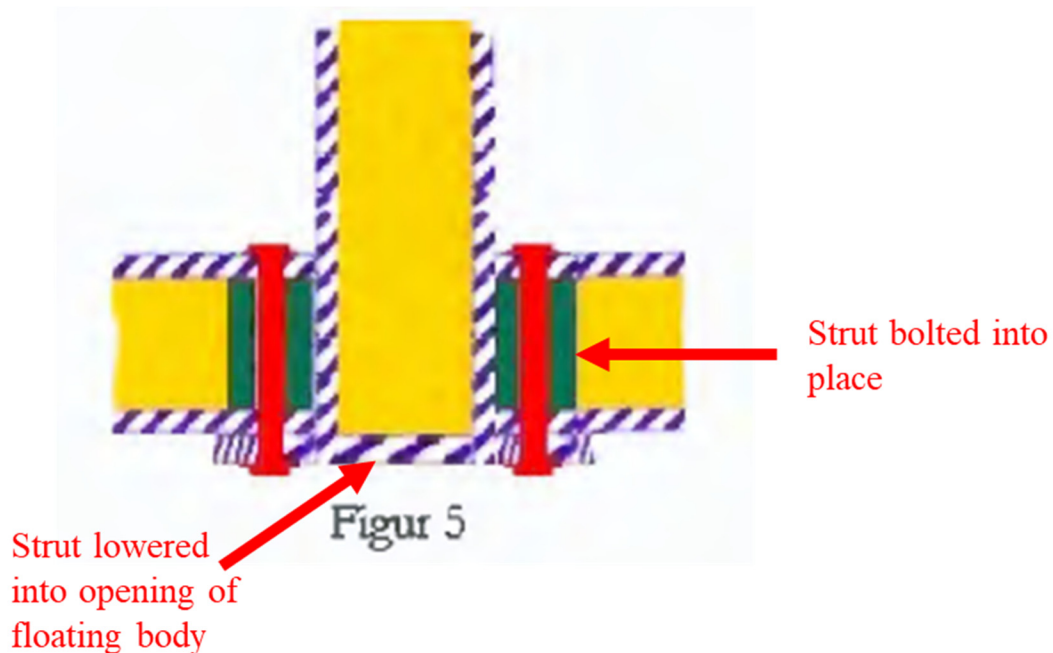
EvoloReport further discloses that the fitting is detachable. Ex-1003-EvoloReport, 275 (“The structural design of the strut is dictated partly by the strength and stiffness requirements according to [1] and partly by the practical requirements for the strut such that the strut must...be **detachable** from the floating

body to facilitate transport.”), 277 (“Structure The arrangement with a load-bearing steel shaft and composite profile meets the requirements set out in the introduction to this report, including **demountability**, cabling space and module construction.”). A POSITA would have further understood that a fitting secured to the floating body via screws or bolts would be detachable. Ex-1002-Brizzolara-Decl., ¶120.

**8. Claim 22: A watercraft in accordance with claim 21, wherein the detachable fitting is configured to fit into a complimentary opening in the flotation device.**

Evoloreport renders obvious a detachable fitting that is configured to fit into a complimentary opening in the flotation device. As discussed previously in Section IX.A.7, Evoloreport discloses a strut with a detachable fitting. Evoloreport further discloses that interconnections in Evolo, including the interconnection between the floating body and the strut, can be implemented by inserting the end of the strut into a hole in the floating body, and securing the two together using bolts. Ex-1003-Evoloreport, 227 (“A further option is that, like the fin solution on the majority of suction boards, to **mill a through hole in the floating body and that an insert, see figure 2, is attached to the strut. This strut is then lowered from above into the floating body and bolted in place**, as illustrated in Figure 5.”), 225 (“This work aims to provide a summary of the possible fastening techniques that are possible in the points between e.g. hydrofoil [*sic*] and floating body, and to give suggestions on

which techniques should be used for each area”). According to EvoloReport, this allows for the core material to contribute to load absorption. EvoloReport, 227 (“The construction in this case means that the torque is partly absorbed by...the insert which abut[s] against the surface layer....”).



Ex-1003-EvoloReport, 227, FIG. 5. Ex-1002-Brizzolara-Decl., ¶122.

Based on these teachings, a POSITA would have found it obvious to extend either a portion of the base plate or the strut of EvoloReport into an opening in the core of the floating body. EvoloReport already discloses that bolts and the battery are inserted through openings in the floating body, and extending either the base plate or the strut (or both) into an additional cutout in the floating body would allow the core material of the floating body to absorb additional loads, as taught by

EvolReport. Ex-1002-Brizzolara-Decl., ¶123.

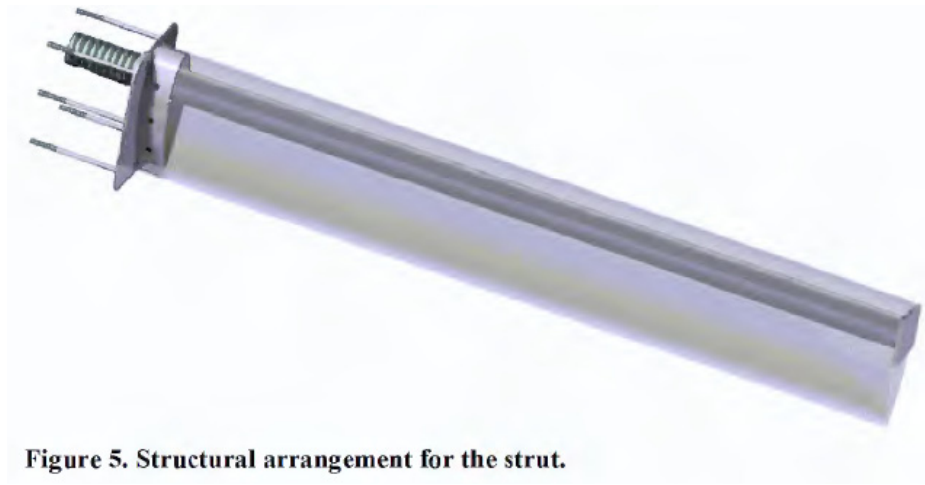


Figure 5. Structural arrangement for the strut.



Figure 4. Joining the parts of the strut.

