

PRESS BOOK  
2017 - 2020



# INTRODUCTION

Following a record breaking few years - from announcing the partnership with Aston Martin and together developing the ultra-luxurious Project Neptune submersible in 2017; the delivery of the world's first submersible certified to 'Unlimited Depth' in 2018 and its year-long expedition diving the deepest point of each of the five oceans in 2019; to the delivery of the first significant tourist submersible in 30 years, the Triton DeepView 24 in early 2020, to mention just a few projects - Triton Submarines has generated an astonishing amount of media coverage.

The following document presents a collection of articles from notable publications, organized by year, to illustrate some of the interest that Triton has received during this time.

TOTAL
ARTICLES - 4,183
REACH - 9,535,959,370
ADVERTISING EQUIVALENCY - \$88,203,477









## 2020 - Q1, Q2 & Q3

2020 has seen the delivery of the first significant tourist submersible for over 30 years - the 24 passenger, 100 meter capable, acrylic hulled Triton DeepView 24 to a client in Vietnam.

Triton also announced record breaking sales for Q1, as well as a second round of dives in the Mariana trench with the full ocean depth Triton 36,000/2 submersible - the Ring of Fire Expedition - including taking astronaut Kathy Sullivan and Kelly Walsh, the son of Don Walsh, to the bottom of Challenger Deep.

TOTAL

ARTICLES - 285

REACH - 1,942,070,000

ADVERTISING EQUIVALENCY - \$17,960,000



TRITON 3300/6



TRITON 1650/7 CONFIGURABLE



TRITON 7500/3



TRITON DEEVIEW



As featured in  
*The CEO Magazine*  
For more info visit  
[theceomagazine.com](http://theceomagazine.com)

# GREEN WITH ENVY

A NEW WAVE OF ECO-FRIENDLY SUPERYACHT TOYS HAS ARRIVED – AND THEY CHANNEL 007 WHILE DITCHING FOSSIL FUELS.

WORDS CHRISIE MCCLATCHIE

**T**he future of yachting is green. That's the word from Daniela De Marco, Head of Charter Management Europe at Fraser. "Yachting is moving in a greener direction and clients are increasingly aware of the impact of their yachting activities on our oceans and the planet," she explains. It's a sentiment echoed by the yacht brokerage's CEO, Raphael Sauleau, in a recent *Wealth-X* report, "Luxury Yachting Market: Five trends influencing the global yachting industry". "All sectors are involved [in sustainability initiatives], from the paint manufacturer to the engine supplier," he says.

With a product selection that spans from superhero-inspired jetpacks to oversized inflatable slides, superyacht tender

and toys have always been the fun side of the industry. A new wave of water toys is hitting the market that manages to combine old-fashioned thrills with eco-friendly credentials.

While it's hard not to marvel at the technological ingenuity behind electric jetskis and energetic waterbikes, sometimes it's the simplest ideas that are the most enduring. "For the past few years, there has been a growing trend for eco-bio golf balls that allow clients to tee off from the yacht into the ocean without any environmental consequences," Daniela continues.

Here are five businesses scoring a hole in one with their sustainable water toy innovations.

## RADINN

*The Financial Times* has called electric surfboards "the jet set's new joy ride" and there's no doubt that a jet board, as it is also known, is the latest must-have accessory in every superyacht's toy box. While there's no shortage of choice on the market, Swedish startup Radinn has been making waves thanks to a modular design that allows you to adapt the board to your skill level and intended use: explore (for beginners); freeride (which is "easy to learn, challenging to master", according to its makers); and carve (for advanced riders). Built around an electric jetpack and controlled via a handheld, wireless remote, this silent eco-ride cuts through the noise of its petrol-powered rivals and guarantees long-range action thanks to top speeds of 58 kilometres per hour and a powerful battery pack. The recently released G3 collection of next-generation jet boards has raised the bar even higher with a new jetpack controller. "Our improved technology unleashes higher speeds and faster acceleration," says Radinn's Founder, Alexander Lind.

[radinn.com](http://radinn.com)

LUCKY LADY is available  
for charter with Fraser.



## QUADROFOIL

When a Formula One world champion has been snapped behind the wheel of your electric hydrofoil (as Nico Rosberg was in Ibiza last European summer), describing it as a "sports car" for the water seems more than appropriate. No doubt the now-retired German driver felt at home with the interactive race car steering wheel and sleek, state-of-the-art design. Adrenaline junkies, whether professional racers or not, have the team of engineers and nautical enthusiasts at Quadrofoil to thank for a futuristic water toy unlike any other on the market.

The Slovenian company's Q2 range of hydrofoiling watercraft needs to reach just 12 kilometres per hour to fly over bodies of water such as lakes, rivers and bays, but there's plenty more room to accelerate with top speeds of 40 kilometres per hour. Battery-powered and with zero emissions and almost zero noise pollution, these watercraft can be enjoyed in protected zones where motorised vessels are forbidden – making it the perfect companion to expedition cruising in remote corners of the world.

[quadrofoil.com](http://quadrofoil.com)



## TRITON SUBMARINES

While its partnership with Aston Martin for the limited-edition Project Neptune model has only strengthened Triton Submarines' enviable position atop of every yacht owner's toy wishlist, sustainability has been at the core of the civil submersibles business since day one. "In terms of environmental impact, subs are completely non-polluting: they are virtually silent, there are no emissions and all consumables are naturally occurring gases and minerals," Triton's Craig Barnett explains. Yet there's a wider angle to

consider: the role these battery-operated "toys" play in raising awareness of the world below the waterline. "Subs like ours are such a platform to increase public engagement with the marine environment," he continues. From taking Sir David Attenborough and his team to the depths of the ocean floor for *Blue Planet II*, to the more than 40 marine species its innovations have helped discover, each sub "acts as a catalyst for understanding more about our oceans and how we can protect them for the future". Craig explains.

[tritonsubs.com](http://tritonsubs.com)

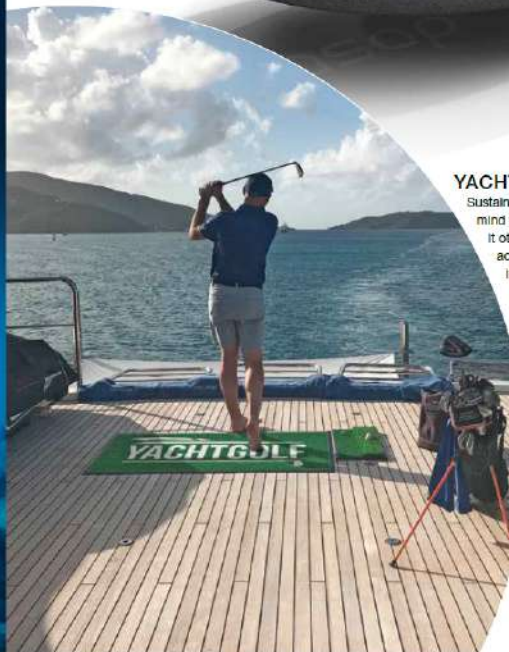


## ASAP WATER CRAFTS

Asap Water Crafts' Wave Jam is the ultimate university project come good for Ross Kemp, the company's Founder. "It kind of evolved from my student days when I saw an opportunity for something that had power, but that was quick to launch and that one person could pick up and throw in the water," he explains. The original intention was to design a rescue product but, somewhere along the way, he realised his innovation was also a lot of fun. After a few modifications, the safety craft also became a pleasure craft and clients now include national fire and rescue departments and yacht brokers. "The main difference between the two is that you can drive the rescue model one-handed so that you can grab

someone with your free hand, whereas with the Wave Jam (leisure) version you have to have both hands on the throttle," he says, adding that both share the same speed and power. Although marketed as an electric jet board, the riding position is closest to bodyboarding, as is the sensation when you catch a wave. "What I love most about the experience is the feeling of being blasted through the water," Ross enthuses. The intention was always to bring to market a battery-powered product for simplicity, ease of maintenance and cost – but the silence means our boards fit in nicely where noisy motors have been banned," he grins.

[asapwatercrafts.com](http://asapwatercrafts.com)



## YACHT GOLF

Sustainability was at the forefront of Kristian Hunter's mind when founding Yacht Golf. "I wouldn't have done it otherwise," the Hong Kong-based entrepreneur acknowledges. His luxury golf events business was inspired by gatherings he had organised on Sir Richard Branson's Necker Island, where it had been imperative "to find golf balls that wouldn't pollute the ocean", as he explains. Enter Albus Golf, whose EcoBioBalls are single-use, biodegradable golf balls with fish food at their core. The Barcelona-based business has become the ideal partner for its Yacht Golf days and personalisable Yacht Golf kits, which are set to be released later this year.

What's the attraction of playing golf on a yacht? "It's a unique experience," Kristian explains. After all, most people have swung a golf club – but not necessarily on the water. "It's enjoyable for everyone, not just serious golfers. After all it combines two luxury pastimes in one!" And it's all the sweeter given its role of nourishing underwater life. ■

[yachtgolf.com](http://yachtgolf.com)



The New York Times

## Second Woman Quickly Follows First to Ocean's Nadir

The mountaineer Vanessa O'Brien is set to dive to the Challenger Deep, seven miles below the surface of the sea.



The submersible Limiting Factor, a two-person craft piloted by Victor Vescovo, after a dive to the deepest known point of the Mariana Trench in the Pacific last year. Tamara Stubbs/Atlantic Productions for Discovery Channel, via Associated Press

By William J. Broad

June 10, 2020



The second of two women is poised to make history by diving to the ocean's deepest spot: the Challenger Deep, the lowest point of the Mariana Trench, the greatest of the sea's many recesses.

The long fissure of the western Pacific lies 200 miles southwest of Guam. The deep's muddy bottom lies nearly seven miles down in inky darkness under crushing pressure.

If waves, technology and weather permit, [Vanessa O'Brien](#), 55, a star of adventure tourism, is to dive into the icy abyss on Thursday or Friday. Her moment comes after [the plunge on Sunday](#) of Kathy Sullivan, 68, an oceanographer, astronaut and the first American woman to walk in space.

Both women are passengers of [Victor L. Vescovo](#), a wealthy investor who has climbed Mount Everest and [last year piloted a mini submarine](#) into the Challenger Deep.

His innovative craft is up for sale, and earlier this year [a London firm was selling dives](#) on the expedition for \$750,000.

Men who have made the descent include James Cameron, the maker of the “Avatar” and “Titanic” films, who explored the deep in [a 2012 dive](#), and two Navy divers in 1960. Dr. Sullivan became [the eighth person](#) in history to reach the deep’s bottom, and the first woman.

Mr. Vescovo calls his diving venture [Caladan Oceanic](#), after a water-covered planet in the science-fiction saga “Dune.” His [two-person craft](#) features an inner five-foot sphere made of titanium, a superstrong metal, and three portholes the size of dinner plates. He had it built [by Triton Submarines](#), a company in Sebastian, Fla. The diving vessel and its mother ship cost \$48 million.

In [a recent profile](#), The New Yorker described Mr. Vescovo as part of an elite group of explorers setting the last meaningful records on Earth.

In an email Tuesday, Mr. Vescovo said that Ms. O’Brien was paying for her dive but gave no specific figure.

“Funds she provides will allow me to fund longer science missions in the northern Mariana Trench,” he wrote. Those dives are planned for July, Mr. Vescovo said.

Mr. Vescovo added that Ms. O’Brien’s financial contribution would help pay not only for her own dive but also for the expedition’s monthlong seabed mapping effort for [the National Oceanic and Atmospheric Administration](#) and a project of the International Hydrographic Organization known as [the General Bathymetric Chart of the Oceans](#).



Vanessa O'Brien during a news conference in Islamabad, Pakistan, in 2017, as she prepared to reach the summit of the world's second-highest peak, K2. Aamir Qureshi/Agence France-Presse — Getty Images

Ms. O'Brien [told Forbes in April](#) that she decided to pay for her part of the expedition in lieu of signing up backers, as extreme adventure fans often do. “It didn’t seem appropriate to try and find sponsors,” she said, at a time when the global coronavirus pandemic had upended so many lives.



[Vanessa Audi Rhys O'Brien](#) grew up in Grosse Pointe Farms, Mich., worked for Barclays and Morgan Stanley and is the author of a [forthcoming memoir](#), "To the Greatest Heights." The book describes Ms. O'Brien's fall from the corporate ladder during the 2009 economic downturn and her quest for new meaning in global mountaineering.

In the depths of the global ocean, the line between raw exploration and adventure tourism has long been murky. In 1985 the deteriorating hulk of the Titanic [was discovered](#) some 73 years after the luxury liner, said to be unsinkable, struck an iceberg on its maiden voyage and went down in waters more than two miles deep, resulting in the loss of more than 1,500 lives.

By 2003, [scientists warned](#) that visitors in newly capable miniature submarines were endangering the world's most famous shipwreck. Assailed by explorers, moviemakers, salvors and tourists — including a couple that was married on its sunken bow — as well as rust and seabed creatures, the iconic liner was described as rapidly falling apart.

It is not uncommon for tourist-dive companies to perform a measure of scientific research as an adjunct to their commercial ambitions. In an interview last year, Mr. Vescovo said that he saw his own push for deep exploration — including what [his team has called](#) the world's first crewed "expedition to the deepest point in each of the five oceans" — as helping rekindle interest in the planet's lifeblood.

"Hopefully, it will spur more interest in the ocean and real science," he said. "No one has ever been to these places before and measured them. We'd like to continue to see that done. I hope it leads to a renaissance in deep-sea exploration."



## ПЛАВУЧАЯ ФАБРИКА МЫСЛИ

СПАСЕНИЕ МИРОВОГО ОКЕАНА – ВОТ, ЧТО ДВИЖЕТ СОЗДАТЕЛЯМИ УНИКАЛЬНОГО, КРУПНЕЙШЕГО НА ПЛАНЕТЕ ЭКСПЛОРЕРА REV (RESEARCH EXPEDITION VESSEL). СУДНО С ИННОВАЦИОННЫМИ ЛАБОРАТОРИЯМИ И СОВРЕМЕННЫМ ОБОРУДОВАНИЕМ СТАНЕТ АРЕНОЙ ДЛЯ УЧЕНЫХ, ИССЛЕДОВАТЕЛЕЙ И МОРСКИХ ЭКСПЕРТОВ СО ВСЕГО МИРА. ФИНАНСИРОВАНИЕ ЭКСПЕДИЦИИ ПО ОЗДОРОВЛЕНИЮ ОКЕАНА ОБЕСПЕЧИТ СДАЧА СУПЕРЛОДКИ В ЧАРТЕР.

ЕЛЕНА БОЙКО

СУДНО БУДЕТ ОСНАЩЕНО  
ТРАЛОВЫМИ СЕТЯМИ,  
КОТОРЫЕ СМОГУТ СОБИРАТЬ  
ПЛАВАЮЩИЕ ПРЕДМЕТЫ  
И ПОДАВАТЬ ИХ В БОРТОВУЮ  
МУСОРОСЖИГАТЕЛЬНУЮ ПЕЧЬ

ФОТО: OCEANART, RUSSON



182,9  
МЕТРОВ  
Длина

22  
МЕТРА  
Ширину

5  
МЕТРОВ  
Осадка

17  
УЗЛОВ  
Максимальная  
скорость

18  
Килог  
Тоннаж

54/36  
ЧЕЛОВЕК  
Экипаж/пассажиры



## REV СМОЖЕТ СОВЕРШИТЬ КРУГОСВЕТНОЕ ПУТЕШЕСТВИЕ БЕЗ ДОЗАПРАВКИ ТОПЛИВОМ

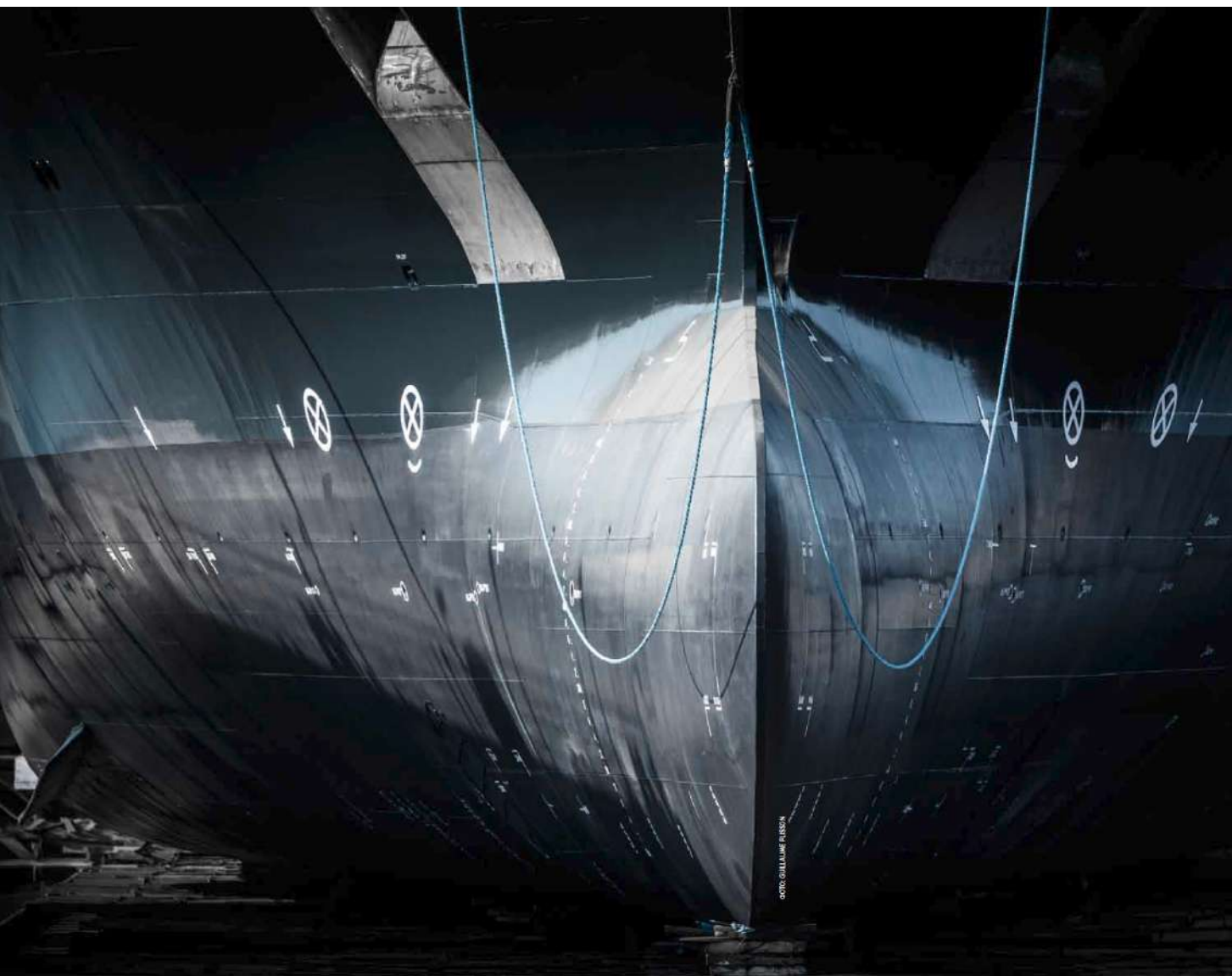
### ГЛОБАЛЬНЫЕ РЕШЕНИЯ

Главная задача судна – обеспечить платформу не только для изучения океана, но и для его очистки. Около 4000 квадратных метров пространства на борту посвящено исследованиям, что составляет примерно 40% от общего объема. Огромные внутренние размеры REV позволяют комфортно разместить не только большую исследовательскую команду, но и многочисленное научное оборудование, а также лаборатории с имитацией различных климатических условий. Судно будет оснащено гравитационными сетями, которые смогут собирать плавающие предметы и подавать их в бортовую мусоросжигательную печь. Полученное тепло используют для питания бортовых систем, при этом выброс вредных испарений будет сведен к абсолютному минимуму. Часть программы REV по сохранению морской среды заключается в изучении редких и исчезающих видов рыб. Океанографы смогут проводить съемку течений, морского дна, рыб, животных и растений.

### ФИНАНСОВАЯ СТОРОНА

На первый взгляд кажется удивительным и не совсем логичным решение о постройке такого судна частным инвестором. На что Хельми Инге Рекке отвечает следующее: «Возможно, вовсе не требуется экономическое основание для подобного строительства – все это делается для океана, а не для личных нужд. Я с нетерпением ожидаю сотрудничества с учеными, экологами и знающими людьми, ориентированными на поиск решения проблем: как в Норвегии, так и на международном уровне. И да, это удивительно: мы, наверное, знаем больше о космосе, чем об океане. Я провел половину жизни в море. Теперь я буду изучать вопрос еще глубже вместе с экологическими организациями и другими сообществами. Кроме того, суперяхта более чем пригодна для чартера частным лицам, компаниям и учреждениям. Это обеспечит финансирование исследований. И я, и мои близкие обязательно будем брать судно в чартер для незабываемых морских прогулок».





#### ВЫСОКИЕ СТАНДАРТЫ

В августе 2019 в румынском городе Тулча на верфи Vard состоялся технический спуск REV на воду. После этого мегаяхта отправится на верфь Vard в Норвегию. Во время Monaco Yacht Show 2019 был подписан контракт, согласно которому из страны визитов судно в апреле 2020 на год прибудет на финальную оснастку в немецкую Lloyd Werft.

Дизайн эксплорера разработала студия еще одного именитого норвежца – Эслена Ойно. В течение года ученые давали комментарии о том, какая именно лодка будет наиболее полезной для них. Выступая на Superyacht Design Symposium 2018, Ойно отметил, что владеет вовсе не собиравшись строить самую большую яхту: «Изначально судно имело длину около 140 метров, но для оборудования потребовались иные габариты». Сегодня 182,9-метровая REV – самая длинная яхта в мире и крупнейшее судно, вскоре доступное для чартеров. По расчетам инженеров, на скорости 11 узлов дальность плавания эксплорера составит 21120 морских миль. Это значит, что REV сможет совершить кругосветное путешествие без дозаправки топливом.

В исследовательских экспедициях судно готово принять до 90 человек, 30 из которых – члены команды. В чартерных круизах – 36 гостей, а также экипаж из 54 человек.

#### РЕВОЛЮЦИОННЫЙ БАТИСКАФ

Осенью 2019 года Triton Submarines объявила о продаже своего первого батискафа Triton 7500/3 компании REV Ocean. В подводном аппарате с акриловым корпусом три человека смогут погружаться на максимально возможную глубину – 2286 метра. Сфера изготовлена по запатентованной технологии, в результате чего акрил стал прочнее, прозрачнее и превосходит все, что было сделано ранее.

«Мы в восторге от того, что проект REV Ocean решил добавить Triton 7500/3 к огромному арсеналу подводных инструментов и оборудования на своем совершенно уникальном и революционном судне», – отметил президент Triton Патрик Лэхи.





Директор REV по науке об океане Алекс Роджерс добавил: «Я нырял с подлодками Triton во время многочисленных экспедиций, и они обеспечивают уникальные платформы для посещения океана и просмотра морских пейзажей. Новый батискаф Triton 7500/3 позволит океанологам REV посещать самые недоступные и уязвимые морские экосистемы, а также достигать наиболее продуктивных зон подводных гор и других объектов».

#### ВОПРОСЫ БЕЗОПАСНОСТИ

Каталитические конвертеры и фильтры, которыми оснастит дизель-электрическую силовую установку, позволят максимально снизить выбросы вредных веществ в окружающую среду. А за счет литий-ионных аккумуляторов судно будет перемещаться еще и бесшумно, чтобы не потревожить подводных обитателей. Инженеры позаботились и об экономии электроэнергии – благодаря технологии

Free Cooling система кондиционирования работает за счет разницы температур воздуха и воды на глубине. А для обогрева воздуха может применяться мусоросжигательная установка. Для переработки пригодны практически любые отходы, кроме стекла и металла. Также REV будет соответствовать стандартам безопасности SRP (Safe Return to Port): на судне используют новейшие системы пожаротушения и сохранения непотопляемости при повреждении корпуса, дублирующие элементы силовой установки и системы управления.

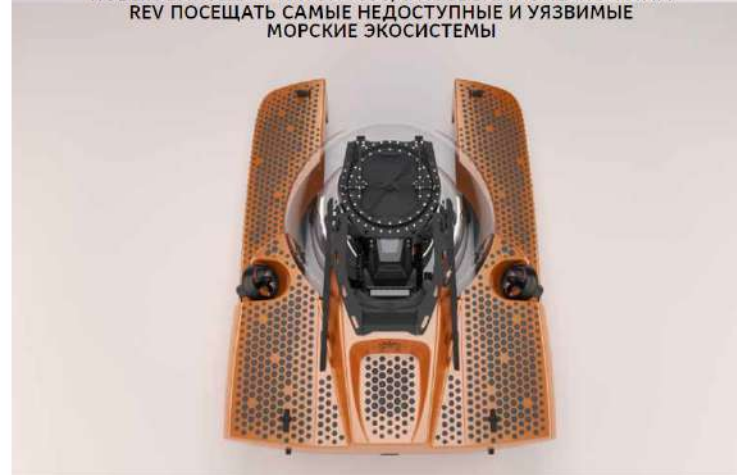
#### ИСКУССТВО РАДИ НАУКИ

Кроме роскошных кают для гостей, на борту обустроены лаборатории, конференц-зал на 40 человек, переговорные комнаты, тренажерный зал, столовая зона. Интерьер уникальной суперяхты – дело рук авторитетного мастера Джонни Хорсфилда и его команды H2 Yacht Design. Вме-

сто того чтобы «обходить» правила SOLAS, он воспринял их как возможность использовать новые материалы. К примеру, в дизайне REV гораздо меньше дерева, чем в большинстве яхт (оно считается пожароопасным). «Мы сделали ставку на металл и бетон, – говорит Хорсфилд. – В итоге получили современный стиль, я бы назвал его скандинавским, минималистичным. А эффектный атриум из шести лестничных пролетов можно считать произведением искусства». Однако ему придется выдержать конкуренцию. Художник, скульптор, участник группы A-ha, Магне Фурухольмен выступает консультантом проекта и собирает коллекцию норвежского искусства для гостей судна. Он представляет этот проект как амбициозный гибрид, призванный возродить желание инвестировать в науку



НОВЫЙ БАТИСКАФ TRITON 7500/3 ПОЗВОЛИТ ОКЕАНОЛОГАМ REV ПОСЕЩАТЬ САМЫЕ НЕДОСТУПНЫЕ И УЯЗВИМЫЕ МОРСКИЕ ЭКОСИСТЕМЫ



2020年代の必須科目30



## PERSONAL SUBMARINES



(1) 32-Bit Winx (2) 4年  
(3) レジャー (4) 44% (5)  
200m (6) 121600 (7) 3人  
(8) 2,500,000EUR (9) 橋  
ムンチャーター (10) 0.1%の増で転  
賃のため、ACがに減価増し。



## PRODUCTS

個人潜水艇でGO!

## Automa-3C

(1) 58Anagap (Hydrospap), (2) 1988年 10月 1日  
1988年 10月 1日 (3) 1,000円 (4) 1,000円  
(5) 1,000円 (6) 1,000円 (7) 1,000円  
(8) 1,000円 (9) 1,000円 (10) 1,000円  
で、資料提供が可能。

## JAPANESE

(1) 水深調査機 (2) 受信機  
(3) レジャー (4) 50 (5)  
水深調査機 120 (6) 水深調査機  
120 (7) 水深調査機 120 (8)  
水深調査機 (9) 水深調査機  
水深調査機 (10) 水深調査機



### Seabreacher Z

(1) Innaprom Promoters (2) 10年 (3) レジャー  
(4) 海外約15カ国・同社約22カ国 (5) 約1.5m (6) 本  
社は今年満了だが、昨年秋期の先行が可成 (7) 3人  
(8) 約10,000~130,000USD (9) 集入/レンタル  
(10) 東京は11月15日頃か遅くは16日、2月のジャンプ  
が初めて200万部を突破したと報告



## Triton 7500/3

[illegible]



## FEATURE: The incredible engineering behind the submarine that plumbed the deepest depths

15 Jun 2020  
Dominic Bliss



*The DSV Limiting Factor and its mother ship, the DSSV Pressure Drop (Credit: The Five Deeps Expedition)*

The Mariana Trench, at the bottom of the western Pacific Ocean, is the deepest place in any ocean.

The very deepest spot within it is the eastern pool of a valley called Challenger Deep, lying at 10,928m below sea level. It was here, in April 2019, that American private-equity millionaire Victor Vescovo achieved the deepest dive made by any human in history. It was part of his now completed mission – called the Five Deeps Expedition – to visit the deepest points of the world's five oceans.

Victor's vessel was a submarine called DSV Limiting Factor, a craft he had specially designed and built by Florida-based company Triton Submarines. "This submarine and its mother ship took marine technology to an unprecedented new level by diving – rapidly and repeatedly – into the deepest, harshest area of the ocean," he said after returning to the surface. "We feel like we have just created, validated and opened a powerful door to discover and visit any place, any time, in the ocean – which is 90% unexplored."

DSV Limiting Factor (or LF, as it's known for short) is, like its mother ship DSSV Pressure Drop, named after fictional spacecraft from the sci-fi novels of the late Scottish author Iain M Banks. It's an astounding piece of engineering. Designed by Triton's British engineer, John Ramsay, it measures 4.6m long, 1.9m wide and 3.7m high, resembling some sort of giant suitcase rather than a traditional cylindrical submarine.

Much of its bulk is taken up by buoyancy foam, made of tiny glass spheres suspended in polymer resin. Triton assigned its most high-tech craft the model number 36000/2 (36,000 being the maximum depth in feet it can dive to and two being the number of occupants it can accommodate).

## Titanium hull

Said occupants access the submarine via a hatch on the top before climbing down into the spherical pressure hull, forged from 90mm-thick titanium, with room inside for two people to sit comfortably on leather seats. From here, the pilot directs the vehicle using a joystick and a touchscreen, viewing the alien world outside through three 200mm-thick conical viewports made of acrylic.

The total weight of the sub – with submariners aboard – is around 11,700kg, fairly light for a submersible designed to withstand the crushing pressure at 11,000m below sea level. Its main lithium-polymer battery provides 65kWh of power, while a set of 10 electric thrusters allow it to move in all directions at a speed up to three knots. It can operate for up to 16 hours at a time. Ten external LED lights, each with 16,000 lumen, ensure the occupants have a great view of their surroundings, even in the darkest ocean depths where sunlight cannot penetrate. A robotic arm is used to collect samples and do experiments.



*A robotic arm was used to collect samples (Credit: The Five Deeps Expedition)*

Triton, based in a town on Florida's Atlantic coast called Sebastian, manufactures 10 different models of submarine for deep-sea exploration, with depth ranges of between 300m and 11,000m. Ramsay, who is based the other side of the Atlantic, in a Devon village called Meavy, designed all but one of them.

The LF is the most advanced, by a country mile. Its titanium pressure hull was forged and machined in the US, while the components were manufactured in the US, the UK, Germany, Spain and Australia.

Unusually for a deep-sea submersible, the two hemispheres of the pressure hull are bolted together rather than welded. Ramsay says many of his peers in submarine engineering warned him against using bolts, worried the seal between the hemispheres wouldn't hold at extreme depths. But he and the company's co-founder and president, Patrick Lahey, were convinced a combination of bolts and precisely machined contact surfaces was the best option. They both agreed that welding would pose too many risks.

"The titanium hemispheres are machined to within half a millimetre," Ramsay explains. "They're so incredibly precise. If you're then going to weld them together, you're throwing a whole load of heat into the equation, which changes the properties of the titanium, causing it to warp. We were adamant we were going to eliminate that risk."

## Sealed by pressure

They knew that when the LF was thousands of metres down, the external pressure of seawater would clamp the two hemispheres together, tightening the seal even further. "The seals between the hemispheres are actually low-pressure seals, designed to work at depths up to 1,000m," Ramsay adds. "Below that level the actual seal is generated by having metal on metal, forced together, which creates its own seal."

One of the most impressive achievements of the LF, Ramsay says, is its compactness. "The problem with submarines is, the bigger they get, the heavier they get," he says. "And the heavier they get, the more space they take up on the deck of the mother ship; and the bigger the handling system you need to take them in and out of the water. Everything grows exponentially in size."



He believes his LF submarine is lighter even than Deepsea Challenger, the vehicle that Canadian film director James Cameron used to visit the Mariana Trench in 2012. "But that was minuscule, with room for just one person in the foetal position," Ramsay adds. "Whereas, in the LF, two people can sit extremely comfortably side by side."

**Ballast devices**

The other major engineering achievement is the LF's ballast system. Most submarines carry ballast tanks containing compressed air at up to 300bar, the equivalent of water pressure at 3,000m down. Lower down than 3,000m, however, these air cylinders are likely to collapse – not very useful for Vescovo's voyage into the abyss. Instead, Ramsay incorporated three different ballast devices into his sub.

First is a ballast control tube containing twenty 5kg weights, used to submerge the submarine to the ocean floor. These are released one at a time until the LF's descent slows and the craft settles into position just above the seabed. Ramsay explains how, when the submarine reaches diving depth, it needs to be slightly positively buoyant so that it floats along just above the seabed. This allows the pilot to make small thrusts downwards in order to stay at the same depth. "Thrusting in a downwards direction doesn't stir up the seabed," Ramsay says. "If you have to thrust upwards to stay in place, though, it fires a jet of water downwards and stirs up the seabed so you can't see a thing. It's unbelievable how long it takes for the silt to settle after it has been stirred up. It can take hours."



*Victor Vescovo pilots the sub (Credit: The Five Deeps Expedition)*

The second ballast device is a set of huge steel weights on the bottom of the submarine, secured in place by electro-magnets. This is a failsafe system which – in case of power failure or if the pilot loses consciousness – automatically triggers the release of the weights, causing the craft to return to the surface.

Finally there is the air ballast which kicks in once the LF returns to the surface. This, Ramsay explains, uses a "clever combination of one-way valves" to increase the buoyancy and ensure the submarine remains with its top section above the sea surface once the mission is complete. "Without this extra buoyancy, you would reach the surface and the submarine would constantly be dipping up and down," Ramsay adds. "A wave would come, lift it up, and then the LF would dive back down below the surface." All this bobbing around would make it extremely difficult for the occupants to exit the hatch, or for divers to locate the craft; and very dangerous when the mother ship attempted to winch the submarine on board.



*One of three landers that supported LF and did extra scientific tasks (Credit: The Five Deeps Expedition)*

Given his intimate knowledge of the submarine's engineering, it was only right that Ramsay himself should have been offered a trip to the bottom of the Mariana Trench. His dive, piloted by his company boss Patrick Lahey, took place seven days after Vescovo had set the new depth record, and saw the two men visiting Challenger Deep's slightly less deep central pool. They spent just over three hours on the sea floor.

"I think Patrick and I are the only people who have dived into the central pool," Ramsay says of his experience, during which they captured geological and biological samples.

The ocean surroundings at that depth are like an alien planet. Descending from the ocean surface, the LF passes through several zones. First, from the surface down to around 200m, is the sunlight (or epipelagic) zone. This is followed by the twilight zone (200 to 1,000m), the midnight zone (1,000 to 4,000m), the abyssal zone (4,000m to a depth where much of the ocean floor lies), and finally the hadal zone (beyond depths of 6,000m), named after Hades, the underworld.

### Sea life at great depths

Ramsay describes the sea life he observed down in the hadal zone. "Mostly anemones and little shrimp-like things; little white creatures scampering around the seabed."

Not the most exciting beings, he admits, but he was surprised at just how much life there was down there. "You see a lot more than if you were swimming along the beach in Devon, which I do quite a lot," he adds.



*Sub designer John Ramsay (Credit: The Five Deeps Expedition)*

The LF has been busy since it completed Vescovo's Five Deeps Expedition. It has visited the wreck of the Titanic, for example. In February this year Vescovo dived in it again, this time to the deepest point in the Mediterranean – Calypso Deep – accompanied by Prince Albert II of Monaco.

Now the craft is up for sale. It might have a future in scientific exploration. It might be used for documentaries or feature films, or to visit sunken shipwrecks. It might simply ferry wealthy tourists to the bottom of the ocean.

But whoever ends up buying it will need pockets as deep as the ocean floor. The asking price is \$48.7m.



Thu 19 Mar 2020 10:54 AM

## US deep water submarine firm targets wealthy Middle Eastern buyers

A Saudi national took part in an expedition to the deepest point of the Red Sea, in a Triton Submarines model



Triton Submarines are priced from around \$4m.

A US-based company which manufactures deep water personal submersibles has described the Middle East as one of its “primary markets” and is targeting wealthy buyers in the region who want to add the next big toy to their superyacht, private jet or sports car.

Triton Submarines offers a range of submersibles which can dive to depths of up to 1,000 metres with around six passengers. The Florida-based company has also developed a larger model – the DeepView 24 – which can be used by tourism companies or high-net-worth-individuals (HNWIs).



"As the size of our client's vessels continues to grow, so we are experiencing a demand for submersibles that deliver extraordinary experiences for larger parties of guests," Triton's president Patrick Lahey said in a press statement.

According to [an article by The Guardian](#), around 30 personal submersibles are sold around the world to HNWIs each year, with the units ranging in price up to around \$35 million.

"The super-rich aren't happy to sit on the back of their yachts... They want to see what's beneath the surface as well as what's on top. They have seen Blue Planet, and they want to get down there and see it for themselves," a Triton spokesperson said, adding that the BBC's series narrated by Sir David Attenborough had helped see a spike in sales.

It is no surprise that the Middle East is a focal point for Triton, whose submarines are priced from around \$4m.

"The information about Triton clients is strictly confidential," a spokesperson told *Arabian Business* when we asked about specific buyers. "But they do have Arab buyers, as the Middle East is one of the primary markets."

The Five Deeps Expedition is being carried out by Caladan Oceanic, a private US company dedicated to the advancement of undersea technology and supporting exploration of the Earth's oceans.

As part of a partnership with the King Abdullah University of Science and Technology (KAUST) in Thuwal, Saudi Arabia, Caladan Oceanic's founder Victor Vescovo, along with Saudi national Mohammed A. Aljahdli, make the first-ever manned dive to the deepest point of the Red Sea, Suakin Trough. The team made the journey in a Triton 36000/2 model submarine.

"We are so excited about the collaboration between Caladan Oceanic and KAUST, and even more proud that our very own Mohammed Aljahdali is the first Saudi to reach the deepest point in the Red Sea," Justin Mynar, Executive Director of the KAUST Core Labs and Research Infrastructure, was quoted as saying.

Mynar said the Red Sea is virtually unexplored and is a major research priority for KAUST. "In order to protect this important resource, we need to understand it, and partnering with Victor has given us the opportunity to observe and sample the deepest and most inaccessible regions like never before," he added.



As part of efforts to promote their products in the region, Triton is involved in the Five Deeps Expedition initiative, which aims to dive to the deepest points on earth, including an expedition to the Red Sea.



"It was wonderful to join a young Saudi Arabian national to the bottom of the Red Sea in a manned submersible – for the first time in history. We also believe this will make him the deepest-diving Saudi of all time," Vescovo said in a press statement.



# AVENUE



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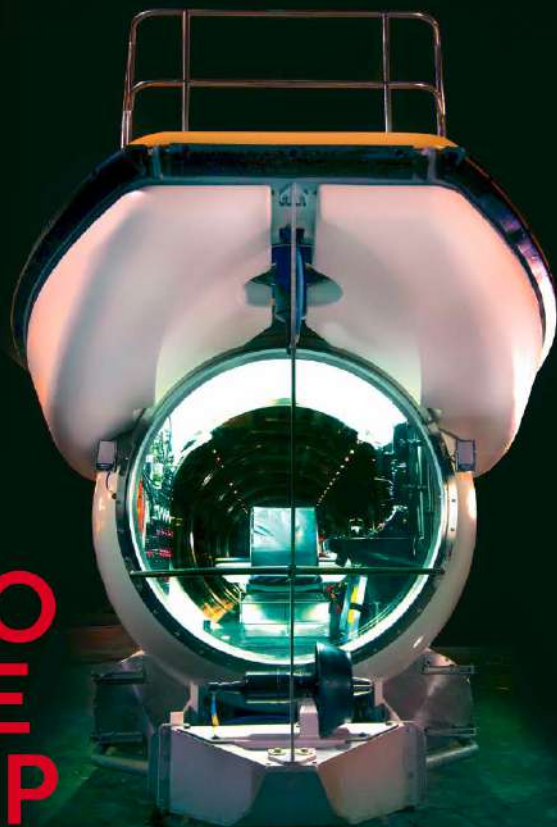


feature

Tourism

WORDS BY  
LAWRENCE SCHÄFFLER  
PHOTOGRAPHY BY  
TRITON SUBMARINES/  
JUAN CAMILO MORENO

# INTO THE DEEP



Guests at an exclusive, island resort in Vietnam can now view the region's colourful aquatic life in unparalleled clarity thanks to a new 24-person submarine with panoramic windows that takes tourists to depths of 100m in air-conditioned comfort.