Ex-1003-EvolReport, 277, FIGs. 5, 4. Indeed, Woolley discloses a similar tongue 106 at the end of a strut for insertion through an opening in the board:

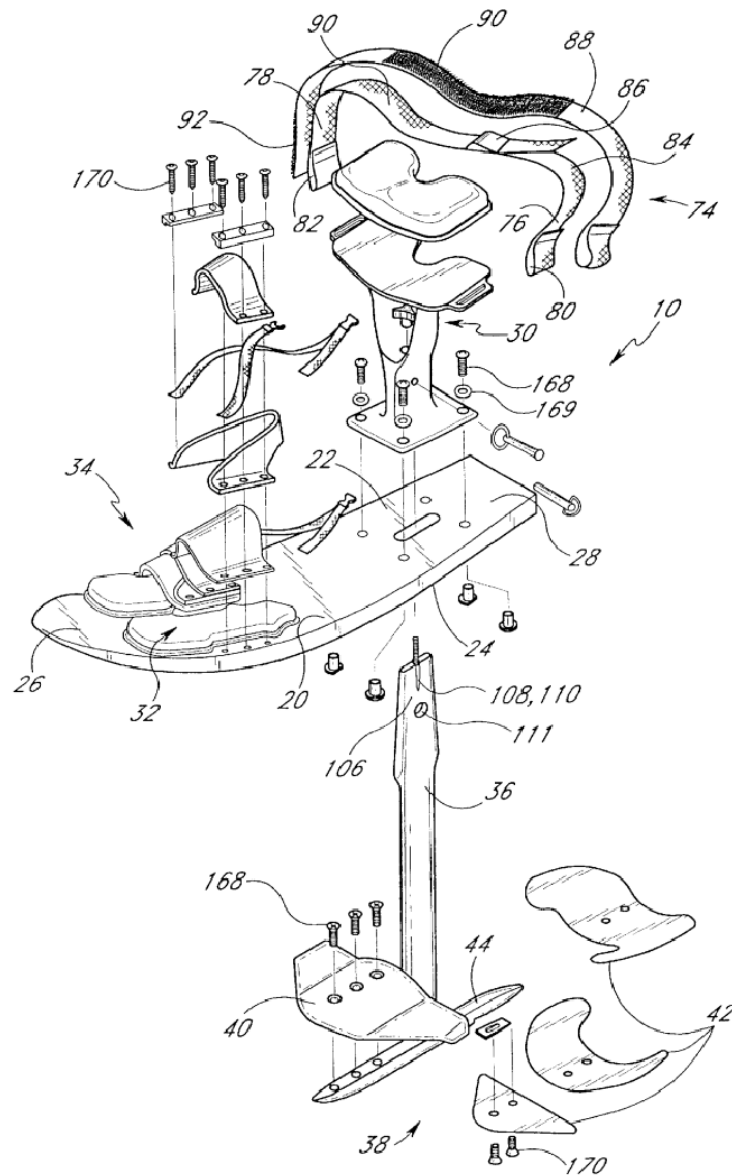


**FIG. 2**

Ex-1011-Woolley, FIG. 2; Ex-1002-Brizzolara-Decl., ¶123; *see also id.*, 10:4-28.

A POSITA would have had a reasonable expectation of success in modifying a portion of the base plate or strut to extend into the core of the floating body. EvoloReport teaches that modifications to the disclosed mounting techniques are

contemplated and within the skill of a POSITA. Ex-1003-EvoloReport, 228 (“With regard to the mounting points analyzed in this case, there are essentially three basic principles that can be used and these can then be combined to achieve the requirements that are set.”). Likewise, the ’659 patent itself does not disclose anything critical to the disclosed fitting, and instead notes that “[a]ny other attachment approach may be used” while leaving such alternative approaches to the skill of a POSITA. Ex-1002-Brizzolara-Decl., ¶124.

**9. Claim 23: A watercraft in accordance with claim 22, wherein the fitting is configured to be secured within the complementary opening by at least one of a bolt, a pin, and a latch.**

EvoloReport discloses the fitting is configured to be secured within the complementary opening by at least one of a bolt, a pin, and a latch. Ex-1003-EvoloReport, 276 (“**The longer bolts join the base plate with the floating body** and are slightly shorter than the thickness of the floating body, which allows nuts to be set into the floating body.”), 227 (“A further option is that, like the fin solution on the majority of suction boards, to mill a through hole in the floating body and that an insert, see figure 2, is attached to the strut. This strut is then lowered from above into the floating body and bolted in place, as illustrated in Figure 5.”), 276 (“Figure 3. Base plate for joining the strut and floating body”), 277 (Figure 4. Joining the parts of the strut), 277 (“Figure 5. Structural arrangement for the strut”). Ex-1002-

Brizzolara-Decl., ¶125.

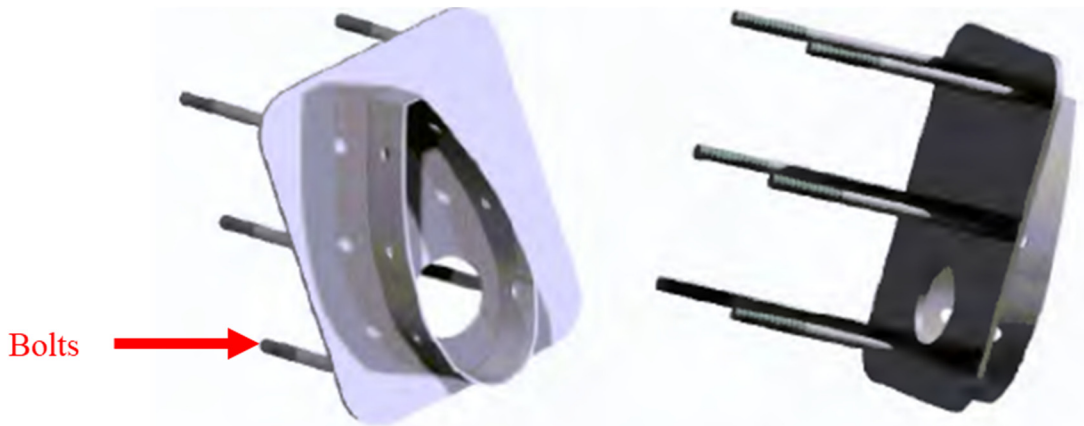


**Figure 3. Base plate for joining the strut and floating body.**

Ex-1003-EvoloReport, 276, FIG. 3.



**Figure 4. Joining the parts of the strut.**

*Id.*, 277, FIG. 4.

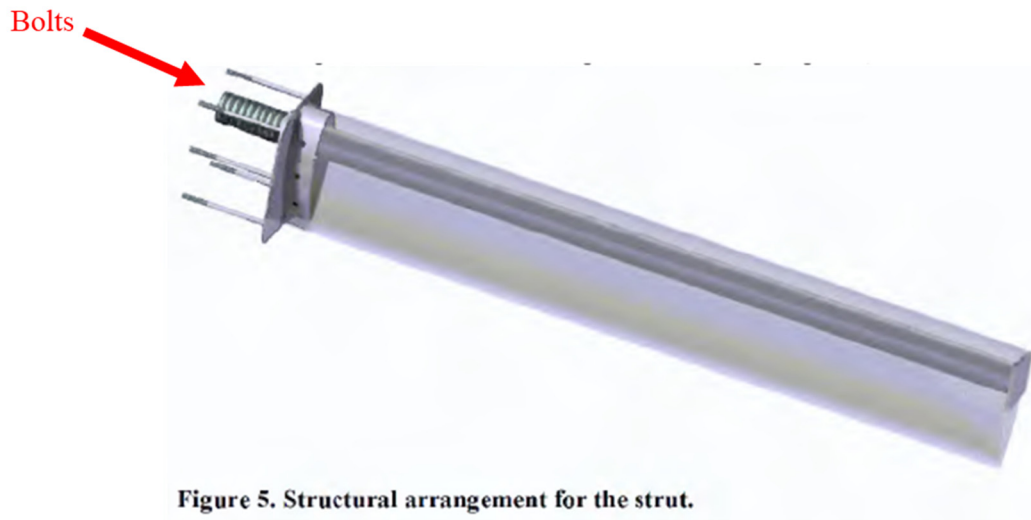


Figure 5. Structural arrangement for the strut.

*Id.*, 277, FIG. 5; *see also* Ex-1003-EvoloReport, 227, 225, 227 FIG. 5.

**10. Claim 26: A watercraft in accordance with claim 1, further comprising a safety device for monitoring the presence of a user on the flotation board.**

EvoloReport discloses a safety device for monitoring the presence of a user on the flotation board.<sup>12</sup> For example, EvoloReport discloses using “a dead man’s switch, or so-called kill switch” to ensure the safety of the user. Ex-1007-EvoloReport, 185; *see also id.*, 126-127 (“In order for the propeller to stop immediately in the event of a fall, some form of deadman switch is required. This

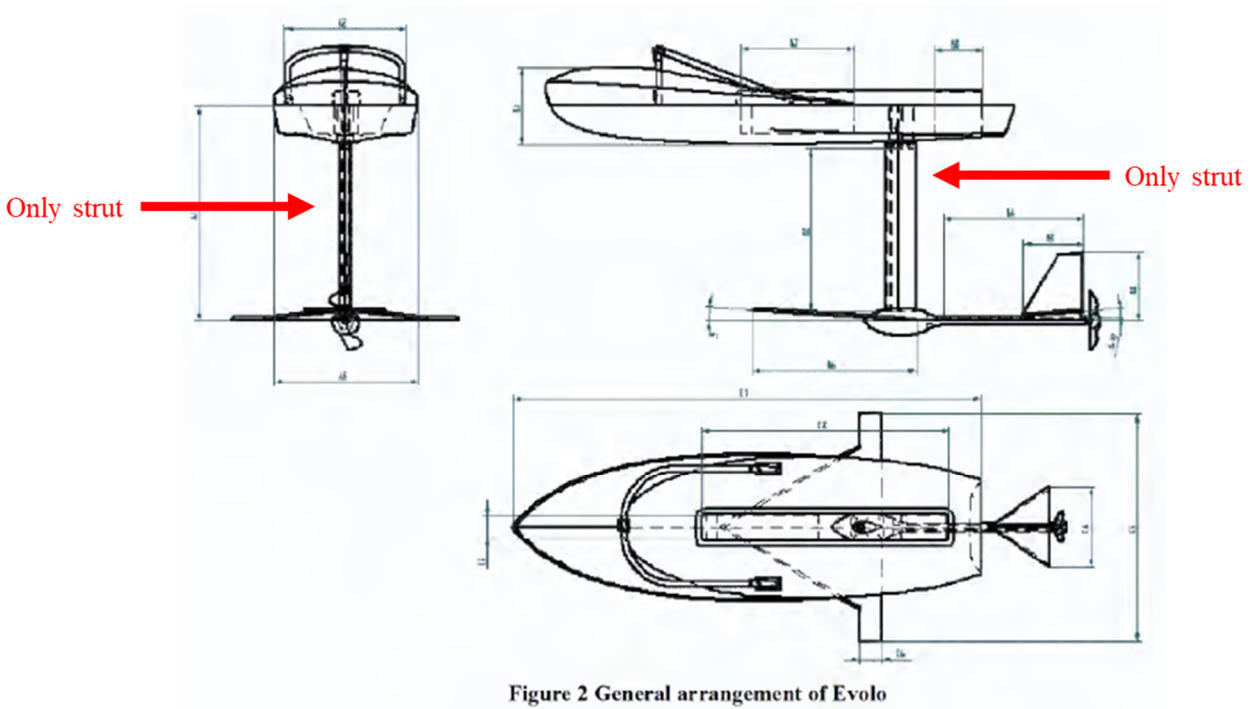
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<sup>12</sup> The term “flotation board” lacks antecedent basis in the claims. For purposes of this IPR, Petitioner considers “the flotation board” to refer to “a floatation device” in claim 1.

can either be solved by a classic dead man's switch in the form of a line which, if it is pulled, turns off the power. Since Evolo will require movement of the body while driving, this may be perceived as limiting. An alternative is therefore a throttle control that requires constant pressure to provide propulsion and springs back as soon as it is released and thus turns off the power.”). A dead man's switch or kill switch is set off when a user falls off the floatation device. *Id.* Therefore, a POSITA would have understood a dead man's switch or kill switch monitor the presence of a user on the floatation device. Ex-1002-Brizzolara-Decl., ¶126.