OPPOSITE A submersible like no other – large panoramic windows offer excellent views of the aquatic life.

BOTTOM Fingertip control for getting guests around the reefs safely.

B

uilt by Florida-based Triton Submarines, the 15.4m DeepView 24 sports large, 140mm-thick acrylic windows, a radical design departure from the limited views provided by more conventional submarines.

This one is more akin to travelling in a clear, elongated tube, with enough headroom for passengers to stand. It was commissioned by luxury resort chain Vinpearl as an additional experience for guests staying at its resort on Vietnam's Hon Tre Island in Nha Trang.

Thanks to its electric propulsion and steering systems, the sub is virtually silent. It's powered by two 20kW main thrusters and four 12.6kW Vertran thrusters, all serviced by a 240kWh bank of lead-acid batteries. This keeps the sub operational for up to 14 hours, gliding along at a top speed of three knots.

And to offset the darkness and lack of colour in the depths, the vessel's fitted with ten 20,000-lumen LEDs. To control descents/ascents, the sub uses around 1,800kg of variable ballast in addition to 4,000kg of fixed main ballast.

The vessel is also the first of a range of Triton's DeepView tourist submarines that can be built in different lengths to customer specifications, able to accommodate between 12 and 66 passengers. As a modular design, additional sections can be added six seats at a time.

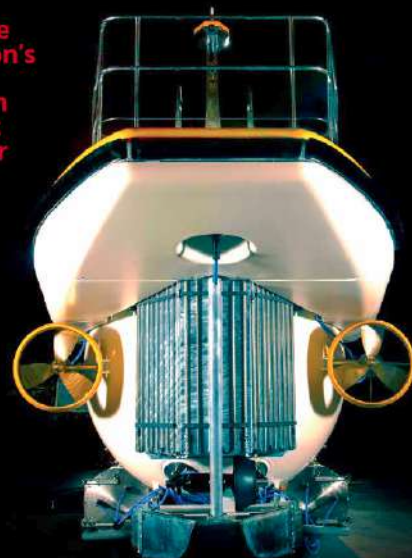


**FAR RIGHT** Two horizontal thrusters deliver a top speed of 3 knots – in total silence.

**BELOW** This is a submersible that doesn't require a hunched posture



The vessel is also the first of a range of Triton's DeepView tourist submarines that can be built in different lengths to customer specifications...



If you think the Triton name sounds familiar you'd be correct: the company is arguably the world's leading manufacturer of deep-sea exploration submersibles. Last year its *Limiting Factor* submersible made a record breaking dive to 10,927m – the planet's deepest point called Challenger Deep in the Mariana Trench.

Triton says DeepView 24 was developed in response to the rising demand from travellers and tourists for adventure and experience-based holidays. "This 'sub-sea tourism' has grown exponentially as interest in our oceans has developed, driven in part by the popularity of internationally-recognised programmes such as *Blue Planet II*."

Company co-founder and CEO Bruce Jones says with its panoramic views DeepView 24 represents a quantum leap forward in submarine technology, providing a vastly improved, fully-immersive guest experience.

"Of the near 60 tourist subs that have operated in the past 34 years, the DeepView 24 is competitively superior in all respects. It is the most significant commercial tourism submersible to be brought to market in the past two decades."

The pilot drives the sub with a joystick and touchscreen. There are manual overrides in case of malfunction, and the vessel is certified to International Classification Standards by DNV-GL.

For more information visit [www.tritonsubs.com](http://www.tritonsubs.com)

#### SPECIFICATIONS Triton DeepView 24

Operational depth	100m
Passengers	24
Crew	Pilot 9 Co-pilot
Speed	3 knots
Endurance	14 hours
Main ballast	4,000kg
Length	15.4m
Beam	3.6m
Height	3.6m
Weight	55,000kg
Acrylic thickness	140mm
Battery system	Dual supply & emergency
Main battery	240kWh
Main thrusters	2 x 20kW
Vertical thrusters	4 x 32.5kW
Controls	Joystick, touch screen, plus manual override
External lights	10 x 20,000 lumen LED
Life support	Oxygen & CO <sub>2</sub> scrubber





ARTICLE by TOM BURSON in YACHTS & JETS — APRIL 2020

# Triton's Latest Submersibles

A quartet of subs on the Triton fleet



Last year was a record-setter for Triton Submarines. The leading innovators of the submersible market developed the 36000/2 Full Ocean Depth submersible and set records in manned exploration missions during the Five Deeps Expedition. This year looks to be more of the same from Triton.

In just the first half of this year, the renowned brand will deliver three new units: the first six-person submersible capable of reaching 1,000m depths in the Triton 3300/6 Configurable, a new tourism sub with the DeepView 24; and a welcome addition to their "superyacht sub" series in the Triton 1650/7 Configurable. This in addition to a late 2019 announcement of the Triton 7500/3, which is set to be the world's deepest diving acrylic pressure hulled submersible.

Here's a quick preview of the upcoming fleet.

## Triton 3300/6 Configurable



Featuring Triton's largest acrylic pressure hull produced to date, this six-person submarine was designed to deliver extraordinary experiences for larger parties of guests. Capable of reaching depths of 1,000m and boasting a staggered, stadium-seating arrangement, the 3300/6 offers a true shared experience exploring the world's oceans (and their floors).

## Triton DeepView 24



Following a stretch of sea trials in March, Triton DeepView 24 looks like it might revolutionise commercial submersible tourism. The vessel can carry up to 24 passengers and 2 crewmembers to depths of up to 100m, and an intuitive modular design means larger capacities are also available. The stunning Paul Moorhouse design features four acrylic sections at the focal point of the pressure hull, which offer vast panoramic windows that deliver a truly immersive experience.

## Triton 1650/7 Configurable



Described as "a salon under this sea," this 1650/7 Configurable promises to provide the ultimate experience in undersea opulence. This vessel will be able to dive to depths of 500m, though maintain an increased interior volume of a capacious 6.37 cubic metres and an interior design reminiscent of a yacht.

## Triton 7500/3



Assigned to Project REV, the world's largest explorer yacht-in-waiting, at the end of 2019, this remarkable submersible, which is currently under construction, is set to dive to an astonishing 2,286m, earning the title of the world's deepest diving acrylic pressure hulled submersible. It's a design set to push the technological and innovative standards of the industry while simultaneously allowing for a more comprehensive understanding of our oceans.

For more information on the submersibles, [visit the website](#).



## Pictured: The incredible 24-person submarine with vast panoramic windows that will take tourists to depths of up to 328ft in air-conditioned comfort

- The Triton DeepView 24 affords passengers amazing views from the comfort of a 50ft-long interior
- It has been made by Florida-based Triton Submarines, which made the record-breaking Limiting Factor
- The Limiting Factor vessel last year made a record-breaking dive to the deepest point in the planet's oceans

By TED THORNHILL, MAILONLINE TRAVEL EDITOR

PUBLISHED: 07:01 EDT, 8 May 2020 | UPDATED: 07:23 EDT, 8 May 2020



17  
View comments

An incredible submarine is all set to give tourists a sea view like no other.

The Triton DeepView 24 can take 24 passengers to depths of up to 100m (328ft) and afford them magnificent views thanks to vast panoramic windows – and all from the comfort of a 15.4m (50.5ft) long air-conditioned interior big enough to stand up in.

Anyone feeling nervous about stepping on board should note the company that has built it – Triton Submarines. It knows a thing or two about underwater vessels, having manufactured the **Limiting Factor** submersible that last year made a record-breaking dive to the deepest point in the planet's oceans, Challenger Deep in the Mariana Trench – 10,927m (35,853ft) beneath the surface.



© Juan Camilo Moreno

The Triton DeepView 24 can take 24 passengers to depths of up to 100m (328ft) and afford them magnificent views thanks to vast panoramic windows



© Juan Camilo Moreno

DeepView 24 has been built by Triton Submarines, which manufactured the Limiting Factor submersible that last year made a record-breaking dive to the deepest point in the planet's oceans, Challenger Deep in the Mariana Trench

Florida-based Triton said in a statement that DeepView 24 is 'the most significant commercial tourism submersible to be brought to market in the past two decades'.

The vessel, it explained, is virtually silent, entirely non-polluting and is easy to board and disembark – even for passengers with reduced mobility – thanks to a generous access hatch.

It continued: 'DeepView 24 was developed in response to the rise in demand from travellers and tourists alike for adventure and experience-based holidays. This "sub-sea tourism" has grown exponentially as interest in our oceans has developed, driven in part by the popularity of internationally recognised programs such as Blue Planet II.



© Juan Camilo Moreno

Florida-based Triton said in a statement that DeepView 24 is 'the most significant commercial tourism submersible to be brought to market in the past two decades'



© Juan Camilo Moreno

The vessel has been commissioned by hospitality firm Vinpearl to provide guest experiences on Hon Tre Island in Nha Trang, Vietnam

'Today, an experience within the optically perfect hull of the Triton DeepView 24 will create an entirely new generation of stewards for our oceans.'

The vessel has been commissioned by hospitality firm **Vinpearl** to provide guest experiences on Hon Tre Island in Nha Trang, Vietnam.

The vessel was assembled at Triton's manufacturing facility in Barcelona, where it successfully passed sea trials in March. It's due to operate ticketed dives for resort guests in December.

Bruce Jones, Co-Founder and CEO of **Triton Submarines**, said: 'The Triton DeepView 24 with its panoramic view represents a quantum leap forward in submarine technology, providing a vastly improved, fully-immersive guest experience.'

'Of the near 60 tourist subs that have operated in the past 34 years, the DeepView 24 is competitively superior in all respects.'

'The variation in size, with models that will seat from six to 66 passengers means there is a sub suitable for a wide range of operators in different locations. And a DeepView experience is terrific for encouraging guests to promote environmental stewardship after directly experiencing the seafloor environment.'



© Juan Camilo Moreno

The vessel was assembled at Triton's manufacturing facility in Barcelona



© Juan Camilo Moreno

Bruce Jones, Co-Founder and CEO of Triton Submarines, said: 'The Triton DeepView 24 with its panoramic view represents a quantum leap forward in submarine technology, providing a vastly improved, fully-immersive guest experience.'



## Inside the New Triton Deepview 24 Submarine

The Deepview 24 is the most significant commercial tourism submersible in the last two decades.

BY ALEX MARTIN | JUNE 2 2020



Passengers will see the wonders of the ocean down to 333ft / ©Juan Carrillo MorenoEditing & retouching Special Project  
Six.



The submarine offers unrestricted views



World-leading technology propels the submersible

**Triton Submarines**, the company behind the groundbreaking **Five Deeps mission**, has once again pushed submersible technology to new heights with the release of the Deepview 24.

The new submarine is capable of carrying up to 24 passengers to depths of 328ft, where it will offer unrestricted views of marine wildlife through state-of-the-art panoramic windows.

It marks the most significant step forward in commercial submarine technology in the last two decades and further seals Triton Submarines' reputation as the world's leading submersible company. In 2019, its prototype successfully guided adventurer Victor Vescovo to the deepest point in each of the world's five oceans.

The technology that allowed Vescovo to travel to depths of almost 36,000ft has gone into the development of Deepview 24, which will begin public operations in December. The first client, hospitality specialists **Vinpearl**, plans to offer excursions beneath the waves around Hon Tre Island in Nha Trang, Vietnam.



The interior has enough space for 24 passengers

Tourists brave enough to board the 50.5ft submersible will be treated to an immersive experience that has hitherto only been available to a select few. As well as unbroken views of the ocean, the cabin will also be a comfortable environment: It is big enough to walk around in and fully air-conditioned. It has also been designed with a generous entrance hatch, allowing passengers with reduced mobility to board with ease.

Virtually silent and entirely non-polluting, Deepview 24 will cause minimal disturbance to the environment. It was developed after what the company claim has been an exponential growth in demand for sub-sea tourism.

Bruce Jones, co-founder and CEO of Triton Submarines, said: "The Triton DeepView 24 with its panoramic view represents a quantum leap forward in submarine technology, providing a vastly improved, fully-immersive guest experience. Of the near 60 tourist subs that have operated in the last 34 years, the DeepView 24 is competitively superior in all respects.

"The variation in size, with models that will seat from 6- to 66-passengers means there is a sub suitable for a wide range of operators in different locations. And a DeepView experience is terrific for encouraging guests to promote environmental stewardship after directly experiencing the seafloor environment."

The company has also announced plans to create bigger models capable of carrying up to 66 passengers.

**Images: @Juan Camilo Moreno**





**100m**  
The depth that  
DeepView can dive  
to while carrying 24  
passengers

## Under pressure

With underwater tourism set to become the next big frontier in "experiential tourism", recreational sub manufacturers like Florida-based Triton Submarines are gearing up with state-of-the-art vessels

BY VARUN GODINHO

**T**he Five Deeps Expedition, which concluded in August last year, had an impressive mandate. It successfully undertook manned expeditions to the bottoms of the world's five oceans including the Puerto Rico Trench (Atlantic Ocean), Java Trench (Indian Ocean), Mallow Deep (Arctic Ocean), South Sandwich Trench (Southern Ocean) and the Challenger Deep (Pacific Ocean).

Those death-defying descents were undertaken by intrepid adventurer and American businessman Victor Vescovo who used his \$37m two-seater personal submersible, a

Triton 36,000/2 sub christened Limiting Factor, which is the world's first certified full ocean depth submersible constructed using a titanium hull and rated to dive to depths of up to 11,000 metres.

What sort of an engineering daredevilry does it take to build such a sub? "The pressure on the personnel capsule - 36,000 pounds per square inch, at the bottom of Challenger Deep - is equivalent to a stack of 292 fully-loaded 747s," L. Bruce Jones, the CEO and co-founder of the Florida-headquartered Triton Submarines, told *Gulf Business*.

Jones along with Patrick Lahey co-founded the privately-held company 32 years ago at a time when, as Jones says, they "realised there was a distinct market for smaller, deep-diving luxury submersibles."

The company has around 50 employees spread across two locations - one in Florida and the other in Barcelona.

On average, the team hand-builds less than 10 submersibles a year. Expectedly, they don't come cheap.

The popular Triton 3300/3 which dives to 1,000 metres and carries three people, costs approximately \$4m. Its least-expensive personal sub meanwhile dives to 305 metres and costs \$2.7m, while its most expensive sub in existence takes two people to 11,000 metres (Challenger Deep-levels) and is priced north of \$30m.

While these deep-diving vessels can be used by researchers, filmmaking crews or even serve as vanity-soothing ego-inflating toys for the elite, there's a bright - and yet untapped - burgeoning industry of underwater tourism, that Triton is set to tap with its latest multi-seater DeepView series of subs. The first DeepView sub is set to be

delivered later this year and will be able to dive to depths of 100 metres while carrying 24 passengers and 2 crew members. It features broad acrylic panels that allow for uninterrupted vistas of the surrounding water body.

"The Triton DeepView 24 is a revolutionary 4th-generation tourist sub designed to make up to 12 dives per day, including night dives, carrying 24 passengers. This is the first of the DeepView series, which includes subs that can carry as few as six passengers, or as many as 66," explained Jones adding that the delivery of the first \$6.76m DeepView 24 is expected shortly to an undisclosed Vietnamese client who has ordered it for their portfolio of resorts.

A smaller, but deeper-diving tourism-focused sub is the \$5.35m Triton 3300/6. The six-person submersible can descend to depths of 1,000 metres and features the largest acrylic pressure hull produced to date.

The Triton 1650/7 Configurable meanwhile is the world's first single-hulled, 500-metre capable, seven-person submersible produced until now.

Triton is a familiar name here in the Middle East. It exhibits at the annual Dubai International Boat Show and has already made inroads in the region. "One of our clients in Dubai owns a Triton 3300/3. We are negotiating with another group in the UAE as well," revealed Jones.

Meanwhile, Vescovo and his team recently collaborated with Saudi Arabia's King Abdulrahman University of Science and Technology (KAUST) to explore the deepest point of the Red Sea using Vescovo's 36,000/2 sub.

Mohammed A. Aljabelli, a Saudi engineer and member of the KAUST Coastal and Marine Resources Core Lab, joined Vescovo to descend to the bottom of the Scaikin Trough (2,777m) in the Red Sea, making Aljabelli the deepest-diving Saudi of all time.

Business for these luxury vessels hasn't been greatly impacted by the Covid-19



Above: The Triton 36,000/2 which was used in the Five Deeps Expedition

Below: The \$6.3m six-seater Triton 3300/6



designing the deepest-diving acrylic-hulled sub ever produced, the DeepView 15,000/2," said Jones of the sub which can carry two people to 4,570 metres, twice as deep as its current deepest-diving acrylic-hulled sub, the \$6.65m Triton 7500/3, and 15 times deeper than any other sub in the market at the moment.

"We are also leveraging our experience with the Triton 36,000/2, which has a titanium hull and we intend to produce a new full ocean depth model, the Triton 36,000/3 GPH (glass pressure hull). This revolutionary sub will have a personnel sphere composed of high-pressure glass and will carry 3 people to 36,000 feet." If you must ask, the price is \$58.1m.

Understandably, a near-\$60m price tag puts subs like this one in a billionaire's field of vision. Even for those not willing to make that commitment, there's another way to explore the ocean floors. Vescovo has teamed up with EYOF Expeditions to offer underwater exploration trips for tourists. He will pilot his two-seater sub to some of the deepest underwater points in the world, with a tourist riding shotgun. This month, there are two such tourist expeditions planned to the bottom of the Mariana Trench - one of which was already sold out at the time of going to press. At \$790,000 a seat for the expedition, you'll still have to be at least a millionaire to pay for it.

A much more affordable option will come when luxury ocean-side resorts begin to invest in subs like the DeepView 24, allowing residents of the properties to book a seat on these subs as part of the resort's regular roster of leisure activities. A gamechanger for the tourism industry.

pandemic, said Jones. The assembly teams are pressing on, while a few of the company's marketing and sales personnel are now working from home. "We continue to sign contracts and, in fact, just signed one today [April 20]. We are fortunate that our sales do not seem to be significantly affected by the pandemic."

While a global economic slowdown is crystallizing, Triton is swimming against the current. "We are in the process now of

**"The pressure on the personnel capsule - 16,000 pounds per square inch, at the bottom of Challenger Deep - is equivalent to a stack of 292 fully-loaded 747s"**

## WEEK-END

### Les sous-marins de poche, nouvel hobby des milliardaires

05/06 | 07:30 | mis à jour à 10:34 | Par Veronique LE BILLON

La société Triton, basée en Floride, construit des sous-marins de poche de haute technologie capables d'explorer les abysses des océans. Un hobby en vogue chez les milliardaires aventureux ou écologistes.



Le monde s'est fermé pour cause de coronavirus, et Patrick Lahey a dû rentrer. Des Seychelles, où il était parti explorer les montagnes sous-marines de l'Océan indien, il a fait en urgence le chemin inverse pour retrouver sa Floride, à mi-chemin entre Miami et Orlando, sur cette côte qui aimante les Canadiens en mal de soleil d'hiver. Au fond d'une allée, les ateliers de Triton Submarines, l'entreprise qu'il dirige, sont installés au milieu d'un paysage inondé de végétation, tout juste troublé de coassements de grenouilles et de chants d'oiseaux. « Je dis aux gars de ne pas nourrir les alligators », dit-il en passant quand on admire le petit étang aux nénuphars.

De la fabrique de Sebastian, petite ville de 16 000 âmes, sortent des objets autrement plus fantasmagiques que les Crocs, ces sabots en résine qui s'y produisaient il y a encore dix ans. Une bulle transparente et scintillante, enchâssée sur un flotteur jaune, et le visiteur se voit enfant jouer dans sa baignoire avec le bathyscaphe des Action Joe, ou dévorer *Le Trésor de Reckham le Rouge* avec Tintin à bord de son sous-marin en forme de requin. Car Triton Submarines est parti à la conquête des mondes immergés : il construit depuis quinze ans des sous-marins de poche et de luxe, à ranger dans les garages des superyachts, à côté des jet-skis sous l'héliport.

#### La conquête des grands fonds

« Ce qui résonne chez ces propriétaires de yachts, c'est que vous leur proposez de devenir des explorateurs, de voir des choses que personne n'a vues avant vous », explique Patrick Lahey, l'œil pétillant, le cheveu poivre et sel en brosse et une allure de yachtman décontracté. Avec son coéquipier Bruce Jones, il a tout de même dû arpenter bien des Salons nautiques pour convaincre des acheteurs. « La plupart des gens avaient le sentiment que le monde sous-marin est noir et terrifiant. Pendant des années, ils nous riaient au nez, disaient « Quelle idée stupide ! », ».

Peu à peu, la presse nautique et les gazettes people ont pourtant distillé les noms des premiers intrépides à faire confiance à Triton ou à ses concurrents comme U-Boat Worx ou Seamagine Hydrospace pour entamer la conquête des grands fonds, presque aussi risquée que celle de l'espace.

#### Une plongée tout confort

L'oligarque russe Roman Abramovitch en a caché un sur l'*Eclipse*, son ultrayacht de 160 mètres, et on a vu Richard Branson s'amuser dans les abysses. Le cofondateur de Microsoft, Paul Allen (décédé en 2018), en avait un aussi et Ray Dalio, le patron du hedge-fund Bridgewater, en possède déjà deux. La citation favorite de Patrick Lahey, qui en ferait presque sa devise, lui est venue de Carl Allen, un client texan, de retour de sa première plongée en sub : « C'est bon, vendez le p... d'équipement de plongée ! ».

Tous les plongeurs qui ont pesté en enfilaient leur combinaison néoprène et en portant leur bouteille d'oxygène comprendront Triton propose à ces milliardaires une expérience autrement plus confortable : air conditionné, siège moelleux avec porte-gobelet incorporé. Il faut juste veiller à aller aux toilettes avant...





Canadien d'Ottawa, Patrick Lahey est « tombé amoureux » de l'océan à 7 ans, quand son père a emmené toute la famille vivre pendant trois ans à la Barbade. De retour au Canada, il apprend à plonger en piscine ; plus tard il filera à Los Angeles en faire son métier. Dans son bureau qui surplombe l'atelier, une photo le montre tout jeune homme, son scaphandre sous le bras. C'est l'école marseillaise (Cousteau, la Comex...) qui lui a offert sa première plongée en submersible, au début des années 1980 : il a alors 21 ans, travaille en Californie pour le Français André Galerne, qui a monté une entreprise de services à l'industrie pétrolière en mer.

### Sensations d'enfant

« J'étais ébloui de ne pas avoir à respecter ces paliers puritifs pour remonter, de ne pas être limité dans la durée de la plongée, il n'y avait pas de restrictions physiques, c'était calme et confortable. » Une sensation qui guidera sa carrière et le pousse à son tour à devenir un entrepreneur des profondeurs. Il commence à construire des sous-marins pour touristes à Everett, près de Seattle, pour le compte du canadien Atlantis.

« Quand vous commencez à vous intéresser à un produit, vous vous demandez comment l'améliorer. Je voulais emmener des gens à de plus grandes profondeurs. Quarante-cinq mètres, c'était bien mais c'était comme rester à l'orée d'un bois, je voulais aller dans la forêt, voir ce qui était moins accessible ! »

Patrick Lahey a construit son métier sur ses sensations d'enfant, mais il « déteste quand les gens disent que ça ressemble à des jouets. Ce sont des vaisseaux spatiaux sous-marins », corrige-t-il, se définissant comme un artisan, en anglais un *boutique manufacturer*. Il faut compter dix à douze mois pour fabriquer un submersible, deux ans au moins pour un nouveau modèle - il en a 14 en catalogue. Quinze ans après le début de son entreprise, l'entreprise démarre à peine sa vingt et unième commande.

### Comme un immense bocal à poisson rouge

Au milieu de l'atelier, bercé en fond sonore par les notes de David Byrne (Talking Heads), une sphère comme un immense bocal à poisson rouge est posée sur une palette de bois. Elle a déjà traversé l'Atlantique : elle a été fabriquée en Allemagne, chez Röhm et Heinz Fritz, deux spécialistes de l'acrylique. D'une épaisseur de 167 mm, 205 et même bientôt 321 mm : la boule en plexiglas (du polyméthacrylate de méthyl) forme une frontière sans cesse repoussée pour pouvoir plonger plus profond sans perdre en visibilité et en transparence.



À quelques pas, en bermuda et chaussures souillées de peinture, Colin Quigley prépare le châssis moulé à Cap Canaveral, découpant la coque pour y placer les lumières et les valves qui évacueront l'air. À l'arrière d'un autre submersible en construction, les entrailles laissent apercevoir une dizaine de bouteilles d'air comprimé, un entrelacs de tuyaux bleus et une palette de circuits électroniques. Les batteries pourvoient à l'autonomie et sur la coque, deux petites hélices noires assureront la propulsion.

### Un modèle à 3,85 millions de dollars

Une fois mis au point, les sous-marins doivent passer des tests stricts pour décrocher les certificats du DNV-GL ou de l'American Bureau of Shipping. « Quand le dossier de certification pèse aussi lourd que le submersible, c'est que vous avez terminé, résume Patrick Lahey. C'est une tâche décourageante, qui prend beaucoup de temps mais qui vaut la peine. » Une nécessité, surtout : « Sinon, personne ne voudrait les assurer. » Une fois qu'un riche client a installé un Triton sur son yacht, il lui faut encore décrocher le permis d'explorer les fonds. Pas toujours évident : en Méditerranée, la France et la Grèce seraient particulièrement scrupuleuses, soucieuses de préserver leurs épaves et antiquités englouties.



Il ne restera plus qu'à trouver un pilote : parfois le propriétaire, plus souvent un des membres d'équipage du yacht. La formation est incluse dans le prix d'achat - compter 3,85 millions de dollars pour le modèle qui plonge à 1 000 mètres et embarque deux invités avec le pilote, le best-seller de la maison. À ce prix-là, on peut choisir la couleur. Le jaune reste numéro 1 (pour être vu de loin en surface) mais le premier client de Triton, Chris Cline (décédé l'an dernier dans un accident d'hélicoptère aux Bahamas), avait choisi la couleur or.

On peut aussi opter pour l'orange, le noir ou le citron vert (très florissant), voire camouflage façon militaire. Celui que Triton livrera en Allemagne en juin - un six-places descendant à 1 000 mètres - sera même « bleu Tiffany ». *Pour les inconditonnels d'Aston Martin, un modèle exclusif, pas plus haut qu'une voiture, a été imaginé il y a deux ans. Il n'attend que son premier client.*

### Sauver les océans

En quête de beauté sous-marine, les milliardaires qui commandent ces petits sous-marins n'ont pas toujours été les plus vertueux en matière environnementale : Chris Cline avait fait fortune dans le charbon, le Texan Carl Allen dans les sacs en plastique, le Norvégien Kjell Inge Røkke dans la pêche et l'off-shore pétrolier. L'âge venant, certains de ces hommes d'affaires ambitionnent de sauver les océans.

Le Norvégien construit un navire de recherches océanographiques de 182 mètres pour dépolluer les océans, sur lequel il embarquera son sous-marin Triton, capable de plonger à 2 300 mètres de profondeur. « *Ce sera la sphère acrylique la plus épaisse qu'on ait jamais faite. C'est révolutionnaire, quelque chose que nous n'aurions pas pu faire il y a même cinq ans* », assure Patrick Lahey.



Début mars, Ray Dalio, le patron du hedge fund Bridgewater, a mis à l'eau aux Pays-Bas OceanXplorer, qui pourra héberger son deuxième sous-marin Triton. Le navire qui servait à l'industrie parapétrolière a été entièrement reconverti pour un nouveau projet d'exploration des océans que le financier démarre avec son fils Mark et le cinéaste James Cameron. Il avait déjà mis son navire *Alucia* et son premier Triton au service du naturaliste David Attenborough pour le documentaire *Blue Planet II*, et pour la quête du mystérieux calamar géant dans les eaux du Japon en 2012.

### Jusque dans les abysses

Investisseur texan et serial-explorateur, Victor Vescovo s'est lui aussi reconverti en arpenteur des abysses. Son sous-marin, le *Limiting Factor*, est la fierté technologique de Triton Submarines. En titane, il ressemble à une étrange boîte blanche percée de trois petits hublots : la structure est capable d'aller au plus profond de notre planète, à 11 000 mètres sous la mer - il a été certifié par le DNV-GL pour « toutes les profondeurs de l'océan ».

« *C'est un peu le Space X de l'exploration des océans. Mais je pilote mes propres véhicules* », expliquait Victor Vescovo lors d'une conférence TED l'an dernier, un brin moqueur à l'égard d'Elon Musk. Entre décembre 2018 et août 2019, le *Limiting Factor* a exploré les cinq points les plus profonds de l'océan, dont la fosse des Mariannes, en plein Pacifique à 10 928 mètres. *Le lieu où se déroule Underwater, le film d'horreur sous-marin avec Kristen Stewart sorti début 2020.*

En route pour l'Arctique, il est descendu saluer l'épave du *Titanic*. Depuis, le bateau et son sous-marin biplace sillonnent le globe, faisant des escales au gré des expéditions programmées. En février dernier, Victor Vescovo était au large de Toulon, à 2 250 mètres de profondeur sur l'épave de *La Minerve*, le sous-marin militaire français disparu en 1968, pour percer les causes du naufrage et déposer une plaque commémorative. En route pour les Seychelles, le *Limiting Factor* devait y étudier l'impact du changement climatique et les montagnes sous-marines. Mais ça, c'était avant le coronavirus... Partie remise pour l'instant.

#### Vers un tourisme des grands fonds ?

À l'instar du tourisme spatial, les offres se multiplient pour l'exploration des profondeurs océaniques, encore largement méconnues. Concurrent de Triton, U-Boat Works a ainsi accueilli à son capital le malaisien Genting, qui a installé des sous-marins sur ses piquebots de croisière comme argument commercial de poids. Triton vient de livrer au Vietnam son premier sous-marin pour touristes : construit à Barcelone, le Vinpearl pourra emmener 24 passagers admirer les fonds. Eyo's Expeditions et Caladan Oceanic proposent aussi à 15 personnes de descendre dans la mythique fosse des Mariannes. Quatre heures de descente, quatre au fond de l'eau et quatre autres pour remonter, dans le *Limiting Factor*, le bâtiment le plus étrange construit par Triton. Prix : 750 000 dollars...

Par Véronique Le Billon Photographe : Devin Christopher



## TOY BOX & WILD ON WATER

Navigator delves deep to bring you the toys you need to have fun on the water, below the water, and even above the water this summer

WORDS MIRIAM CAIN



01

### ON THE WATER

Paddleboards, windsurfs, canoes and kayaks - there are endless options for those looking to power themselves over the water, but for those looking for the adrenaline rush that only motorsports evokes, then Radline's GZX Electric Jetboard takes the thrill of surfing to another level. Reaching speeds up to 37mph, the Jetboard makes you look like a pro without all the hard work.

[www.radline.com](http://www.radline.com)



02

## 02 ABOVE THE WATER

Experience the amazing sensation of levitation and the thrill of flying over water with the Tandem Jetavator. Twin controls provide the option of manoeuvrability from the front and rear seat, allowing passengers ride with an instructor (a trained and certified crew member). Without the need for comprehensive training, even the younger guests can have a whirl. [www.jetavator.com](http://www.jetavator.com)

## 03 ON THE WATER

For a day of endless fun and activity, a complete waterpark can include everything from an inflatable climbing frame, trampoline, yacht blob, water slide and even a watersports obstacle course. Choose from Aquaglide's traditional Aqua Park setup with simplified paths; Ring Aqua Park designs for a challenging race track; or their ultimate Circuit Aqua Park collection with obstacle sections and anchored items. Endless fun is guaranteed. [www.aquaglide.com](http://www.aquaglide.com)



04

## 04 BENEATH THE WATER

For the intrepid traveler looking to go to even deeper depths, the submersibles hitting the market are out of this world. The Triton 7500/3 is the deepest-diving acrylic-pressure-hull-equipped submersible, capable of diving to depths of 7,500 feet (or 1.4 miles) with three passengers on board. [www.tritonsubs.com](http://www.tritonsubs.com)

05



## 04 ON LAND

In today's world of "going green," the Lohner Falkon – a luxury two-seater electric bike born of an Austrian-German lineage dating back to 1821 – is a unique, stylish and sophisticated means of cruising. Ideally suited for exploring island interiors and stunning coastal paths that dot the Mediterranean's cruising grounds, the Lohner Falkon is a fun addition to any onboard toy arsenal, allowing guests to ride solo or together. [www.lobnherleebikes.com](http://www.lobnherleebikes.com)





## 2019

A big part of 2019, naturally, was taken up by the Five Deeps Expedition - diving the Triton 36,000/2 submersible to the deepest point of the world's oceans, including setting a world record for the deepest ever manned dive in the Challenger Deep, Mariana Trench.

The Triton 36,000/2 also conducted the first dives on the Titanic in almost fifteen years, capturing incredible footage of the current state of the famous wreck as it is consumed by the ocean around it.

Meanwhile, the company won a contract for delivering the deepest certified acrylic hulled submersible ever built, the three-person, 2,286 meter capable Triton 7500/3 to Project Rev.

2019 also saw Triton moving to new head quarters in Sebastian, Florida, delivering the ninth unit of the Triton 3300/3 model, as well as developing the Triton 1000/2 MKII, the upgraded sibling to the legendary two-person, 305 meter capable Triton 1000/2 - the submersible that essentially created the personal submersible industry in 2008.

TOTAL
ARTICLES - 1,400
REACH - 4,553,974,322
ADVERTISING EQUIVALENCY - \$42,124,264



# Victor Vescovo on driving exploration

**As his self-funded journey to the bottom of all five oceans nears the halfway point, Victor Vescovo tells *Elite Traveler* what inspired his mission, and why exploring the unknown is so important**

I feel like I have been exploring all my life. From riding all over my neighborhood on a bicycle as a kid; immersing myself in the pages of many, many books; climbing to the tops of some very high mountains; and now, diving to the depths of the world's oceans.

My first 'expedition' taught me perhaps my most valuable lesson. At three years old, I tried to drive a car, and after a very brief initial success, it ended as expected – extremely badly. Surviving that trauma had a profound impact on how I view life. I have always felt fortunate to be alive, and I have an intense desire to make the most of the time I have on Earth.

I hugely admire great explorers, pilot engineers and climbers like Roald Amundsen, Neil Armstrong, Chuck Yeager and Reinhold Messner. My childhood dream was to become an astronaut, then a pilot. To me, making the most of life means experiencing all the world has to offer and what it has to show from every possible angle. That desire drives my curiosity and truly is the fuel for my need to explore.

What I love most about this journey is the uncharted nature of it – that no person, organization or government has ever even *tried* to make it happen. In fact, no one in history has been to the bottom of *four* of our five oceans – well, now there are only three left to reach since we just dived to the bottom the Atlantic Ocean in December 2018. Human beings are capable of accomplishing truly amazing feats if they put their minds and resources to it.

The Five Deeps Expedition is an extremely complex technological,



organizational and logistical challenge. An endeavor of this magnitude requires partners at the top of their fields with the required technical skills and expertise, but who share the same curiosity and passion for exploration that I have – like EYOS Expeditions, which is running the day-to-day execution of the mission.

When I first called Triton Submarines, I wasn't sure what the response would be, but I am grateful that they did not laugh me off the phone. Not only did they jump at the chance to build a full ocean depth submersible, but they worked tirelessly to design, build and perfect it. The DSV *Limiting Factor* not only delivers on the objective, but will have a life well beyond our expedition.

As the Five Deeps Expedition vision

My hope is that this is just the beginning of an uncovering of knowledge, a technical proving ground that will be a part of propelling scientists across the world into a new era of exploration and innovation

became a reality, we saw how much this expedition could impact the scientific community. Not only can we finally obtain reliable access to some of the world's most punishing environments, we also have the ability to study organisms and other undiscovered samples that promise a world of new scientific discovery in biological, geological and oceanographic study.

To many people, the Five Deeps Expedition looks like a very elaborate and expensive vanity project – another check on a bucket list of sorts. Okay, fair enough. I say, at some level, it is. But I also believe it is incredibly important for those with the means to fund basic science and technological development to do so. Science and technology have solved more world problems and alleviated more suffering than any other historical factor – except, perhaps, regime change. And there's nothing more inspiring than seeing people and organizations being pushed to do things that have never been done before that advance us as a species.

What excites me most about diving the Five Deeps Expedition is the act of doing it, against all of the challenges and moments of doubt. My hope is that this is just the beginning of an uncovering of knowledge, a technical proving ground that will be a part of propelling scientists across the world into a new era of exploration and innovation – as well as the continuation of the full story of the oceans that is only now beginning to be told.

That's where the Discovery Channel and Atlantic Productions come in. Sharing our discoveries in a television series is a win for everyone who wants to learn more about two-thirds of our planet. Once our expedition is complete, I hope the DSV *Limiting Factor* will continue to explore the oceans' hidden places and help in complex undersea recoveries.

As for what's next for me, maybe I'll finally fulfill my childhood dream of becoming an astronaut. Mr Musk, if you're reading this, I say to you: I'll give you a ride in my vessel, if you give me a ride in yours.

[fivedeeps.com](http://fivedeeps.com)

# Deep Impact

An ambitious effort to take a manned submarine to the bottom of the Earth's five oceans is pushing subsea technology to its limits. Jon Excell reports

It's something of a cliché. But we still know more about our closest cosmic neighbour than the depths of our own oceans.

While 12 astronauts have walked on the surface of the moon, just two manned missions have made it to the deepest known point on the Earth's seabed: Challenger Deep in the Pacific Ocean's Mariana Trench (10,916m).

And although robotic probes have been sent to almost every corner of our solar system, the murkiest depths of our own planet remain a mystery: a risky frontier of bone-crushing pressures and near-freezing temperatures where navigation is difficult and the prospect of rescue remote.

Which makes a current effort to land a manned submersible on the deepest parts of the world's five oceans all the more exciting and impressive.

The so-called Five Deeps mission is the brainchild of thrill-seeking US financier Victor Vescovo, who is hoping to add the bottom of the world's five oceans to an explorer's CV that already includes the 'seven summits' and skiing expeditions to the North and South poles.

The project kicked off its first milestone late last year, when – aboard a hi-tech submersible developed by Florida-based submarine manufacturer Triton – Vescovo became the first human to reach the Puerto Rico trench in the Southern Ocean (8,378m). Last month, he reached the southern portion of the Atlantic's South Sandwich Trench (7,433.6m) and in the coming months plans to land his vessel on the bottom of the Java Trench, thought to be the deepest point in the Indian Ocean; Molloy Deep in the Arctic Ocean; and, of course, Challenger Deep.

But the 348m (£36m) effort is much more than a rich man's vanity project. Those involved – who include some of the world's leading experts in deep sea exploration – describe it as a scientific mission without precedent, an undertaking that has driven the development of a host of advanced submarine technologies and which will shine new light on our planet's most mysterious frontier: the 6,000–11,000m Hadal Zone, a world of deep, dark trenches home to some of the hardest and most unusual living organisms on the planet.

Clearly, achieving this requires some pretty extreme engineering, and that begins with the submarine at the heart of the project, the 11.2-tonne, titanium-hulled Triton 3600/2 (or Limiting Factor as Vescovo has named it).

Triton's chief engineer John Ramsay, who is based in the firm's UK engineering office in Devon, told *The Engineer* that the vessel is unlike anything he has designed before.

Whilst most of the firm's subs are able to make use of off-the-shelf components from other sectors such as oil and gas, nothing is really available for depths beyond 6,000m, he said. So the team has had to develop a host of technologies from scratch: from the pressure-compensated batteries that power the sub to its assorted manipulators, thrusters and electrical systems.

The most striking feature is its giant titanium pressure hull, a precision-engineered 50mm-thick structure, able to withstand 16,000psi and

accommodate two passengers within its cosy 1.5m diameter confines.

Formed from giant forgings joined without welds and machined to within 99.999 per cent of true spherical form, the production of the hull was, said Ramsay, a major challenge.

"Normally if you make a pressure hull like this it would all be welded. But we were determined from the start that we wouldn't have any welding... because it introduces so many unknowns into the design. It means that essentially once it's welded you don't really know the strength in the weld, it causes everything to move and shift, you want it to be as close to a perfect circle as you can."