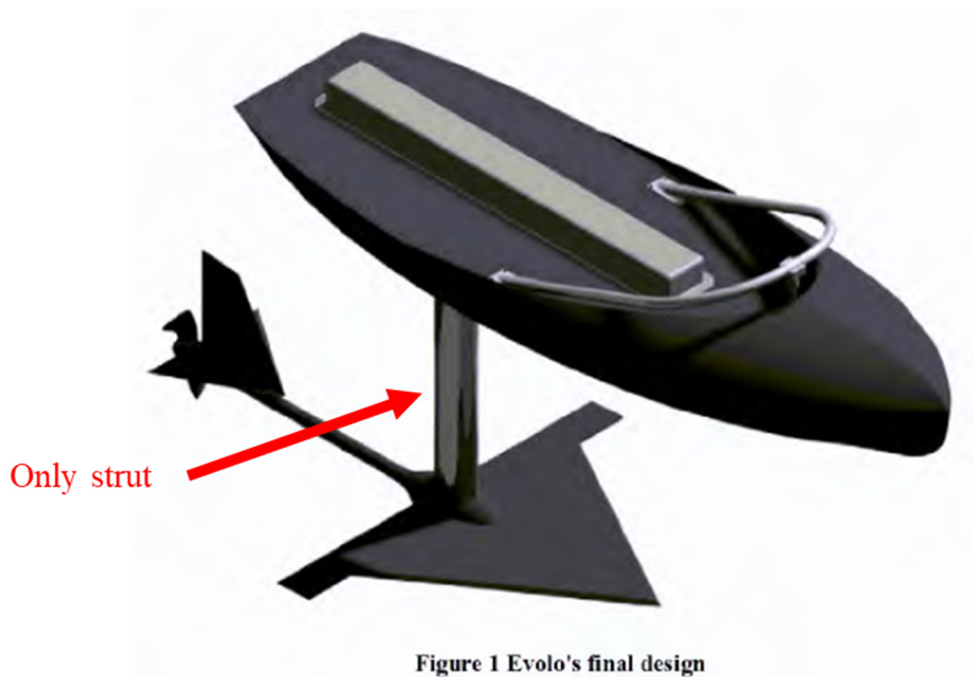
**11. Claim 27: A watercraft in accordance with claim 1, wherein the strut is the only strut connected with the flotation device.**

EvoloReport discloses the strut is the only strut connected with the flotation device. As shown in the images below, only one strut is used to connect the hydrofoil to the floatation device. Ex-1003-EvoloReport, 4 (“Figure 2. General arrangement of Evolo”), 7 (**The strut** is the part that connects the floating body and the hydrofoil.”). Ex-1002-Brizzolara-Decl., ¶127.

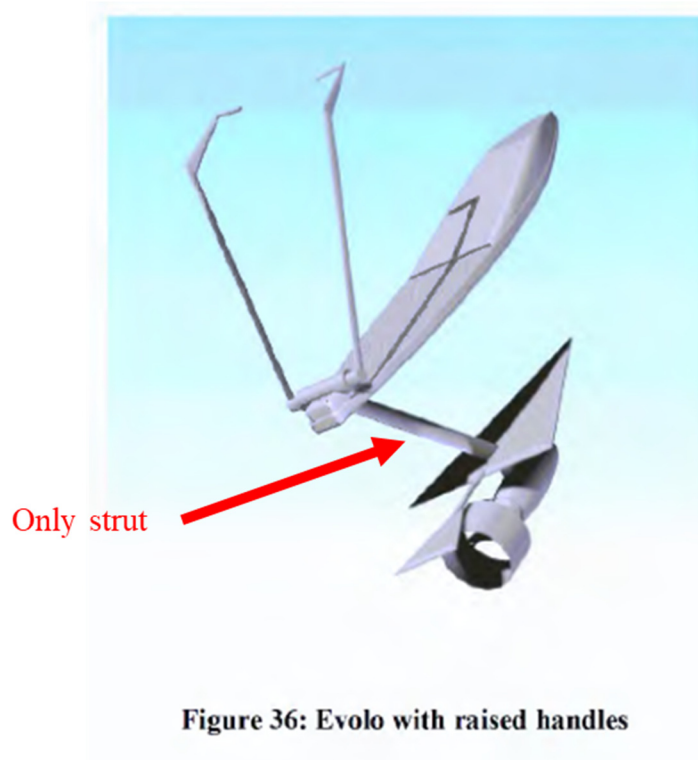


Ex-1003-EvoloReport, 4, FIG. 2; *see also* § IX.A.2.b.

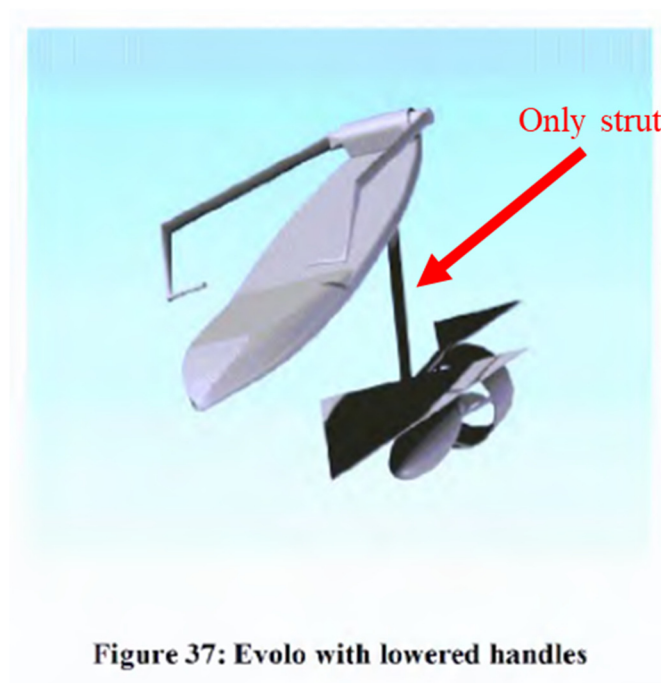
Similarly, the flotation devices that lack handles and/or protrusions discussed with reference to limitation [16A1] also utilize only one strut:



Ex-1003-EvoloReport, 3, FIG. 1.



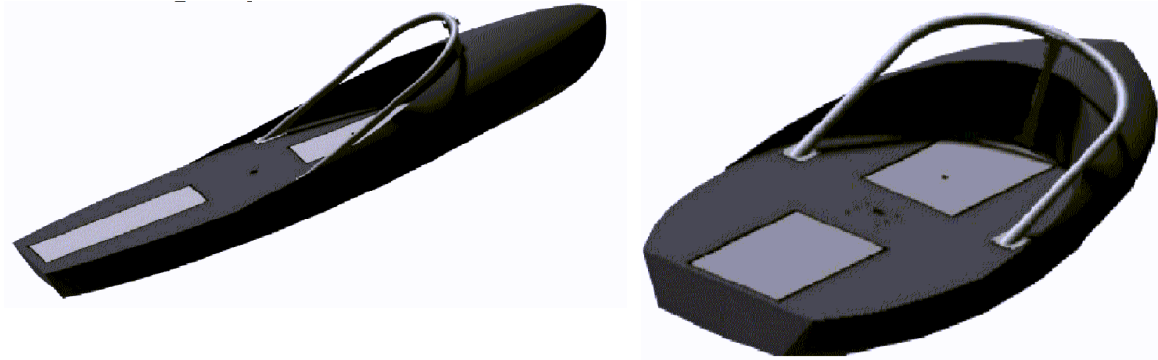
*Id.*, 332, FIG. 36.