The end result is a hull that is barely affected by the enormous pressures it encounters at full depth. Ramsay estimates that it reduces in diameter by just 4mm, quite an achievement considering it has the equivalent to the weight of the US's largest aircraft carrier pushing down on it.

One of the most problematic areas of the hull was the design of the viewports, which are made from acrylic and therefore not as strong as the titanium. "The pressure on the acrylic is higher than the rated strength of the acrylic – so it's quite an unusual design," said Ramsay.

"As the sub dives deeper the acrylic viewport gets pushed into a conical opening and moves about 7mm into the viewport seat. It's all designed to distribute the stresses evenly at the maximum diving depth."



01 The Submarino shortly before its successful visit to the South Sandwich Trench. Image: Canadian Oceanic

02 The Limiting Factor returns from its Dec 2018 trip to the Puerto Rico Trench. Image: Canadian Oceanic



Despite the enormous pressures, space constraints within the pressure vessel, coupled with the challenges of passing electrical signals through a titanium hull, mean that many of the key components – including the submarine's lithium polymer batteries – are actually stored outside and designed to operate at the ambient pressure. "Electronics where possible need to be pressure-tolerant, so they're immersed in oil that's compensated at water pressure," explained Triton's chief electrical engineer Tom Blades.

The batteries power 10 powerful electric thrusters controlled by joysticks within the vessel. These include four transverse manoeuvring thrusters, two additional thrusters for manoeuvring up close and four vertical thrusters that can be used to arrest the submarine's weight-enabled descent. "If you're descending and for any reason you want to stop for a moment, you can arrest the descent with the thrusters without having to drop all the weights," explained Ramsay.

Electrical wiring for carrying control signals and power is passed through the pressure hull via a series of specially designed penetrators, developed for the project by Aberdeen firm CRE. These use an innovative glass-to-metal seal to ensure that the pressure integrity of the hull isn't compromised.

Beyond the innovative design elements, one of the key factors that differentiates the submarine from other deep diving vessels is that it has been engineered for repeated use.

While previous efforts, such as the two successful attempts to reach the bottom of Challenger Deep (the Swiss-designed Trieste in 1960, and James Cameron's Deepsea Challenger in 2012) were

one-off dives, the Triton sub has been designed to perform thousands of missions.

To achieve this, the engineering team had to work closely with the marine certification body DNV GL to get the vessel approved. "That level of scrutinisation... sets it aside from what you might call a prototype or a sub that was only going down for one specific dive," commented Ramsay.

Getting the design to this point called for a rigorous programme of testing. And in the absence of any existing facilities the team worked with Barcelona-based submarine manufacturer ICTINEU on the development of the largest high-pressure hyperbaric chamber in Western Europe. This has been used to test every single component at pressures 1.2 times greater than those experienced during actual use.

Another major aspect of the design has been the development of safety and redundancy systems to ensure that, in the event of a problem, the submarine can get back to the surface without assistance. "It's going to be on its own," said Ramsay. "There's no chance of getting rescued when you're down at 11,000 metres."

Alongside back-up batteries, thrusters and breathing equipment, one of the key innovations here is that all of the external features, including the thrusters, batteries and manipulators, are ejectable, meaning the pilot can rapidly increase the buoyancy of the sub and also disentangle it should it become snagged on something. "Every sub pilot's biggest fear is pulling a rope into the thruster," said Ramsay. "The safest and most reliable way is to just have the thrusters drop if you snag onto anything – we use these





amazing explosive bolts where you apply a current to a sheath around the bolt and after about 90 second it snaps," he explained.

While the submarine is the star of the show, it is just one element of a wider package which includes a support vessel (the DSSV Pressure Drop) and a series of advanced unmanned subsea landers. These are particularly key to the development of an innovative underwater GPS system that uses modems on the surface vessel, the landers and the sub itself to triangulate the position of the vessel and help it navigate to its target.

Triton's Tom Blades explained that while submarines operating at shallower depths typically use so-called ultra-short baseline (USBL) systems that communicate with a surface vessel using acoustic pulses, this method of navigation is not effective at greater depths.

"To get all the way down to full ocean depth you need to use much lower-frequency sound," he explained, "which gives you the problem that you can't sense direction without a much larger array." The solution has been to use acoustic modems that can transmit and receive analogue voice communications and also data.

These subsea modems have a high-precision time reference synchronised to GPS on the surface. Whenever data is sent from the subsea modems, the time of sending is encoded into that message. "You compare that to the time at which the message was received and you have time of flight which, using bathymetry data, we can calculate the speed of sound through water and get a distance," explained Blades. "We use all these distances to triangulate the sub's position."

Alongside their role in the navigation system, the subsea landers are also a key component of the scientific side of the mission and are equipped with a host of sensors, baited cameras, traps and push cores that can be used in collaboration with the submarine to record, collect and return samples from the seabed.

This area of the project is being headed up by one of the world's leading experts in the deep ocean and the technology required to study it: Newcastle University's Dr Alan Jamieson. Over the course of his career, Jamieson has carried out some of the pioneering work in Hadal Zone exploration, discovering dozens of new species of fish and crustaceans and writing one of the definitive books on the topic: *The Hadal Zone: Life in the Deepest Oceans*. He even has a species of shrimp named after him: the *Princaxella jamiesoni*.



"Having someone in it grabs people's attention. Kids don't look at ROVs and go 'wow!'"

Dr Alan Jamieson

However, despite being involved in around 250 dives of 6,000m and deeper in the last 12 months (all of which relied entirely on free-falling landers) he believes the Five Deeps mission could be a game-changer.

"This Five Deeps thing is a really big jump forward because of the sub," he told *The Engineer*. "When we use baited landers we can film and sample all of the mobile animals that come to us, but there's a whole bunch of stuff that isn't attracted to bait so the sub and lander combined give us the best of both worlds."

"I think the true legacy of this is going to be the scientific and exploration side."

Of the sites being visited by Five Deeps, the Mariana Trench is the only one that Jamieson's group has been to before. And he expects that examining other trenches will lead to the discovery of a number of new species and also, as he puts it, "help join up some of the dots".

One of the big things his group is looking at is genetic connectivity. "The deep trenches are very isolated," he explained. "They're like an upside-down island."

"There's a lot of things that live at the bottom of trenches but can't get from one to another. But the tectonic plates have been moving all of the time, so we have what Darwin was talking about with his finches except on a much, much bigger scale and it's happening right now."

"You can see genetic diversions between two trenches that have been slowly moving apart for the last 50 million years." Getting similar samples from all of the five deeps sites will, said Jamieson, help the group start to develop a bigger picture about how life evolved on earth.

The mission will also, he said, dramatically improve the information we have about the seabed. "One of the first things we did when we got involved was to work with colleagues at BGS (British Geological Survey) to go through the five deeps and have a look at the bathymetry, the data, the quality of the data and when it was taken, and where people think the deepest places are. And it was amazing – every single one of them was wrong. There was one time in the Tonga trench we found a vertical wall about 10m high that isn't even on the charts."

While much of this existing data was acquired using pretty primitive equipment, the echo-sounder aboard the Five Deeps support vessel is, he said, the most advanced instrument of its kind in the world, and will significantly advance our knowledge of what lies beneath. There is even the intriguing possibility that it could identify hitherto undiscovered depths.

Despite Five Deeps' undeniable scientific promise, in the age of the remotely operated vehicle there is – Jamieson concluded – something a bit old-fashioned about the notion of a manned research submarine. "They're a thing of the past because they're so unbelievably expensive. To operate them you need a whole different level of support vessel and an army of technicians to keep them going."

But, as with space exploration, there is something undeniably exciting about having a human in the loop. And Five Deeps' package of technologies, which goes on sale for the princely sum of £4.5m once Visco's mission is complete – could offer someone with deep enough pockets an opportunity to build on this excitement. "Having someone in it grabs people's attention," mused Jamieson. "Kids don't look at ROVs and go 'wow!'" ■

03 The sub's precision-engineered Titanium pressure hull

04 Limiting factor during one of its test dives

05 The submarine aboard its support vessel, the DSSV Pressure Drop

06 Victor Vescovo studies data on the South Sandwich trench, image: Canadian Oceanic

07 Early engineering work by one of Triton's engineers





LUXURY WITHOUT COMPROMISE

# Robb Report

31st ANNUAL

## Best of the Best

WINE • MARINE • TECH • SPIRITS • TRAVEL • AUTOS • STYLE • WATCHES • AVIATION • JEWELRY • CIGARS • DESIGN • ART • CULINARY

JUNE 2019



**CBI Navi Stella di Mare**  
MOTOR YACHT 100 TO 200 FEET

The 30-foot explorer yacht by Italian shipyard CBI Navi, is built for long periods at sea. The designers included serious storage, refrigeration units for far-flung adventures. This star of the sea distinguishes itself with an 800-bottle, climate-controlled wine cellar. The owner, who has a big family, wanted to ensure that a two-week voyage many miles from port didn't compromise the culinary experience.

For expedition infrastructure, Italian designer Hydro Tec also created a spa to this interior that was contemporary without being flashy. Walnut, aluminum, and a classic look but leather and burnished brass give it a touch of elegance. The designers commissioned globe-maker Gallerby & Co. to create bookshelves in the window of the main salon, with another hand of the world behind the dining table. The children's staterooms have cartoon characters on the walls. Outside, the boat's versatile sundeck dining area or can be set up as a gym, and there's space for a grill and living area. There is even a rock with a couple of seats on the front of the boat that allows for exceptional water views. [cbinavi.com](http://cbinavi.com) Q.W.



**Triton Hadal Exploration System**  
SUBMERISBLE

Costing \$48.2 million, the Triton 3000/2 Hadal Exploration System is actually two vessels, comprising the research boat EGV Pressure Drop and Triton submersible Limiting Factor. The dynamic duo was funded by Victor Vescovo for his Five Deeps Expedition, which is exploring the deepest, most unexplored places in the world's five oceans. Limiting Factor is Triton's first full-ocean-depth model, which is capable of carrying two submariners into the ocean's hadal zones (hadal derives from Hades, the Greek mythological underworld) that range to 36,000 feet below sea level. The sub is significantly lighter than previous deep-diving vehicles and features 10 electric thrusters to enhance sub-surface maneuverability. Last December, Five Deeps completed its Atlantic dive in the Puerto Rico Trench (27,480-foot depth), the expedition dove the South Sandwich Trench in Antarctica (34,300 feet) in February, and in April, it explored the Java Trench in the Indian Ocean (23,596 feet). Beyond ocean exploration, Five Deeps will be hosting 50 scientific missions into the lands around those remote locations. [tritonsubs.com](http://tritonsubs.com) Q.W.

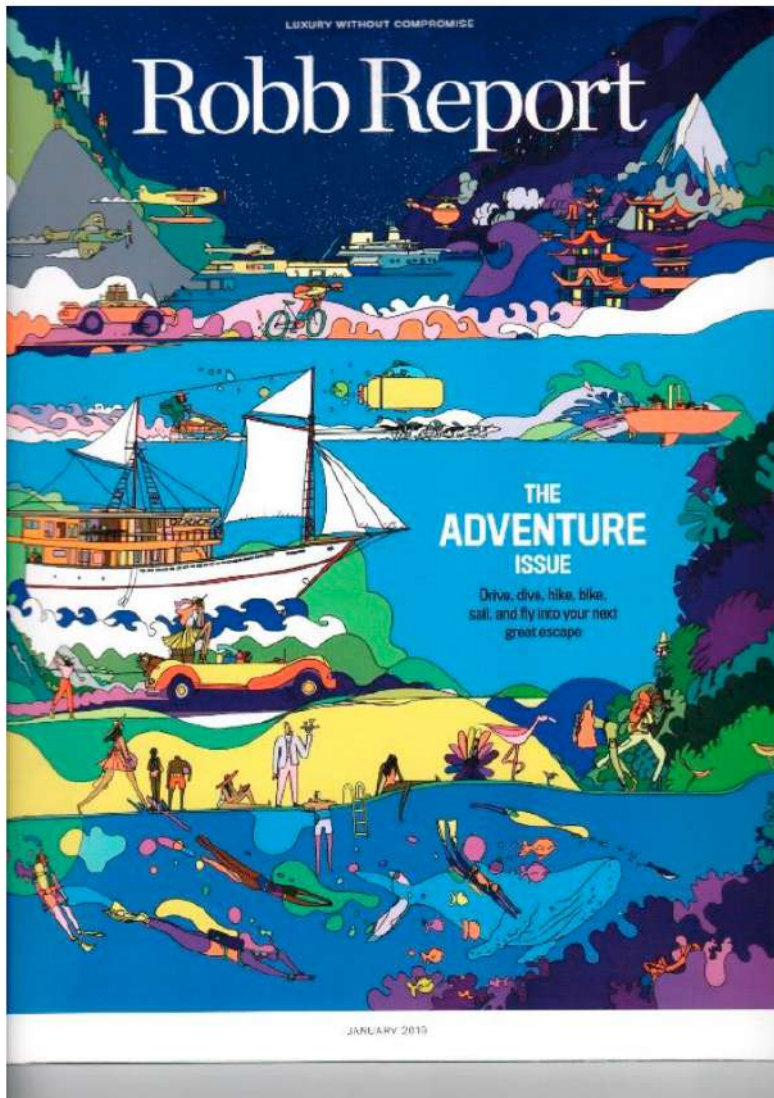


QUOTED: OUR FRIENDS IN LUXURY HAVE THEIR SAY

*"If I were looking for a new boat right now, I'd go to one of my favorite US manufacturers, Delta Marine, in Washington State. They make a fabulous boat from fit to finish."*

Joe Anderson Founder of Bellevue Winery





# WATER

"Most people don't have the same passion for ocean exploration as they do for space."

Deeper Understanding

## INTO THE ABYSS

HUMANOID HAS VISITED the wildest and most remote places on Earth as well as an increasing amount of space via piloted and remote operated spacecraft, but only a few submersible vehicles have journeyed to the deepest points of the world's oceans. With its ability to access the greatest depths, the Triton 2000D/2 Hybrid Exploration System (tritonhds.com) promises to make underwater surveys and study more attainable.

Well, sort of. Priced at \$48.2 million (including the research vessel DSV *Pressure Drop* and the sub *Limiting Factor*), Triton's system is named after the hadal zones (hadal derives from Hades, the Greek mythological underworld), the parts of the ocean ranging in depth from about 20,000 feet to more than 36,000 feet. For adventurers interested in such exploration, *Limiting Factor* is Triton's first full-scale-depth (FOD) model, capable of carrying two submersibles inside of a titanium pressure hull.

© 2019 Triton

outfitted with advanced life-support systems. Significantly lighter than previous deep-diving vehicles, it features 10 electric thrusters that provide maneuverability in all directions and enable it to reach the bottom of the Mariana Trench (36,070 feet) in less than 2.5 hours.

"Recent advances in analytical software, materials like syntactic foam, and new electronics let our engineering team develop the systems," says Triton president Patrick Lahey. "We also had a network of outside strategic partners." Plus there was an investor (more revealed on page 112), who had the capital and vision for the FOD model.

Lahey asserts that because many Americans don't generally see the value in ocean exploration, there has never been any government mandate to build an FOD sub. "Most people don't have the same passion for ocean exploration as they do for space," he says. "But the oceans are inextricably linked to our survival. They control our weather, provide most of the oxygen we need, and are the most significant source of food."



But before it can be delivered to a new owner this fall, the sub will be part of the Five Deeps Expedition, which will explore the Puerto Rico Trench in the Atlantic Ocean, South Sandwich Trench in the South Atlantic Ocean, Java Trench in the Indian Ocean, Challenger Deep (part of the Mariana Trench) in the Pacific, and Molloy Deep in the Arctic Ocean. In the process, the expedition team hopes to set new records and observe new species. **Gert Ward**

**A-List Access:** For serious inquiries only, contact Triton president Patrick Lahey at [patrick@tritonsubs.com](mailto:patrick@tritonsubs.com).

The Five Deeps Expedition will explore the deepest points in the ocean.



New to  
Charter

## Blurring Boundaries

With ubiquitous windows and outdoor am  
Vista Blue opens up the onboard experien

**THE DESIGN** of the sporty 126-foot Vista Blue is focused on inviting the outside in. Launched by Perretti's Custom Line in 2017, with an interior by the Florence-based firm Francesco Paszkowski Design, the yacht integrates the outdoor environment into as much living space as possible. Sweeping views befitting the yacht's name dominate the interior, from the floor-to-ceiling windows in the main saloon to the enormous transparent aft door, effectively creating a glass lounge.

A nexus for open-air activities, the sundeck is furnished with couches, cocktail tables, overhead misters and awnings, and a large hot tub surrounded by sun pads. Built-in Champagne coolers further enhance the alfresco bolt-to. Two more sun pads and L-shaped loungers sit toward the bow.

The clever aft deck door folds out to the water to form a beach club and entrance for swimming and water sports. Guests who hanker for a tast



# The New York Times

## Two Miles Below the Waves, The Titanic Is Decaying Fast

By WILLIAM J. BROAD

In the 34 years since the R.M.S. Titanic was discovered on the seafloor south of Newfoundland, it has become the world's most famous shipwreck — a rusting hulk assailed by hundreds of explorers and moviemakers, salvors and tourists, scientists and federal watchdogs.

All agree that the once-grand ship is rapidly falling apart. Resting on the icy North Atlantic seabed more than two miles down, upright but split in two, the fragile mass is slowly succumbing to rust, corrosive salts, microbes and colonies of deep-sea creatures.

This month, a team from Triton Submarines captured video of the iconic wreck with human-occupied submersibles, in order to assess its status and anticipate the trajectory of its deterioration. The company called it the first such visit in nearly 14 years.

"It was kind of a cool thing to see the ocean reclaiming it," said Patrick Lahey, the president of Triton, who surveyed the

wreck himself during one of the dives.

The grand ocean liner, where the Astors and the Strauses played and dined, sank on April 15, 1912, taking more than 1,500 lives. Since then, the ship's remains have become a diminishing aspect of the dark abyss, the new images revealed.

The crow's nest, where a lookout once shouted an infamous warning — "Iceberg right ahead!" — has vanished. The forward mast has crumpled. The captain's cabin, where the British naval officer Edward John Smith was resting when his ship struck the iceberg, has collapsed, as has the poop deck where passengers gathered as the liner sank.

In an interview, Mr. Lahey said that viewing the historic luxury liner was less compelling than seeing "the massive shipwreck being consumed by the ocean and returned to its elemental state."

He called the disorderly remains a refuge for "a large number of interesting animals," including fish and sea anemones. "It's unusual to find a shipwreck two miles down that's so active."



ATLANTIC PRODUCTIONS

Science & Environment

## Victor Vescovo: Adventurer reaches deepest ocean locations

By Jonathan Amos  
BBC Science Correspondent

9 September 2019

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Watch Victor Vescovo touch bottom in the Molloy Trench (Credit: Discovery Channel)

**US adventurer Victor Vescovo has become the first person to visit the deepest points in every ocean.**

His fifth and final dive in a prototype submersible was made to the bottom of the Arctic's Molloy Trench, some 5.5km (3.4 miles) below the sea surface.

This followed dives during the past 10 months to the floor of the Pacific, Indian, Southern and Atlantic oceans.

The millionaire financier's team also visited the wreck of **the Titanic**.

All Mr Vescovo's dives were made using the 12-tonne Deep Sea Vehicle (DSV) Limiting Factor, launched and recovered from a dedicated support ship, the DSSV Pressure Drop, ironically a one-time navy submarine hunter.

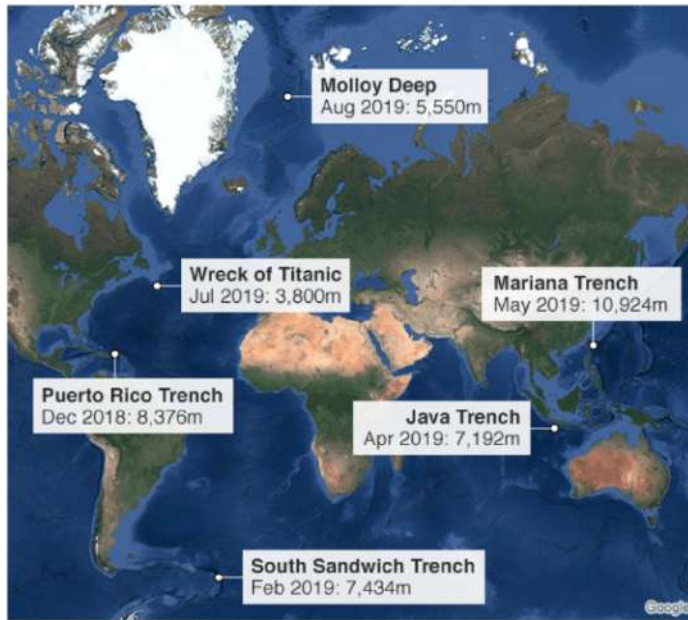
- **Deepest-ever sub dive finds plastic waste**
- **Robot duo wins ocean-mapping XPRIZE**

The last leg of the **"Five Deeps Expedition"** was concluded on 24 August when the explorer reached a spot known as the Molloy Hole, which is about 275km (170 miles) west of Norway's Svalbard archipelago.

The recorded depth on the solo dive was 5,550m, plus or minus 14m. It is the first time any human has been to this location.



## Victor Vescovo's deepest dives



Source: The Five Deeps Expedition



Mr Vescovo spoke of his elation and deep gratitude to the people who had worked with him.

"These things need to be done," he told BBC News. "I come from a philosophy that says we're put here not just to survive, or even just to be comfortable - but to contribute in some way. And the path I chose was to have some adventure whilst also doing something that could move us forward as a species."

The former US Navy reservist's wealth and drive have previously led him to ski to both poles and to climb the highest mountains on every continent. But it's evident when you talk to him that he is utterly absorbed by the science he's facilitated.

Over the course of the worldwide tour, researchers deployed more than 100 landers. These are instrumented frames that sink to the seafloor and record what they see and sense on the way down, and at the seabed.



The VSSV Pressure Drop has collected a large amount of bathymetric (depth) data

The Five Deeps science team says it has discovered upwards of 40 new species in the process. A large catalogue of biological and water samples awaits analysis in the lab, including a unique set of bottom-water samples retrieved at every one of the five deeps visited.

Dr Alan Jamieson is the expedition's chief scientist. He highlighted the measurements of salinity, temperature and depth that were made by the sub and the landers.

"You cast on the way down and on the way up, and if you add up the metres we measured - it works out at 1.5 million metres of water," he said. This will help researchers better understand ocean circulation, which is needed to improve the computer models that project future climate scenarios.

"We have so few measurements from the deepest parts of the oceans, from below 6,000m," the Newcastle University, UK, marine biologist added.

The DSSV Pressure Drop mapped the seafloor as it traversed the five oceans. This bathymetric (depth) data covers roughly 300,000 sq km - an area equivalent to Italy.

This is being donated to the international project that seeks to chart the entire global ocean floor by 2030. Currently, less than 20% has been mapped to an acceptable resolution.

But the Five Deeps Expedition has also fundamentally demonstrated the capability of the latest deep-sea technology.



The hope is that the DSV Limiting Factor will now be followed by many more such vehicles.

"I think what Victor has done is remarkable and others are going to want to continue what he's started by going back to some of these places and spending more time there," said Patrick Lahey, co-founder of Triton Submarines which built the Limiting Factor.

"You're starting to see more privately funded marine research being conducted by wealthy individuals who bought subs they thought they would use recreationally but are now using to complete scientific expeditions, to give people like Al Jamieson a platform to work from."

It is no surprise to learn that Victor Vescovo has set his sights on going into space; he's actively talking to those who might help him get there.

However, he's far from done with ocean research and expects next year to conduct further dives in previously unexplored trenches around the Pacific rim.

The American oceanographer Don Walsh made history in 1960 when he joined Jacques Piccard in making the first crewed dive to the deepest point on Earth - the Challenger Deep, part of the Pacific's Mariana Trench. Mr Walsh marvels at the latest technology.

"What you have here is a system - the ship, the sub and the landers. They interact and cooperate, and when you see them working together it's like a ballet," Mr Walsh told BBC News.

"What's impressive is the repeatability - being able to dive time and time again."

Atlantic Productions is making a five-part documentary about the Five Deeps Expedition for the Discovery Channel. It's likely to air early next year.

✉ [Jonathan.Amos-INTERNET@bbc.co.uk](mailto:Jonathan.Amos-INTERNET@bbc.co.uk) and follow me on Twitter: [@BBCAmos](https://twitter.com/BBCAmos)



THE WORLD OF LUXURY YACHTING

# ocean

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## Ocean Keepers

### The highs of the deep

The Five Deeps Expedition is visiting the Earth's most remote frontier: the deep ocean. It has successfully dived to the previously unvisited bottom of one of the world's five oceans, discovering new hadal-zone species along the way, as Victor Vescovo shares with **Brittany Cooper**.



**O**ne cannot hope to protect and nurture the ocean until one understands it. This is one of the motivations behind the Five Deeps Expedition, which aims to reach the most isolated points of the planet – the bottom of the world's five oceans – in a manned submersible vessel, along the way contributing to the fields of ecology, oceanography, marine biology, and geomorphology. Indeed, the expedition's motto is 'In Profundis Cognitio', which means 'in the depths: knowledge'. It conveys the mission to build our understanding of the largest, unexplored and most inaccessible places left on Earth.

On 11 April 2019 the Five Deeps team completed its third exploratory mission, to the deepest point of the Japa Trench in the Indian Ocean, now measured at 7302 metres. American former naval officer and undersea explorer Victor

Vescovo piloted the DSV *Limiting Factor*, a Triton 36000/2 submersible that is currently the world's deepest diving operational submersible, to the bottom of the trench.

Unlike first-generation deep-water subs, which were filled with lighter-than-water fuel to allow for buoyancy, *Limiting Factor* is constructed with glass bead-based syntactic foam. The material is durable enough to withstand the enormous pressure as the sub descends thousands of metres, and it can do so repeatedly without developing significant deformation or stress fractures over time. The two-person control capsule is constructed in titanium alloy, and has space for a pilot and passenger with three acrylic-lensed viewports.

Along with the pure glory of exploration, the dives have provided the 30-strong team with an unprecedented opportunity to sample life across a gradient of depths, temperatures, salinity, food supply and latitude, and in

### SNAPCHAT

Victor, what's it like diving to the very bottom of an ocean trench?

It is an amazing feeling – to visit places that have been undisturbed for hundreds of millions of years. They have existed in complete darkness until briefly illuminated by my submersible. It feels like being a kid again, exploring around my neighbourhood on my first bike, never knowing what is around the next corner. Before a dive, there's a tremendous sense of excitement

and some apprehension because of the crushing depth and all the systems that have to work very well to make a dive successful. Afterwards, I am pretty exhausted given the dive duration of up to 11 hours, but it is infused by such a great feeling of happiness and sense of accomplishment.

What has been the highlight to date? Making it to the bottom of the Atlantic Ocean last December. It was the

deepest dive we had yet made. It was also my first solo dive, if you can believe that. Most sub pilots' first solo dives are to a few hundred metres – mine was to more than 8,000.

Why are the expedition's mapping and biology activities important for ocean health?

The most extraordinary thing about the ocean, to me, is just how unknown it is. By some estimates, 90 percent of the ocean floor is completely unexplored.

The sea has more biomass than the rest of the world combined and environmental interactions with our atmosphere that we are only now beginning to understand. To protect the health of the ocean and preserve its unique genetic reservoirs, we need to first figure out just what is down there. This expedition, in large part, I designed to build and test a craft that can open – and leave open – the door to exploring this unknown frontier.



places around the world that were formed, split, or conjoined millions of years ago by the shifting of the Earth's tectonic plates.

The hadal zone of the ocean, named after the realm of Greek mythological figure Hades, begins at 6,000 metres deep, and its 46 individual habitats form a cumulative 0.25 percent of the sea floor. Marine life decreases with depth, and studying the trenches' organisms for biological adaptations to extreme environments has until now proven tremendously challenging.

At the bottom of the Java Trench, the team captured footage of what is believed to be a species previously undiscovered by humans. From the sub, a new species of hadal snailfish was observed amongst other bottom dwelling organisms, and the landers observed a gelatinous animal – thought to be a stalked Ascidian, otherwise known as a sea squirt – which does not resemble anything seen before.

"Among many other rare and unique observations, the stalked Ascidian was a really significant moment," comments Dr Alan Jamieson, the expedition's chief scientist. "It's not often we see something that is so extraordinary it leaves us speechless. At this point we are not entirely sure what species it was, but we will find out in due course. This was a big moment for hadal science."

The Five Deeps Expedition has also settled debate about the Indian Ocean's deepest point. "Our Kongsberg EM124 multibeam sonar – the most advanced sonar currently mounted on a civilian vessel – provided detailed maps of the Diamantina Fracture Zone sea floor off the coast of Australia, as well as the deepest parts of the Java Trench," says Vescovo. "We believe we have built the most precise maps possible of the deepest places in the Indian Ocean."

The data generated by the expedition's sonar mapping and sample-collection mission

The next stop on the Five Deeps Expedition is the Challenger Deep within the Mariana Trench, commonly known as the deepest ocean trench on Earth.

will contribute to the Seabed 2030 Project to map the world's sea floor in detail by the end of the year 2030. In addition, the expedition is collecting biological samples of scavenging crustaceans – known as amphipods – from a depth of 7,010 metres. These will then be genetically analysed at Newcastle University, UK, to examine the role of fracture zones in evolution.

The next stop on the Five Deeps Expedition is the Challenger Deep within the Mariana Trench, commonly known as the deepest ocean trench on Earth. Only two other manned submersibles have reached its 10,916-metre depth, once each: James Cameron's *Deepsea Challenger* in 2012, and Don Walsh and Jacques Piccard's bathyscaphe *Trieste* in 1960. The team predicts *Limiting Factor* will be able to reach the Challenger Deep multiple times in one week and remain at the bottom for longer.

The other remaining major dives planned for the Five Deeps Expedition are the Tonga Trench (Pacific Ocean, 10,882 metres) and the Molloy Deep (Arctic Ocean, 5,573 metres). The overall mission is now 60 percent complete, remaining on schedule for completion in September 2019. [fivedeeps.com](http://fivedeeps.com)



# ScienceTimes

The New York Times



## Bubble Subs Dive Deep

By WILLIAM J. BROAD

Bruce H. Robison, a marine biologist at the Monterey Bay Aquarium Research Institute in California, began prowling the deep Pacific in a revolutionary craft in 1985. It was essentially a giant bubble of clear plastic that gave its occupants stunning panoramic views, instead of requiring them to peer through a tiny port-hole. ¶ "It was absolutely transformative," Dr. Robi-

son said recently. "The profession of life was so much greater than what I had imagined." The dark sea was alive: glowing, fading, shimmering. "It was amazing to see all this bioluminescence and realize it's a major form of communication," he said. "It really changes your perspective."



Three-plus decades later, bubble craft have gone mainstream, and thousands of people are experiencing that deep-sea vista. While Elon Musk and Jeff Bezos advance space travel, another set of entrepreneurs is going in the opposite direction, seeking to expand the exploration of inner space. Fans of the undersea craft sometimes call these new submersibles tricer spacehips.

"They keep reaching deeper and deeper," said Will Holron, who tracks development of bubble craft for the Marine Technology Society, a professional group. Much of the activity, he added, arises from growing concern about the ocean's health. "People want to see it firsthand. It's all about connecting with the ocean."

The current generation of bubble craft CONTINUED ON PAGE B6

Workers with Triton Submarines conducted a stability test on a bubble craft in Florida, top. Above, a giant squid was filmed by a bubble sub in 2012.

D6

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THE NEW YORK TIMES, TUESDAY, NOVEMBER 19, 2019

## Bubble Subs Explore Undersea Wonders



SCOTT BAIRD/FOR THE NEW YORK TIMES



CONTINUED FROM PAGE D1

can dive as deep as 7,500 feet, far below the last flickers of sunlight, and hold as many as seven people. Larger, deeper-diving bubbles are on the horizon.

The giant plastic spheres, and in at least one case, a hemisphere, are opening eyes to the sunless depths of the ocean and leading to discoveries. In 2012, a bubble sub off Japan captured the first video of a giant squid, a creature with a nightmarish tangle of tentacles. A three-person bubble tracked the creature to a half-mile below the surface.

In 2016, a dive off Portugal's Azores Islands caught sight of a female anglerfish and her tiny mate locked in a sexual embrace. Marine biologists hailed the resulting video as a breakthrough in revealing the behavioral secrets of the anglerfish, long notorious for dangling a bioluminescent lure in front of its needlelike teeth.

This summer, scientists in a bubble off the Bahamas attached a satellite tag to a bluntnose sixgill shark, an abyssal giant that pre-dates most dinosaurs. Scientists said the tagging was a first in the shark's habitat and would provide more accurate tracking.

The innovative craft are the result of many advances in electronics and materials science. According to Triton Submarines, a plastic bubble seven feet wide, its walls six and a half inches thick. The craft can take three people down 3,280 feet, roughly three-quarters of a mile.

Sub makers are not immune to a sense of wonderment. Patrick Lahey, president of Triton Submarines, said he was exploring the deep Pacific in a bubble with scientists from American Museum of Natural History when he blinked his flashlight two or three times into the darkness.

"Off in distance, an animal flashed back the same number," he recalled in an interview. "It was unbelievable. Something was communicating back."

During the Cold War, the American Navy pioneered the first bubble certified for deep diving and named it Nemo, after the captain of the submarine Nautilus in Jules Verne's novel "Twenty Thousand Leagues Under the Sea." The technology was so new that the Navy relied on Bruce Beasley, an Oakland, Calif., artist known for his acrylic sculptures, to cast the undersea spheres.

Nemo was 5½ feet wide, with walls 2½ inches thick, and could hold two explorers. It underwent sea trials in 1970 and, in the next decade, made more than 600 dives.

The bubble that Dr. Robison first piloted in 1985 was a one-of-a-kind craft, named Deep Rover, designed by Graham Hawkes of Deep Ocean Engineering, based in San Leandro, Calif.

Other commercial designers followed. An oceanographic team in Costa Rica has used a bubble made by SEAmagine Hydrospace, based in Upland, Calif., for deep tourism and biodiversity research for more than a decade.

"They've made tons of discoveries," said Mr. Kohnen, the Marine Technology Society official who is also the company's president. "It's really fantastic."

Bubble development is now driven mainly by very wealthy people — typically owners of superyachts, which can cost \$100 million or more. A bubble is perceived as a status symbol; costing \$2 million to \$5 million, it represents a relatively small part of a luxury investment. Chris Cline, a billionaire

entrepreneur, philanthropist and political donor who died in a helicopter crash in July, ordered a bubble sub for his superyacht more than a decade ago.

Another early enthusiast was Ray Dalio, a founder of the investment firm Bridgewater Associates, in Westport, Conn. With his superyacht and a Triton submarine, he became the first, in 2012, to capture footage of a giant squid in its dark habitat.

Mr. Dalio has turned his hobby into a global calling. Last year, he and his son Mark started OceanX, an arm of Dalio Philanthropies that promotes ocean exploration and awareness, mainly through filmmaking. OceanX owns two bubbles and is building a second ship.

"Ocean exploration is more exciting and important than space exploration," the senior Mr. Dalio said last year in a statement. "We are on a mission to show people that."

Recently, Triton announced that Kjell Inge Røkke, a Norwegian billionaire who made his money in commercial fishing, was buying a bubble that could descend 7,500 feet, about a mile and a half. That would be the deepest dive yet for a plastic sphere. His ocean foundation plans to use the craft for scientific research.

The walls of the craft will be a foot thick. "That wasn't possible just a few years ago," Mr. Lahey of Triton said in an interview. Triton contracts out its bubble production to a German team that includes Röhm, the inventor of Plexiglas, a brand of solid transparent plastic.



ALAN LE GRONOVIC, VIA ALAMY

In a brochure titled "Luxury Submersibles," Triton advertises a model that can hold seven people — a pilot and six passengers — and can be operated from a cruise ship.

Kelly Downey, a spokesman for Triton, said the company had just received its first order but could not disclose the buyer's name. She said the bubble, which will have walls five inches thick, could dive to 1,650 feet, about a third of a mile deep.

In April, Victor L. Vescovo, a wealthy investor, piloted a Triton vehicle nearly seven miles down into the Challenger Deep, the deepest fissure on Earth. Five feet in diameter, made of titanium, a superstrong metal, and featuring three portholes the size of dinner plates, the vehicle was a new variation on an old theme.

The Triton brochure also offers a vision of the bubble future: a vehicle with a "completely transparent pressure hull" that

Clockwise from top: Technicians and engineers prepared a Triton bubble sub before testing it in the water in October; a bubble sub allowed explorers to examine a shipwreck near the Bahamas; and Graham Hawkes and Sylvia Earle developed a bubble sub prototype in 1983.

"Ocean exploration is more exciting and important than space exploration."



NICK VERGOLA/TRITON

could reach the bottom of the Challenger Deep. In the interview, Mr. Lahey, the company's president, said that the colossal pressures at that depth would crush plastic and that the sphere would have to be made of superstrong glass.

"We'd have to spend a long time and a lot of energy to show it's suitable," he said of a bubble made of glass. "But it would be fantastic."

Triton has also proposed building an undersea resort called Poseidon. It would sit at the bottom of a lagoon in Fiji next to a coral reef and feature 24 guest rooms — not bubbles but domes made of plastic.

The rise of bubble subs promises to pay exploratory dividends for decades. "The

tech is being driven forward," said Dr. Robison of the Monterey Bay Aquarium Research Institute. "Whether it's rich guys with yachts or scientists with instruments, the fact that the technology is evolving means it's going to be much easier to do this kind of research in the future."

Mr. Hawkes, the bubble designer who introduced Dr. Robison to the deep panoramic view in the 1980s, "said it was going to change everything, and he was right," Dr. Robison said.

"We've been studying the deep sea indirectly for a century and a half," he said. "And now we can finally get down there and measure things and see them directly for ourselves. That's a huge advantage."



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# UNDERWATER EXPLORERS

Welcome aboard! How private submersibles are taking us to incredible new depths of the ocean

Words by James Horlton

The oceans serve as Earth's largest habitat and are home to a phenomenal array of life. As well as discovering this rich diversity, exploring the depths allows us to peel back the curtain on another world. Mere centimetres beneath the waves corals bloom, fish graze, cephalopods hunt and crustaceans battle. But few of us ever get the opportunity to venture deeper, down where the pressure is too much for our unprotected bodies to endure and the light fades away leaving the water an inky black. At these extreme depths fantastical creatures begin to appear. First the swordfish, then the angler fish, then for the lucky few, the elusive giant squid. Until recently a private citizen could

do little but dream about seeing such sights for themselves. But there are now some astounding vehicles that have unlocked the potential of the deep blue. We are in the era of the private submersible, which not only lets civilians peruse the depths at their leisure, it's letting them do it in style.

These manned vehicles are escorted to their dive sites by other vessels, but once set loose under the water they are able to roam independently. Many of the companies that are selling such technologies also offer pilot training, meaning the private

operator can take full control of their new vehicle. The variety already on offer is astounding. In this feature we'll uncover shallow pleasure cruisers, harder research vessels and even a submersible that can reach the very deepest point on the ocean floor. Yes that's right, you can now buy a vehicle that will allow you to replicate a feat that has so far only been achieved by three people in history. So read on and get saving, because these pleasures don't come cheap.

But it'd be hard to argue that they aren't worth the money.

*"At these extreme depths fantastical creatures begin to appear"*

YOU KNOW? More people have walked on the Moon than have visited the deepest point in the ocean

## Bottom dweller

Meet the Triton 36000/2, an emerging veteran of the deep

The latest trialled and tested Triton model is a juggernaut of a submersible. Built to endure the punishing pressures of the oceans depths repeated times, the vehicle is currently undergoing a pilgrimage to prove its mettle. Under the control of a private owner, Triton is touring the world on a quest to escort its pilot to the deepest point of the world's five oceans. As the sole manned submersible of the Five Deeps Expedition, at the time of writing Triton has

already touched down at the bottom of the Atlantic, Southern and Indian Oceans, and will tackle the Pacific and Arctic depths later this year. Upon its completion of this record-breaking mission the submersible, its launch vessel and accompanying craft will become available to a private owner. They can all be yours for just \$4.7 million (around £3.7 million).

**TRITON 36000/2**

**DEPTH RATING:** 11,000 metres

**MAX CREW:** 2

**LIFE SUPPORT (HRS):** 85 (standard)

96 (emergency)

**MAX SPEED:** 3 knots

**Protection**  
A 60mm thick and 99.933 per cent truly spherical hull protects the crew from a crushing 1,100 bars of pressure.