*Id.*, 333, FIG. 37. Ex-1002-Brizzolara-Decl., ¶128.

12. **Claim 28: A watercraft in accordance with claim 1, wherein the propulsion system includes a motor speed controller contained in a watertight compartment integrated into the flotation device.**

Evoloreport discloses a watercraft having a watertight compartment integrated into the flotation device. Ex-1002-Brizzolara-Decl., ¶80. The watertight compartment of Evoloreport is shown by the grey plates in the below Figures 11 and 12. Ex-1003-Evoloreport, 550, 327 (“[T]his throttle [control] should be placed **inside the waterproof battery container** that encloses the top of the mounting of the strut.... This is the critical point of the cable routing due to the fact that **the battery container must be waterproof.**”).



Ex-1003-EvoloReport, 550, FIGs. 11-12. These watertight compartments house the batteries. Ex-1003-EvoloReport, 550 (“The floating body has sufficient volume to be able to stay afloat with the driver. **It should also have room for batteries.**”).

Ex-1002-Brizzolara-Decl., ¶129.

EvoloReport further discloses including additional electronics (i.e., the throttle, lanterns, and a display screen) in the watertight battery compartment. Ex-1003-EvoloReport, 327 (“[T]his throttle control should be placed **inside the waterproof battery container** that encloses the top of the mounting of the strut.”); Ex-1003- EvoloReport, 524 (“A slightly larger volume is also required for other reasons **such as containing batteries and electronics**. The vision is that **this volume should also be able to contain a waterproof storage compartment, a clear LCD screen with information about speed, battery level, depth, position, etc., and lanterns.**”). Although EvoloReport discusses incorporating both the throttle and batteries into the watertight compartment, EvoloReport specifically

chooses to use a Torqeedo motor largely because the Torqeedo was already available and was provided with all the required components in a preassembled package. Ex-1003- EvoloReport, 180 (“The motor available today is a Torqeedo Cruise 2.0R....The **advantages of this system are that it is a complete driveline. Control systems are available and can be modified to work on Evolo.**”); Ex-1003-EvoloReport, 491 (“There are several options on the market today in terms of **ready-made electric motor concepts** for marine use. The method would be to source a product... then **remove the excess parts to build the motor and electrical system into the Evolo’s design.**”). Ex-1002-Brizzolara-Decl., ¶¶130-131.

EvoloReport does not specifically disclose whether the motor speed controller is contained within the watertight motor pod or within the watertight battery container as EvoloReport drafters purposely chose the already completed Torqeedo motor unit. Ex-1003-EvoloReport, 8 (“The throttle...is designed like a bicycle brake, see Appendices 20 and 44, and **its wiring is passed through the strut down to the motor and its control unit.**”); Ex-1003-EvoloReport, 181 (“When it comes to controlling the motors, there is no major difference as **Torqeedo’s options include complete systems** and VIAB’s **only need some form of potentiometer to regulate the current.**”); Ex-1003-EvoloReport, 498 (“Since

most industrial and marine motors on the market, eg Torqeedo, are asynchronous motors...it is strongly recommended to purchase an already completed system, adapted to the motor that is finally chosen for Evolo.... **Due to the complexity of motor control of asynchronous motors, it is strongly recommended to use the motor manufacturer's own control system.**"). Ex- 1002-Brizzolara-Decl., ¶132.

EvoloReport discloses obtaining alternative engine systems and that a control unit would need to be obtained and connected with the chosen motor. Ex- 1002-Brizzolara-Decl., ¶133. Ex-1003-EvoloReport, 189-190 ("The purpose of this study is to make a benchmarking of what opportunities there are to develop your own motor solution instead of modifying an existing one and what consequences and opportunities it gives the project.... **Another challenge is that such an motor requires control. This is not built yourself.**"); Ex-1003-EvoloReport, 193-194 ("The company could also sell a control unit for about 350 dollars plus shipping.... **The advantage of these motors is that they are completely ready and 'only' to integrate and connect with a control unit.**"). EvoloReport also discusses integrating a control unit (i.e., a potentiometer) near the handle mounted throttle control. Ex-1002-Brizzolara-Decl., ¶133. Ex-1003-EvoloReport, 184 ("This has a great advantage in view of the fact that **the potentiometer, or control unit for the motor, can be placed separately from the handle** and that the handle can then be

moved more easily.... The cable to the potentiometer can be selected as a regular bicycle brake cable. **If the motor is a torquedo, the wiring to the motor bulb,** which is an ordinary telephone cable with connectors at the ends, can be easily spliced and extended, which **provides easy movement and separation of handles, control unit and motor.**”); Ex-1003-EvoloReport, 185-186 (“The components are easy to procure or manufacture and **allow a wide variety of final placement.** However, **the control itself should not be made too far** as it will then be pulled obliquely if you do not apply the throttle in the middle of the control.”). Ex-1002-Brizzolara-Decl., ¶133-134.

Further, EvoloReport states that the throttle control for the Torquedo motor, should logically be located in the waterproof battery container to ensure that the throttle control will always be dry. Ex-1003-EvoloReport, 327 (“Preliminarily, this **throttle control should be placed inside the waterproof battery container** that encloses the top of the mounting of the strut. This means that **the throttle control will always be dry and is currently the logical choice....** This is the critical point of the cable routing due to the fact **that the battery container must be waterproof** and the cable must be pulled in such a way that they do not destroy it.”). Ex-1002-Brizzolara-Decl., ¶135. EvoloReport thus teaches that it is important to keep sensitive electronics, such as the batteries and throttle controls, dry to

prevent water damage. Ex-1002-Brizzolara-Decl., ¶135.

Accordingly, a POSITA would have been motivated, based on EvoloReport’s own teachings, to incorporate the motor speed controller into the watertight compartment of the flotation device if a preassembled waterproof engine were not used. Ex-1002-Brizzolara-Decl., ¶136.

**B. Ground 2**

EvoloReport in combination with Woolley and Frank renders claim 26 obvious.