**Safety measures**  
Multiple redundant ascension systems and 12 separate batteries ensure that the Triton will always be able to return to the surface.

**Viewports**  
Carefully positioned acrylic viewports allow the crew undisturbed forward and downward views of their surroundings.

**Freedom of movement**  
The submersible can easily ascend, descend and pivot with the help of versatile motors.

**Piercing the dark**  
High-output LEDs illuminate the absolute darkness of the ocean floor.

**Sampling**  
A multi-jaw manipulator arm allows the crew to physically probe and collect samples from the external environment.

**Efficient design**  
The Triton's focus on simplicity allows it to be easily piloted and permits repairs while at sea.

**For the long-haul**  
Leather-bound seats keep the crew comfortable throughout their 8-12 hour-long missions.

**SEAMAGINE AURORA 6**

**DEPTH RATING:** 1,000m

**MAX CREW:** 6

**LIFE SUPPORT (HRS):** 8 (standard)

96 (emergency)

**MAX SPEED:** 2 knots

## Record-breaker

In March 2012, film-maker James Cameron touched down at the deepest point in the world's ocean – near the very bottom of the Mariana Trench. Just two others had achieved the feat before, and Cameron was the first pilot to make the descent solo. Cameron was housed in the state-of-the-art Deepsea Challenger submersible, which was able to capture valuable data. The vehicle itself was an engineering marvel, requiring the team to invent a new composite of foam – to help the vehicle ascend – and develop novel fluid-compensated electronics to produce working thrusters. Equipped with a robotic arm, a 2.5-metre tower of LEDs, two robotic vehicles and 3D cameras, Challenger was able to bring a heap of material back to the surface. The mission was a resounding success.



Triton and Aurora film director James Cameron piloted the Deepsea Challenger in 2012

## Ocean tourer

Dubbed an 'underwater lounge', the Aurora 6 boasts two recliners positioned behind the pilot's chair, a guest area seating three more behind that, and even a lavatory at the rear. Passengers get near-complete views of their environment from inside acrylic globes that form the protective hull. As the vessel tours the ocean, its occupants are treated to an immersive experience akin to an underwater glass tunnel you could find at an aquarium. Except the Aurora can dive to 1,000 metres and explore the darkened depths below.

The Aurora 6 is designed to offer five passengers tantalising views in bluish comfort





# Underwater luxury

Cruise along in unrivalled splendour beneath the ocean tides

Sometimes a massive yacht just isn't enough. For those fortunate few who are lucky enough to tour the seas on their own private vessels, a pleasure cruise beneath the waves undoubtedly holds as much appeal as the sights to see above it. Fortunately, the NEYK submarine is ready and able to fill this purpose. With a modular design that can be easily modified to fit its owner's specifications and desires, the NEYK can host a crew of up to 20 people. The airplane-style hull is also peppered with viewports, allowing the passengers to sit back and drink in the sights hidden beneath the waves.

**Rising up**  
The submarine can return to the surface by inflating four air balloons attached to the hull.

**Sensors**  
Extra lights, cameras, night vision equipment and radar can all be equipped to the NEYK's dome.

**360-degree vision**  
The pilot can gain a wide view via the top viewport.

**Surveying**  
A high-resolution 3D sonar scanning system can complement the viewports to help the pilot visualise the vessel's surroundings.

**Portability**  
A retractable undercarriage allows the NEYK to ascend and descend ramps from launch vessels under its own power.

**Sea views**  
The nose can be modified to a glass front to improve passengers' viewing.

**Modular comfort**  
The heavily customisable interior can be altered to accommodate a large crew, additional furniture or extra equipment.

**Thrust**  
Two powerful 200kW electric motors quickly drive the propellers, providing the crew with a tranquil cruise.

**Streamlined**  
Its teardrop structure helps the slender vessel surge through the water at up to 15 knots.

**TRITON**  
1000/2

**DEPTH RATING:**  
305 metres  
**MAX CREW:**  
2

**LIFE SUPPORT (HRS):**  
10  
**MAX SPEED:**  
3 knots

## Shallow dive

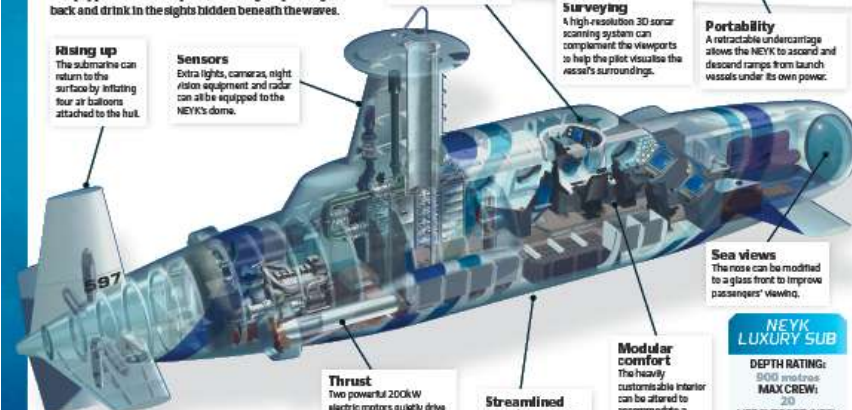
You needn't travel far underwater to enjoy the splendour of marine life. As any keen snorkeller or scuba diver could testify, the bustling marine cities of coral reefs and the diverse array of predators and prey that swarm the shallows offer some truly mesmerising sights. Triton's adventure sub, the 1000/2 model, facilitates long days at these enchanting locations for a pilot and their passenger. Equipped to easily plummet through the shallows, the vessel can playfully scour coastal waters from dawn until dusk. For the media-minded, the vehicle can also tolerate a hefty payload of cameras for capturing the marine environment and footage of sunken wrecks. A mechanical arm mounted on its front also enables the crew to interact with their surroundings and gather samples to bring back to the surface.



Enjoy all mid-ocean while exploring underwater



CC BY-SA/IMAX



**NEYK LUXURY SUB**

**DEPTH RATING:**  
800 metres  
**MAX CREW:**  
20  
**LIFE SUPPORT (HRS):**  
122  
(12 people required)  
**MAX SPEED:**  
15 knots  
(11 knots surfaced)

**DID YOU KNOW?** The pressure at the bottom of the Mariana Trench is 8 tons per square inch, about 1,000 standard atmospheres

# Deep water researcher

The Titan is an innovative deep sea science vessel

**Data collection**  
Multiple 4K cameras, data tablets and a laser scanner enable the craft to capture deep-sea data for scientific research.

**Sight inspection**  
The Titan's arsenal of equipment and large viewport make it perfect for surveying underwater wrecks.

**The Cyclops**  
Titan boasts the largest viewport of any deep-sea submarine, providing immersive views for its crew.



**OCEANGATE TITAN**

**DEPTH RATING:**  
4,000 metres  
**MAX CREW:**  
5  
**LIFE SUPPORT (HRS):**  
8 (extra onboard)  
90 (consumable)  
**MAX SPEED:**  
3 knots

**Easy docking**  
Integrated landing provisions allow the submarine to dock after a dive without assistance from a scuba team.

## Sports sub

No matter the hobby, there are always those who seek to take it to a greater extreme. Enter the HiPar Sub 2, a retro-styled amphibious vehicle straight out of a classic James Bond movie. The vessel can travel at a respectable six knots to a depth of 100 metres, but its true madness and thrill lies in its ability to safely tumble, roll, sway, vertically ascend and descend and generally zip around erratically under the sea. Its designers profess to the sensation being like piloting a fighter jet, and if that wasn't exciting enough, the controls can be easily switched between passengers, letting all aboard (there's a 4-crew version, too) take a turn at the wheel. As far as accessibility goes, this submarine also takes the crown. Rather than being only suitable for a super yacht, it can be easily towed behind a car and smaller marine craft.

**U-BOAT WORKS HIPER SUB**

**DEPTH RATING:**  
100 metres  
**MAX CREW:**  
2  
**LIFE SUPPORT (HRS):**  
6  
**MAX SPEED:**  
6 knots



The HiPar Sub series are purpose built to perform tricks under the water

## Layers of the oceans

What inhabits the bright shallows and dark deep?

**Epipelagic Zone**  
The majority of plant and animal marine life reside in this highest layer of ocean.

**Mesopelagic Zone**  
The twilight zone is home to many deep-sea creatures that migrate at night.

**Hydrographic Zone**  
The deepest region of the ocean is home to many deep-sea creatures that migrate at night.

**0-200m**  
The shallows of the ocean are known as the Epipelagic or the 'Sunlight' Zone.

**200-1,000m**  
Home of the 'Twilight Zone', referred to as the Mesopelagic Zone by ocean scientists.

**1,000-4,000m**  
This gloomy region is the last to be reached by any sunlight.

**4,000-6,000m**  
The Abyssopelagic or simply 'Abyssal' Zone is in perpetual darkness.

**6,000m+**  
The world's deepest oceanic trenches are an alien place than be reached only by extremely specialised vessels.

POSTALES  
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Lifestyle Magazine

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## RETIRO SENSORIAL

Un refugio de 64 villas con vistas a la laguna, el mar o la selva, brinda descanso a los espíritus aventureros que exploran las joyas culturales de Vietnam.



FOTO: CORTESÍA, DOLCE & GABBANA

Golf & Spa

# lujo

92

Submarine /  
Triton Submarine:  
a la conquista  
del océano



104

Cars /  
Range Rover  
Evoque: refinamiento  
todoterreno



## Deleite arquitectónico

La precisión de la relojería suiza y la creatividad milanesa unen sus fuerzas en la línea Manifattura Italiana, de Dolce & Gabbana, cuyos elementos remiten a los cuentatiempos en las plazas de ciudades emblemáticas como Nápoles, Venecia y Florencia. El modelo Roma es un exponente perfecto del exclusivo movimiento automático, el calibre DG 01.01, resguardado en una caja de oro rosa de 18 kilates con dial de madreperla y corona de diamante negro. Ofrece una reserva de marcha de 58 h y una frecuencia de 21'600 vph.

dolcegabbana.com



# BAJO EL MAR

Por  
Ricardo  
Villanueva

Lo que parece inalcanzable, como conocer las profundidades marinas desde un espacio placido y protegido, con la opción de poder grabar en HD la experiencia escuchando nuestra música favorita, se puede realizar a bordo de los minisubmarinos Triton 1650/3 LP y 7500/3.

**T**riton Submarines inició el diseño y fabricación de minisubmarinos privados en 2007 en sus instalaciones en Vero Beach, Florida. Las funciones de estos medios de transporte van desde la aventura, pasando por la ciencia, exploración y arqueología, así como la grabación de videos para cine y televisión.

Los primeros minisubmarinos del sello fueron creados para profundidades de 300 a 1000 metros, incluido el modelo 1650/3 LP y en 2011 comenzaron el ensamblado de modelos para aguas profundas, capaces de llegar a los 11 km de inmersión, con el 7500/3.



**500 m**  
profundidad  
máxima

**12 h**  
tiempo máximo  
de inmersión

**360°**  
la visión que  
tienen sus  
modelos

**4,000 kg**  
su peso

**550 kg**  
su carga útil

**95%**  
del fondo  
oceánico no ha  
sido explorado

**3.2 m**  
de longitud

**2.61 m**  
de ancho

MODELO  
TRITON 1650/3 LP

FOTOS: COURTESY TRITON SUBMARINES

● El minisubmarino de lujo es el proyecto en desarrollo de Triton Submarines y Aston Martin

El Triton 1650/3 LP puede transportar a un piloto y dos pasajeros a una profundidad de 500 metros, disfrutando del ambiente interior, gracias a su altura de 1.80 m y aire acondicionado.

A través de su enorme burbuja transparente, los viajeros observan los paisajes marinos sin perder detalle, al ser iluminados por las luces LED de 20 mil lúmenes de potencia del minisubmarino.

Construido en acrílico, tiene un peso de cuatro toneladas, lo cual permite colocarlo en el agua mediante una grúa. Su par de propulsores, movidos por una batería de 30 kWh, se controlan a través de un joystick, lo cual facilita su desplazamiento.

Para comodidad de los viajeros cuenta con un depurador de oxígeno y CO<sub>2</sub> como soporte vital durante las inmersiones, y en materia de seguridad, en caso de emergencia, dispone de un par de baterías extra.

Utilizando una tecnología patentada, desarrollada en colaboración con los socios exclusivos de manufactura de acrílico de Triton Submarines, el 7500/3 es el sumergible de acrílico de buceo más profundo del mundo,

UBER LANZÓ SCUBER, EL SERVICIO DE MINISUBMARINO PARA RECORRER LA GRAN BARRERA DE CORAL EN AUSTRALIA, CON UN COSTO DE USD 2,100 PARA DOS PERSONAS

capaz de transportar a científicos, exploradores y cineastas a 2.250 metros por debajo de la superficie del océano.

A bordo, la cabina se mantiene en una atmósfera constante, controlada tanto por el clima como por la temperatura. Los asientos de cuero, cosidos a mano, y un sistema de sonido integrado ofrecen como resultado un lugar agradable para permanecer, especialmente durante inmersiones prolongadas.

Como garantía de un ascenso controlado y un retorno confiable a la superficie, Triton tiene contemplados una serie de sistemas de respaldo en todos sus sumergibles como inyección directa de aire a los tanques de lastre y rastreo, y monitoreo continuo de la ubicación submarina del vehículo desde la embarcación principal. Cada minisubmarino contiene soporte vital y energía de batería de emergencia por 96 horas. ●



EN LA COMPRA DE CUALQUIER MODELO, SE BRINDA UN PROGRAMA DE ENTRENAMIENTO, CON CLASES EN EL SIMULADOR Y EN EL MAR

● tritonsubs.com  
Instagram: @tritonsubmarines  
Facebook: @tritonsubs

### TRITON 1650/3 LP

/ 3.20 m / 2.61 m / 1.80 m  
de longitud de ancho de altura



/ 500 m / 3 nudos / 4  
de profundidad su velocidad motores



/ 4,000 kg / 550 kg  
su peso de carga útil

#### ADEMAS

Tripulación: Piloto + 2 pasajeros

Inmersión: 12 horas

• Baterías de ferrosulfato

• Aire acondicionado y humedad controladas

• Control Joystick

• Batería doble 24v de emergencia

Costo: a partir de USD 3.3 millones

### TRITON 7500/3

/ 4.40 m / 3.30 m / 2.60 m  
de longitud de ancho de altura



/ 2.286 m / 3 nudos / 4  
de profundidad su velocidad motores



/ 10,500 kg / 550 kg  
su peso de carga útil

#### ADEMAS

Tripulación: Piloto + 2 pasajeros

Inmersión: 10 horas

• Baterías de ferrosulfato

• Aire acondicionado y humedad controladas

• Control Joystick

• Batería doble de 24v de emergencia

Costo: USD 6.65 millones



News > World

## US adventurer becomes first human to reach deepest points of each five oceans

Victor Vescovo and his crew, of the Five Deeps expedition, shed light on their groundbreaking mission

WORDS AND VIDEO BY ROB LE MARE | 1 day ago | 0 comments



The **ocean's** equivalent of **SpaceX** have arrived in London.

This week, London welcomed the world's only reusable Deep Sea Vehicle (DSV) Limiting Factor, capable of return journeys to the deepest parts of the ocean.

In a landmark breakthrough for deep sea **exploration**, the state-of-the-art submersible enabled US adventurer Victor Vescovo to become the first person to visit the deepest points in every ocean. These depths are known as the Hadal zone and four of them had never been visited by humans before.

Mr Vescovo, a millionaire private equity investor, financed the dives which took place over the last 10 months. The retired naval officer has previously completed the 'Explorer Grand-Slam' which includes climbing the seven highest peaks on Earth as well as reaching the North and South Poles.

Mr Vescovo, originally from Dallas, Texas, told the Standard: "I want everyday people to have a lot more interest in the oceans and be excited about it."



The 12-tonne submersible, with a top speed of roughly 1.5 metres per second, was launched from a dedicated support ship, the DSSV Pressure Drop. Limiting Factor represents a giant leap in Deep Sea exploration technology. It took 26 month to build after a year in the design phase.

“This is the first time humans have had a reusable vehicle that can go to any depth, any ocean, virtually any time,” said expedition leader Rob Macallum of EYOS expeditions. “We’re able to do that five times in an eight day period and we could have done that every second day if we’d wanted to. It’s a fantastic machine.”

“It’s capable of diving to 36,000 feet or full ocean depth and carrying two people” said Patrick Lahey, president of Triton submarines who built the submersible. “For us, I didn’t just want to build a sub that would do a handful of dives and then be relegated to a museum. I wanted us to build a commercially viable craft that would have a life expectancy that would be measured in decades and thousands of dives.”



Victor Vescovo with submersible named Limiting Factor (Five Deeps expedition)

Limiting Factor has small windows with wide angle lenses to maximise its viewing angle for the pilot and passenger. There are also situational awareness cameras placed around the vehicle to assist with visibility.

The pressure when Limiting Factor is at the bottom of its deepest dives is roughly equivalent to the weight of 291 fully laden jumbo jets. The cabin is pressure resistant so the conditions for those on board is the same as surface pressure.

As no daylight reaches the deepest parts of the ocean, lights are positioned on the submersible. They allow they allow the pilot to see up to 200 metres ahead.



An individual, as opposed to a government, privately funding such expeditions draws comparison with Elon Musk of SpaceX. As Mr Macallum said: "I think the trend that you're seeing in ocean philanthropy, ocean science, is similar to what we're seeing in space travel. We're seeing private philanthropists come in with a much more nimble, much faster approach to advancing the technological needle."



Victor Vescovo boards submersible Limiting Factor in Antarctic Ocean (Five Deeps expedition)

Don Walsh, 87, an oceanographer who manned the submarine that first made the descent into the Mariana Trench in 1960, came on board the ship for 10 days of its journey. Mr Walsh told the Standard: "Between five and 15% of the world's oceans have been explored. Think about that, we're going to send people to Mars and the moon and we don't even know what's going on on our planet. The ocean is fundamental to everything on our planet and we don't understand fully how it works."

Chief scientist on board the ship Alan Jamieson said: "A lot of people sort of have this preconceived notion that the deepest points of the ocean are not particularly interesting. They're some sort of barren, lifeless landscape. That's not true at all. I can tell you by looking at the mud on the bottom, which trench it came from. You can tell by the local diversity and the geology, they are really quite different."

"Most of planet Earth is 4000 meters deep. It's the bit that no one seems to care about because humans have an intrinsic fear of the water. And what I want to do is blur that line between the sea that we like and we want to conserve and the bit we would like to ignore. There's no need for that it should just be one entire body of water, the ocean is the ocean, it doesn't have these man made lines drawn in it."

Whilst undertaking the dives, the crew discovered 40 new species. They also found manmade pollutants from the 1950s inside sea creatures, as well as a plastic bag and sweet wrappers at the bottom of the Challenger Deep, the deepest known point on Earth. Water samples have been taken throughout the dives at various depths which await scientific analysis.



Preparing Limiting Factor in the Pacific Ocean (Five Deeps expedition)

As for Mr Vescovo, his days of adventuring are far from over. “I’d love to go into space. I’ve been flying since I was 19 years old, and I’ve always had that dream.”

A five-part **documentary** about the Five Deeps Expedition, made for the Discovery Channel by Atlantic Productions, is likely to air early next year. ■





## First Titanic dives in 14 years reveal how the ocean floor is swallowing up the shipwreck



By Madeline Holcombe, CNN  
Updated 9:06 AM ET, Thu August 22, 2019

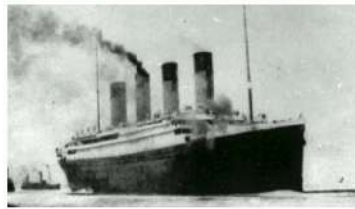


**(CNN)** — The RMS Titanic was visited by divers for the first time in 14 years, and the ship that was once a picture of luxury was found in the process of being swallowed up by the ocean floor and ravaged by metal-eating bacteria.

A series of five dives were completed this month by an exploration team from Triton Submarines to the spot 370 miles south of Newfoundland, Canada, and 4,000 meters below the surface where the ship deemed "unsinkable" now rests, according to a release from [Triton](#).

A team of experts, scientists and a National Ocean and Atmospheric Administration representative captured footage of the 107-year-old wreck with specially adapted cameras. The 4K footage will make it possible to see the wreck in augmented and virtual reality technology.