**1. Claim 26: A watercraft in accordance with claim 1, further comprising a safety device for monitoring the presence of a user on the flotation board.**

EvoloReport in view of Woolley and Frank renders obvious a safety device for monitoring the presence of a user on the flotation board. As discussed above in Section IX.A.10, EvoloReport discloses a dead man’s or kill switch. Ex-1002-Brizzolara-Decl., ¶138.

To the extent that this limitation requires monitoring for the physical presence of an object on the flotation Board, Frank discloses an infrared camera (“safety device”) that obtains image data and monitors for a “man overboard” situation (“monitoring the presence of a”). Ex-1027-Frank, 11:60-64 (“FIG. 3B shows one embodiment of an infrared processing technique 320 as described in reference to

block 225 of FIG. 2. In one implementation, **the infrared processing technique 320 comprises a man overboard mode of operation for maritime applications.**”), 19:29-34 (“Next, the obtained image data may be processed (block 714). In one implementation, **the obtained image data may be processed using the man overboard mode of operation 320 of FIG. 3B to collect image data to detect an object, such as a person, falling into or in the water proximate to watercraft 180.**”), 19:62-67 (When a man overboard condition is suspected or determined, an operator (e.g., crew member) may be alerted or notified....”). Ex-1002-Brizzolara-Decl., ¶139.

A POSITA would have found it obvious to implement Frank’s infrared man overboard detection technique in EvoloReport’s floatation board. EvoloReport prioritizes the safety of the user on the floatation board. Ex-1003-EvoloReport, 123 (“In most contexts during the development of Evolo, safety has been the subject of discussion, partly in connection with the experiments, but also for the final product.”), 226 (“As point 1 marks the transition from the strut into the floating body, this is the point in the structure that will probably be exposed first to the largest torque [1]. However, a combination of several techniques can be used to increase safety.”), 401 (“The **safety of the user is of the utmost importance** during testing.”), 404 (“[S]**afety plays a decisive role....** The test pilots were both run over

by the craft and fell on the wings.”), 407 (similar), 516 (“In addition to the safety details mentioned in the requirements specification, i.e. dead man’s switch and protection against the propeller, it should also be verified that the safety of all operations is high and that recommendations from the safety analysis that was done in the autumn are followed. It is mainly the person who is responsible for the execution of various experiments who should also think extra about safety. However, all project members should consider their own safety and that of others.”). Indeed, EvoloReport recognizes that additional safety measures may be required. *Id.* at 123 (“The purpose of this report is to identify risks to the driver of Evolo and trial participants and to suggest solutions to minimize these and in some cases point out factors that need to be further developed with regard to technical solutions.”). Ex-1002-Brizzolara-Decl., ¶140.

Given EvoloReport’s discussion of safety, a POSITA would have been motivated to combine the safety device (infrared camera) disclosed in Frank with Evolo’s hydrofoil watercraft to yield predictable results (monitoring the presence of a user on the floatation board). A POSITA would have had a reasonable expectation of success given that monitoring cameras were well known at the time and incorporating them would have been well within the skill of a POSITA. The ’659 patent itself merely identifies a generic “safety device[]” and that “may monitor the

presence of a user on the flotation board 101” without disclosing any details about the form of the safety device or how it is implemented. Ex-1001-USP659, 4:52-56. The patent therefore recognizes that selecting and implementing an appropriate safety device for monitoring the presence of a user is well within the level of skill of a POSITA. Ex-1002-Brizzolara-Decl., ¶¶141-142.

## **X. SECONDARY CONSIDERATIONS**

Patent Owner bears the burden of proving secondary considerations in an IPR proceeding. *Fox Factory, Inc. v. SRAM, LLC*, 944 F.3d 1366, 1378 (Fed. Cir. 2019). Although no evidence of secondary considerations has been presented in this proceeding, PO did present arguments secondary considerations during the ’659 patent reexamination, based mostly on a declaration by its co-founder and CEO, Nick Leason, which the Examiner did not credit.<sup>13</sup> Ex-1024-659-Reexam, 313-315, 6-7. Petitioner nonetheless addresses Patent Owner’s and Mr. Leason’s allegations here.<sup>14</sup> As explained below, Patent Owner failed to establish any nexus to the ’659 patent claimed invention, much less prove any secondary

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<sup>13</sup> Petitioner reserves the right to depose Mr. Leason to the extent that PO relies on his sworn statements in this proceeding.

<sup>14</sup> Petitioner reserves the right to respond further to both PO’s arguments in the ’659 patent reexamination and any additional arguments presented in this IPR.

considerations.

**Commercial Success (Ex-1024-659-Reexamination, 228-229):** Mr. Leason does not even identify an actual commercial product, much less demonstrate that such product practices the claims or a nexus between the claims and any purported success. Indeed, PO's purported commercial success may well have resulted from being first hydrofoil board to market. Mr. Leason also discusses purported market share and licensing but provides no evidence regarding his calculations or a single license to a third party.

**Copying (Ex-1024-659-Reexamination, 229-231):** Mr. Leason presents only conjecture that others copied from his company's early marketing and later product. Moreover, Mr. Leason does not provide any direct comparisons between PO's product and competitors' products or between competitors' products and the '659 patent claims. Instead, Mr. Leason relies on an infringement verdict from a lawsuit against Waydoo (which is neither final nor binding on Petitioner) and the declaration of the '659 patent inventor Dr. Jacob Langelaan. But Dr. Langelaan only provides generic images of one single product (the LIFT3 eFoil) and his own unsupported assertions that the '659 patent claim limitations are met. Ex-1024-659-Reexamination, 253-263.

**Long-felt Need (Ex-1024-659-Reexamination, 231-232):** Aside from his

conclusory testimony, Mr. Leason's sole evidence for long-felt need is the absence of a product that practiced the claimed invention on the market prior to the '659 patent. Moreover, Mr. Leason fails to establish that there was a long-felt need for a personal hydrofoil watercraft that lacked moveable surfaces on the hydrofoil, as claimed.

**Failure by Others (Ex-1024-659-Reexamination, 232-233):** Mr. Leason offers his own company as his sole example of a failure. But Mr. Leason provides nothing other than his own vague recollection, which lacks any supporting documentation and has not been subject to testing under cross examination. Furthermore, Mr. Leason concedes that his early failures were due to low power or difficulty in riding, which is inconsistent with his conclusion that his failure was due to the lack of a hydrofoil with no moveable surface. Mr. Leason's position is belied by the dearth of any example attempt to use a hydrofoil with moveable surfaces.

**Unexpected Results (Ex-1024-659-Reexamination, 233-234):** Mr. Leason's (and the inventor's) conclusory assertion that persons of skill in the art would have expected moveable surfaces to be required for powered hydrofoil boards is directly contradicted by the EvoloReport reference, which studied myriad aspects of such hydrofoil boards without once proposing a moveable hydrofoil

surface.

**Industry Praise (Ex-1024-659-Reexamination, 234-235):** Mr. Leason does not identify any industry praise that specifically refers to the purported invention—a hydrofoil with no moveable surfaces. Accordingly, there is no nexus between any purported praise and the challenged claims.

## **XI. DISCRETIONARY DENIAL IS NOT WARRANTED**

### **A. General Plastic**

The '659 patent reexamination certificate issued on August 6, 2024.<sup>15</sup> Since then, Petitioner has worked diligently to prepare and file the instant petition. While the Board considers the *General Plastic* factors in determining whether to exercise discretion to deny a petition on patents already challenged in other petitions (*General Plastic Industrial Co. v. Canon Kabushiki Kaisha*, IPR2016-01357, Paper 19, 9-10 (PTAB Sept. 6, 2017)), those factors appear inapplicable where, as here, it would have been impossible to challenge new or amended claims issued via a reexamination certificate *after* the prior petitions were filed. The instant petition should not be considered a second petition. To the extent that PO argues *General Plastic* applies (it does not), the factors weigh in favor of institution.

**Factor 1 weighs strongly against denial.** As noted above, it would have been

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<sup>15</sup> Petitioner did not requested reexamination.

impossible for Petitioner to file a petition on the amended and new claims of the '659 patent. There are no overlapping claims between this petition and Petitioner's and others' prior petitions challenging the '659 patent—this petition discusses (but does not challenge) claim 1 only to address the added limitations in new dependent claims 21-23 and 26-28. *See, supra*, §IV.B. Moreover, Petitioner's allegations regarding claim 1 in the instant proceeding are substantively identical to those in its prior petition. Therefore, if Petitioner's motion for joinder in IPR2024-01107 is granted and claim 1 is found patentable over the cited prior art, Petitioner will stipulate as to the patentability of claims 21-23, and 26-28 in the instant IPR.

**Factors 2 and 3 weigh against denial.** There are no concerns for road-mapping based on the Foil Boarding IPR. Petitioner relies on the same prior art, declarant, and arguments to address similar limitations in the new and amended claims, which renders moot the fact that the POPR and decision on institution have already passed in the Foil Boarding IPR. *Code200, UAB v. Bright Data Ltd.*, IPR2022-00861, Paper 18 at 5 (PTAB Aug. 23, 2022) (precedential) (“[R]oad-mapping concerns are minimized when...a petitioner files a later petition that raises unpatentability challenges substantially overlapping with those in the previously-filed petition and the later petition is not refined based on lessons learned from later developments.”). For example, Petitioner's arguments as to claim 1 are unchanged

from IPR2024-01107. Furthermore, there are no road mapping concerns for limitations that differ from those addressed in prior IPRs, such as the requirement in claim 16 for a “surfboard-shaped flotation device.”

Petitioner’s knowledge of prior art references relied on in IPR2024-01107 (Factor 2) is likewise irrelevant where, as here, Petitioner could not have challenged the new or amended claims of the ’659 patent. Petitioner’s decisions to challenge only the new and amended claims while relying on substantially similar arguments as the prior petitions weigh against denial. *Code200*, 5 (finding Factors 2 and 3 to weigh against denial where there was no evidence of road-mapping).

**Factors 4 and 5 weigh against denial.** Petitioner filed this petition less than a month and a half after the ’659 patent reexamination certificate issued and less than three months since filing IPR2024-01107. The Board has routinely found larger delays of a few months to be reasonable. *See, e.g., Illumina v. Ravgen*, IPR2021-01271, Paper 12, at 21 (PTAB Jan. 26, 2022). The time elapsed since the earlier Foil Boarding IPR, is irrelevant because Petitioner could not have petitioned for inter partes review of new or amended claims until after they issued. The issuance of a reexamination certificate is more than sufficient reason to justify the time elapsed between Foil Boarding’s and the instant petition. Moreover, factors 4 and 5 should be given less weight because Petitioner is a different party from Foil Boarding. *Id.*,

20.

**Factors 6 and 7 weigh against denial.** Recognizing the finite resources of the Board, this Petition is narrowly tailored to address only the new and amended claims that could not have been previously challenged while recycling as much of the art and arguments as possible from the prior IPRs on the '956 patent. As noted above, any concerns over the sole overlapping claim (which is not challenged in this petition) are mitigated by Petitioner's stipulation. Instituting an IPR on the new and amended claims in this IPR well before final written decisions are (or would be) due in the Foil Boarding IPR and IPR2024-01107 would be the most efficient and timely way to address the patentability of these additional claims, as it would build on the Board's substantive knowledge gained in the earlier-filed proceedings. *See Signify N. Am. Corp. v. Cao Lighting, Inc.*, IPR2023-00214, Paper 4, 21 (PTAB June 15, 2023).

Finally, Petitioner's "multiple petitions...against the same patent is a direct result of Patent Owner's litigation activity," which weighs against denial. *Samsung Elecs. Co., v. Iron Oak Techs., LLC*, IPR2018-01554, Paper 9 at 29, 31 (PTAB Feb. 13, 2019). This IPR was motivated by PO's decision to obtain amended and new claims during reexamination.

**B. 35 U.S.C. § 325(d)**

Discretionary denial under § 325(d) is unwarranted because both Advanced

Bionics factors weigh against denial. *Advanced Bionics v. MED-EL*, IPR2019-01469, Paper 6 at 8-9 (PTAB Feb. 13, 2020).

**First**, the EvoloReport reference was not provided to the Office during prosecution or during the subsequent reexamination of the '659 patent,<sup>16</sup> and contains at least one material difference from the prior art previously considered that alone counsels against denial. During reexamination, PO's arguments hinged on the lack of a hydrofoil in the primary reference (Braden). *See, supra*, Section V.B. According to PO, the teachings of hydrofoils for unpowered watercraft in secondary references Rorabaugh or Woolley alone were insufficient to motivate the Examiner's proposed combinations because they would purportedly produce instability absent active moving surfaces or a tow rope. Ex-1024-659-Reexamination, 312. But EvoloReport—the primary reference relied on in this petition—not only contains the teaching allegedly missing from the art in reexamination (a powered watercraft/surfboard with a hydrofoil that lacks moving surfaces), but also encourages using the hydrofoil to provide the same type of stability taught by the '659 patent and Woolley. The combination of EvoloReport and Woolley is therefore

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<sup>16</sup> *Amazon.com, Inc. v. M2M Sols. LLC*, IPR2019-01205, Paper 14 at 15 (PTAB Jan. 27, 2020).

materially different from the one considered during reexamination of the challenged claims.

***Second***, although the EvoloReport (and the associated evidence concerning public availability in Exhibits 1019-1021) was not provided to the reexamination Examiner (Ex-1024-659-Reexamination, 357-363), the Examiner nonetheless materially erred by failing to seek out more information on EvoloReport and issue a rejection based on EvoloReport. This is confirmed by the Board's institution of the Foil Boarding IPR based on the same references and nearly identical arguments to those in this petition. Moreover, there is no evidence the Examiner had access to (much less considered) the Board's May 28, 2024 decision instituting the Foil Boarding IPR when the Notice of Intent to Issue a Reexamination Certificate was issued on June 24, 2024. Accordingly, the Board should not exercise its discretion to deny institution.

## **XII. CONCLUSION**

Petitioner respectfully requests institution of IPR to cancel claims 16-23 and 26-28.

Respectfully submitted,

Dated: September 17, 2024

/David L. Cavanaugh/  
David L. Cavanaugh  
Registration No. 36,476

**Table of Exhibits for U.S. Patent 9,586,659 Petition for *Inter Partes* Review**

| <b>Exhibit</b> | <b>Description</b>                                                                                                                                                                                                                                       |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1001           | U.S. Patent No. 9,586,659 C1 (“’659 Patent”)                                                                                                                                                                                                             |
| 1002           | Declaration of Stefano Brizzolara, Ph.D.                                                                                                                                                                                                                 |
| 1003           | Certified English Translation of Evolo slutrapport (“Evoloreport”)                                                                                                                                                                                       |
| 1004           | Affidavit of Bjorn Lofgren Regarding Translation of Evoloreport                                                                                                                                                                                          |
| 1005           | Swedish-Language Version of Evolo slutrapport                                                                                                                                                                                                            |
| 1006-1010      | RESERVED                                                                                                                                                                                                                                                 |
| 1011           | U.S. Patent No. 6,443,786 (“Woolley”)                                                                                                                                                                                                                    |
| 1012           | RESERVED                                                                                                                                                                                                                                                 |
| 1013           | U.S. Patent No. 8,290,636 (“Manning”)                                                                                                                                                                                                                    |
| 1014           | RESERVED                                                                                                                                                                                                                                                 |
| 1015           | U.S. Patent No. 9,359,044 (“’044 Patent”)                                                                                                                                                                                                                |
| 1016           | Prosecution History of ’044 Patent                                                                                                                                                                                                                       |
| 1017           | Prosecution History of ’659 Patent                                                                                                                                                                                                                       |
| 1018           | Declaration of Jakob Kutenkeuler                                                                                                                                                                                                                         |
| 1019           | Affidavit of Ingmarie Rohdin Regarding English Language Translation of Batnytt Magazine Article; Swedish Language Version of Batnytt; English Translation of Båtnytt Magazine Article (“Batnytt”)                                                        |
| 1020           | Affidavit of Ingmarie Rohdin Regarding Translation of Batnytt Magazine Viewership Information for 2009; Swedish Language Version of Batnytt Viewership Information; English Language Translation of Batnytt Viewership Information (“BatnyttViewership”) |
| 1021           | Internet Archive Declaration of Nathaniel E Frank-White                                                                                                                                                                                                  |

Petition for *Inter Partes* Review of U.S. Patent No. 9,586,659  
IPR2024-01391

|      |                                                                                                                                                       |
|------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1022 | RESERVED                                                                                                                                              |
| 1023 | Claim Construction Order from <i>MHL CUSTOM, INC. v. WAYDOO USA, INC. and SHENZHEN WAYDOO INTELLIGENCE TECHNOLOGY CO., LTD</i> , C.A. No. 21-0091-RGA |
| 1024 | Prosecution History of Application No. 90/015,269 (Reexamination of U.S. Patent No. 9,586,659) (“659-Reexamination”)                                  |
| 1025 | U.S. Publication No. 2011/0111650 (“Braden”)                                                                                                          |
| 1026 | U.S. Patent No. 5,544,607 (“Rorabaugh”)                                                                                                               |
| 1027 | U.S. Patent No. 8,659,661 (“Frank”)                                                                                                                   |
| 1028 | <i>MHL Custom, Inc. v. Waydoo USA, Inc., et al.</i> , 1:21-cv-00091, DN153, Memorandum and Opinion (“Summary Judgment”)                               |
| 1029 | U.S. Patent No. 6,702,634 B2 (“Jung”)                                                                                                                 |
| 1030 | U.S. Patent No. 3,262,413 (“Bloomingdale”)                                                                                                            |
| 1031 | U.S. Patent No. 4,274,357 (“Dawson”)                                                                                                                  |
| 1032 | U.S. Patent No. 7,047,901 (“Chen”)                                                                                                                    |

Petition for *Inter Partes* Review of U.S. Patent No. 9,586,659  
IPR2024-01391

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|------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| 1033 | <i>MHL Custom, Inc. v. Waydoo USA, Inc., et al.</i> , 1:21-cv-00091, DN31 and 31-1, Joint Claim Construction Chart (“Proposed Constructions”) |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------|

**CERTIFICATE OF SERVICE**

I hereby certify that on September 17, 2024, I caused a true and correct copy  
of the foregoing materials:

- Petition for *Inter Partes* Review of U.S. Patent No. 9,586,659
- Table of Exhibits
- Exhibits 1001-1005, 1011, 1013, 1015-1021, 1023-1033
- Word Count Certificate of Compliance
- Fee Authorization
- Power of Attorney

to be served via express mail on the Patent Owner at the following correspondence  
address of record as listed in Patent Center:

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A courtesy copy has also been provided via electronic mail to counsel for  
Patent Owner in IPR2024-0085 at the following addresses:

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**WORD COUNT CERTIFICATE OF COMPLIANCE**

I hereby certify that the foregoing Petition for *Inter Partes* Review of U.S. Patent No. 9,586,659 contains 13,829 words as measured by the word processing software used to prepare the document, in compliance with 37 C.F.R. § 42.24(d).

Respectfully submitted,

Respectfully submitted,

Dated: September 17, 2024

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