The ship sank in 1912 when it hit an iceberg, leading to the deaths of 1,517 of the 2,223 people on board.



**Related Article:** [Titanic Fast Facts](#)

The footage, which will be utilized for a new documentary made by [Atlantic Productions](#), shows the effects of salt corrosion, metal-eating bacteria and deep current action on the decomposition of the ship.

"The most fascinating aspect was seeing how the Titanic is being consumed by the ocean and returning to its elemental form while providing refuge for a remarkably diverse number of animals," said Patrick Lahey, the president and co-founder of Triton

Submarines.

Victor Vescovo, CEO of Caladan Oceanic and the submersible's chief pilot, noted that the success of this series of dives to the Titanic opens access to visit other hard to reach wrecks using a similar process.

"We now have a proven system that can easily and repeatedly visit any ocean wreck, at any depth, anywhere in the world, and study it in detail. We're seriously thinking about where to take her next," Vescovo said.

The site was not just used for study, however. The dive team laid a wreath and held a ceremony to honor those who died in the ship's sinking.





boote

# EXCLUSIV

# DIE WELT DER SUPERHEROEN

## 54-Meter-Meilenfresser mit Mangusta-Genen

## Superyachten als heimliche Filmstars

### Roberto Cavallis Batman-Yacht

## Schutz vor Attacken

“DAR”

# Gläserner Jäger

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TRITON



# Rekord mit Tiefgang

Die Five-Deeps-Expedition ist der erste Versuch, mit einem bemannten U-Boot auf den Grund der fünf tiefsten Gräben der Erde zu tauchen. Das Unternehmen um US-Abenteurer und Investor Victor Vescovo steht kurz vor dem Finale.

Text: Martin Hager | Fotos: Tamara Stubbs, Rocco Jelliffe

Gute Paarung: Das 68 Meter lange Forschungsschiff „Pressure Drop“ dient während der Expedition als Mutterschiff des von Triton Submarines für Entdecker Victor Vescovo gebauten U-Boots „Limiting Factor“. Das Five-Deeps-Team wird am Ende der Mission 40.000 Seemeilen zurückgelegt haben.





Puerto-Rico-Graben: Die Crew der 88-Meter-„Pressure Drop“ hievt das Triton-Tauchboot „Limiting Factor“ am A-Frame-Kran aus dem Atlantischen Ozean.



Die angesehensten Ozeanografen, U-Boot-Experten und zahlreiche Wissenschaftler arbeiteten drei Jahre lang an dieser von Extremabenteurer und Entdecker Victor Vescovo initiierten Mission. „Es ist eine der ambitioniertesten Forschungs Expeditionen des letzten Jahrhunderts“, beschreibt der heute 87-jährige Dr. Don Walsh das ehrgeizige Vorhaben. Der renommierte US-Ozeanograf muss es

wissen, er tauchte im Jahr 1960 im Bathyscap „Trieste“ und gemeinsam mit Jacques Piccard auf den Grund des Marianengrabens in eine Tiefe von 10911 Meter, ein Tiefschreckrekord, der beeindruckende 59 Jahre lang hielt.

Die Five-Deeps-Expedition ist der erste Versuch, mit einem bemannten Unterseeboot die tiefsten Gräben in jedem der fünf Ozeane zu erkunden. Den 8376 Meter tiefen Puerto-Rico-Graben im Atlantischen Ozean, den 7434 Meter tiefen Süd-Sandwich-Graben im Südpolarmeer, den 7192 Meter tiefen Java-Graben im Indischen Ozean, den 10928 Meter tiefen Marianengraben im Pazifik und das 5573 Meter tiefe Molloytief im Arktischen Ozean, an der Grenze von Nord-

polarmeer und Grönlandsee. Die von Discovery- und Science-Channel filmisch dokumentierte Mission startete als Kollaboration zwischen dem US-Investor und Ex-Marine-Offizier Victor Vescovo, der amerikanischen U-Boot-Werft Triton Submarines und dem auf Extremreisen spezialisierten Unternehmen Eayos Expeditions, das seit einigen Jahren auch Großyachten bei ihrer Routenplanung in wenig befahrenen Gewässern beratend begleitet. Triton Submarines entwickelte das erste kommerziell zugelassene Zweimann-Tiefsee-Unterseeboot mit dem passenden Namen „Limiting Factor“ explizit für das Five-Deeps-Vorhaben. Das 12,5 Tonnen verdrängende Tauchgefährt besitzt einen 90 Millimeter

„Es ist eine der ambitioniertesten Expeditionen des letzten Jahrhunderts“



Fünf Ozeane, fünf Gräben: Die Expedition startete im Atlantik, es folgte das Südpolarmeer, der Indische Ozean und der Pazifik. Diesen September will die Five-Deeps-Crew (r.) das Molloytief im Arktischen Ozean erkunden. Jedem Tauchgang geht viel Planung voraus (r.).



Unterwegs im Südpolarmeer: Das Five-Deeps-Mutterschiff „Pressure Drop“ auf dem Weg zum 8183 Meter tiefen Süd-Sandwich-Graben.

starken Rumpf aus einer Titan-Alu-Legierung und kann bis zu 16 Stunden lang auf Exkursion gehen. Als schwimmende Expeditionsbasis dient das 1985 gelaunchte, 68,28 Meter lange Forschungsschiff „Pressure Drop“, das neben Unterkünften für bis zu 47 Wissenschaftler und Crew mit einem leistungsstarken A-Frame-Kran und mehreren Tendern bestückt ist.

#### Auf den Grund der fünf Ozeane

„Ich war sehr erstaunt, als ich vor vier Jahren entdeckte, dass noch kein Mensch auf dem Grund von vier Ozeanen war“, erzählt Victor Vescovo. Nachdem er im Jahr 2017 erfolgreich den Explorers Grand Slam vervollständigte, der aus der Besteigung der Seven Summits und dem Erreichen des Nord- und Südpols aus eigener Kraft besteht, bot die Bezwingung der fünf tiefsten Meeresgräben die Chance auf weitere Rekorde und das Ausloten neuer Limits. „Physische und technisch anspruchsvolle Herausforderungen haben mich schon immer gereizt. Die Idee zur Five-Deeps-Expedition war geboren, und wir realisierten schnell, dass wir mit unserer Mission Geschichte schreiben können – sowohl technisch als auch wissenschaftlich.“

Den zuvor mit einem hochmodernen Kongsberg-Sonar exakt bestimmten

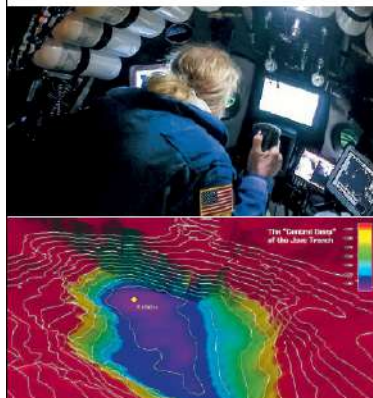
tiefsten Punkt des Puerto-Rico-Grabens erreichte die „Limiting Factor“ mit Victor Vescovo am Steuer am 21. Dezember 2018. „Es war der erste bemannte Tauchgang zur nachweislich tiefsten Stelle des Atlantiks“, erzählte Vescovo.

„Wir waren auf 8376 Meter Tiefe und damit 76 Meter tiefer als das französische U-Boot „Archimède“, das 1964 den Graben erkundete.“

Etwas mehr als zwei Monate später und sehr viel weiter im Süden tauchte



Abgetaucht: Die 12,5 Tonnen verdrängende „Limiting Factor“ von Five-Deeps-Initiator Victor Vescovo ist das erste kommerziell zugelassene Zweimann-Tiefsee-Tauchboot.



Neue Spezies: Am Grund des Java-Grabens in 7129 Meter Tiefe filmte das Five-Deeps-Team einen bis dato unbekannten Tiefseebewohner. Die Wissenschaftler gehen davon aus, dass das Tier zur artenreichen Gruppe der Manteltiere gehört.

Victor Vescovo in seiner Tauchkapsel als erster Mensch in zwei Stunden und 42 Minuten auf den Grund des Südsandwich-Grabens im Südpolarmeer in 7433,60 Metern Tiefe. „Aufgrund der abgeschiedenen Lage stellte dieser

tor Vescovo setzte als erster Mensch auf dem Boden des Java-Grabens im Indischen Ozeans auf, der sich in einer neu gemessenen Tiefe von 7192 Metern befindet. Auf dem Grund gelang es dem Team, ein bis dato unbekanntes Tier zu

Marianengraben im Pazifik gelegene tiefste Punkt der Erde (Druck 1070 bar), war das Ziel der vierten Tauchexpedition. Am 28. April stellte Victor Vescovo einen neuen Weltrekord auf, indem er seine „Limiting Factor“ in die Rekordtiefe von 10928 Meter steuerte – kein Mensch war jemals tiefer! „Wir sind sehr stolz auf diesen Rekord und darauf, was wir bisher erreicht haben“, so der amerikanische Abenteurer. „Doch unsere Mission ist noch nicht beendet, wir haben noch viel vor!“

Das 165 Kilometer westlich von Spitzbergen im Arktischen Ozean gelegene 5573 Meter tiefe Molloytief steuert das Five-Deeps-Team diesen Herbst an. Kein Mensch hat es bisher gewagt, die tiefste Stelle der Arktis zu erkunden.

## Kein Mensch hat es bisher gewagt, die tiefste Stelle der Arktis zu erkunden

Tauchgang viele logistische und wetterbedingte Herausforderungen dar, doch die wissenschaftlichen Erkenntnisse durch unsere exakte Kartierung des Grabens mittels Sonar könnten sich als bahnbrechend erweisen“, so Vescovo.

Mitte April dieses Jahres folgte der nächste Höhepunkt der Expedition: Vic-

tor Vescovo setzte als erster Mensch auf dem Boden des Java-Grabens im Indischen Ozeans auf, der sich in einer neu gemessenen Tiefe von 7192 Metern befindet. Auf dem Grund gelang es dem Team, ein bis dato unbekanntes Tier zu filmen, das an „Limiting Factor“ vorbeischwamm. „Wir gehen davon aus, dass es sich bei dieser neu entdeckten Tiefseespezies um ein Tier aus der Gruppe der Ascidiacea, auch Manteltiere genannt, handelt“, so der leitende Five-Deeps-Wissenschaftler Dr. Alan Jamieson. Das Challengertief, der im



Weltrekord: US-Ozeanograf Dr. Don Walsh (Bild r.) gratuliert Victor Vescovo an Bord der „Pressure Drop“ zu seinem Challengertief-Tauchgang in der Rekordtiefe von 10928 Meter. Auch Eyos-Expeditions-Gründer Rob McCallum (l.) freut sich über den Rekord.



# B I L L I O N A I R E

## Marine Expedition Vehicles Gain Favour

Written By **Tara Loader Wilkinson** Created: 20 September 2019

A growing interest in submersibles and explorer yachts is transforming ocean conservation efforts.



A Triton Submersible off the coast of Bora Bora (c) Cookson Adventures

You could say that one of the highest points in Victor Vescovo's life was also the lowest. Earlier this year the 53-year-old US financier and explorer broke the record for the planet's deepest dive, a title previously held by film director James Cameron. In a seriously cutting-edge Triton Submersible, in May he drove three-and-a-half hours — nearly 11 km — down to the bottom of the Mariana Trench in the Challenger Deep, the planet's deepest point.

What did he do when he got there? He had a look around and, after discovering three new species of marine animal (along with a plastic bag), he "turned the thrusters off, sat back and enjoyed a tuna sandwich".

Vescovo's submersible journey was, in fact, one of five he undertook to the bottom of five different oceans this year, namely the Atlantic, the Southern, the Indian, the Pacific and the Arctic. Called Five Deeps, the expedition lays the groundwork for the entire seafloor to be mapped and the resulting data published for public use within the next decade. The mission is in partnership with Seabed 2030, a collaborative project between non-profit The Nippon Foundation and The General Bathymetric Chart of the Oceans (GEBCO), and is being filmed by Atlantic Productions for a Discovery Channel series

It felt like leaving a bit of a legacy, says Vescovo. "When I started out, I wanted to be the first to actually go to the bottom of all five of the world's oceans, because that had never been done before and I thought it was about time someone did," he explains over email. "But I am extremely happy that through this adventure we created a technological system that allows people to go to any point on the bottom of the sea floor, reliably and repeatedly. I feel very happy to have significantly helped advance marine technology to give humankind this amazing capability."



Victor Vescovo (c) Five Deep



Civilian submersible technology has undergone a huge leap in the last few years, almost exclusively privately funded. The era of deep dives is expressive of a new time of ocean exploration, the Shackletons or the Cousteaus of the 21st century, as billionaires such as James Cameron, Richard Branson, Eric Schmidt and the Packer family have now spent more on ocean exploration than the US government.

Experts say greater knowledge about what submersibles can do, and programmes such as David Attenborough's recent BBC series *Blue Planet II*, has led to a spike in the number of submersible purchases.

According to Florida-based manufacturer Triton, as many as 30 were sold industry-wide in 2017, with price tags of up to US\$30 million. In parallel to the space race, which sees billionaires such as Jeff Bezos and Elon Musk pitted for dominance above Earth, other ultra-wealthy individuals are looking to leave a legacy below the waterline. More than 80 percent of our ocean is unexplored and unmapped, and we know less about it than space.

"Personal submersibles for private yacht owners have enjoyed steady growth over the last two to three years," says Patrick Lahey, founder of Triton Submarines, which now sells around six submersibles annually. He adds while many clients start off using the submersibles for leisure, increasingly they are using them to support marine science and filming projects. "Submersibles provide our clients with legacy opportunities when they are used to support scientific endeavours aimed at furthering our knowledge and understanding of the ocean."

Triton currently has several ground-breaking submersibles under construction, including a six-seater that can dive to 1,000m and a three-seater capable of diving to 2,300m. It is also building the first contemporary tourist submarine in over 20 years, equipped with a transparent cylindrical pressure hull, to carry 24 passengers and two crew members to depths of 100m.



The Five Deep vessel (c) Five Deep

According to submersible pilot Ofer Ketter, the trend for ocean submersible going has risen hand in hand with conservation efforts. He recalls leading a submersible dive trip in the Sea of Cortez off the coast of Mexico 10 years ago, organised by a Cocos Island-based adventure dive operator, Undersea Hunter, one of the first private companies pioneering conservation using submersibles.

The whole team was excited at the prospect of seeing coral and sea life at greater depths than ever before. With some marine biologists on board, Ketter drove the submersible down to 15,000ft. What they saw came as a shock.

"It was supposed to be about sharks and reefs but there was nothing but ghost fishing nets and bare rock," he says. The expedition had a positive ending though. Examining the sub's footage, the marine biologists discovered an image of a grouper that had been thought over-fished to extinction. But this particular grouper was now living at greater depths, where it could not be touched by fishing.

"Using the log of the submersible we were able to retrace our steps back to where we had seen the grouper. As groupers are territorial fish, it was still there. We were able to conduct ground-breaking research, which led to conservation efforts."

Since then, Ketter has also discovered the first deep shark species ever recorded: the prickly shark (*echinorhinus cookei*) on the Cocos Island; the first-ever record of the deep-sea chimaera (a rare deep fish) on Guadalupe Island off Mexico; and new species of coral in Chedra Wasih Bay, West Papua, all through the windows of a submersible.

#### EXPLORER YACHTS

Naturally, the trend in submersible exploration comes with a demand for explorer yachts. Gone are the days when all yacht owners wanted was a gentle summer on the Mediterranean coast. Many are seeking to add meaning to their holidays by adventuring to remote locations, sometimes for research purposes.

Luxury travel agencies such as Cookson Adventures report a flurry of interest in explorer yacht charters, complete with submersible on board: another ripple from the 'Attenborough effect'. Cookson offers yacht and submersible packages to the Antarctic peninsula, the Micronesian archipelago of Palau and the Bahamas, accompanied by dedicated environmental experts and guides. The starting cost is around US\$500,000.

This year will see the inaugural edition of the Explorer Yachts Summit in Monaco, while the superyacht market itself is predicted to grow at a compound annual growth rate of 5.3 percent between 2018 and 2026, attributed in part to the popularity of explorer craft.

One of the most cutting-edge examples of an explorer yacht in private ownership, Russian billionaire Oleg Tinkov is building a 77m icebreaker yacht, named *La Datcha*, due for completion next year. The six-deck expedition yacht will have room for a separate research vessel, as well as a submarine, two snow scooters, two helicopters and a dive-support vessel, as well as every luxury thinkable from Jacuzzis to a fully equipped gym. According to Forbes, Tinkov plans to sail her across the Mediterranean, the Seychelles, Madagascar and then the Kamchatka and Kuril Islands, and on to the Antarctic in January 2021. When Tinkov is not on board, it will be available to rent for €690,000 per week. Bill Gates has reportedly already put his name down for a three-week excursion.



Jasper Smith

Meanwhile, British tech entrepreneur Jasper Smith this year launched Arksen, a sustainable yachting vessel with conservation at its core. Arksen owners will dedicate 10 percent of their vessel's time to projects that the Arksen Foundation collectively supports, allowing scientists and filmmakers access to a fleet of vessels from which to run their projects. As a statement of intent and a sign of Arksen's commitment to the environment, Arksen has signed up to '1% for the Planet', an international organisation whose members commit to donating the equivalent of one percent of annual sales to support environmental causes.

To commission an Arksen boat will cost from £5 million upwards for the 20-30m range. Build commences in summer 2019 at the Wight Shipyard in Southampton, UK, with official completion of the first vessel a year later (the first boat is pre-funded). The vessels are designed by naval architect Humphreys Yacht Design.

Smith says: "Owning an Arksen vessel is not a status symbol. It is a statement of intent." Using his gaming and tech experience, Smith's long-term aim is to send 'unmanned' and autonomous vessels across the world for research purposes.

He adds: "With the vast majority of the sea floor unmapped, huge areas unexplored and two-thirds of our planet being water, there are multiple discoveries to be made that could significantly influence how we approach the challenge of saving our planet."

*This article originally appeared in Billionaire's Earth Issue, September 2019. To subscribe contact [subs@highend.media](mailto:subs@highend.media)*



FIRST LIFE

U-Boat Worx' C-Explorer  
3 submersible can reach  
300-metre depths and has  
a clear hull that provides an  
unobstructed 360° view

# VOYAGE TO THE BOTTOM OF THE SEA:

As the majority of the ocean depths remain unexplored, private submersibles are satisfying the 'pioneer' spirit of thrill-hungry travellers.  
**Dominic Midgley**  
reports

# THE WORLD'S ULTIMATE DESTINATION

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They call it 'the pioneer effect' – the satisfaction to be gained from being among the first people to travel to a particular location. And there can be few better examples of the genre than a voyage by submarine to view the wreck of the *Titanic* 12,500 feet beneath the surface of the Atlantic Ocean. US company OceanGate is offering just such an opportunity for \$125,000 a head – not much more than the cost of an inflation-adjusted first-class ticket on the flagship of the White Star Line, whose maiden voyage in 1912 was brought to such an abrupt halt by an iceberg.

The global popularity of documentaries such as Sir David Attenborough's epic *Blue Planet* series and a growing awareness of the fragility of the marine environment mean the ocean depths have never loomed larger in the popular imagination. And given that scuba divers rarely go down below 40 metres, submarine manufacturers are fond of claiming that 95 per cent of the oceans are undiscovered. Whoever ventures deeper, they argue, will be the first to actually see whatever it is they are looking at, whether that be a wreck, a reef or marine life. So underwater tourism certainly offers the pioneer effect.

As a result, more and more superyachts are being built with a storage bay for a submarine. So-called expedition cruise ships, which offer a more adventurous agenda than conventional luxury liners, are taking to the high seas with one if not two submersibles on board. A new breed of tourist subs, which can carry up to 66 passengers, are being ordered by resorts around the world. And OceanGate is just one of a number of operators to offer premium-priced explorer dives.

But not all has gone smoothly for the company based in Everett, Washington state. OceanGate, which has a waiting list of 17 clients, was due to take its first "citizen explorers" to the wreck of the *Titanic* in June this year. That expedition was postponed to next July after problems relating to the status of the mother ship under Canadian maritime law – the *Titanic* lies 370 miles off the coast of Newfoundland.

When OceanGate's clients do eventually take to sea in its five-man *Titan* deep-sea submersible, they will spend two-to-three hours descending more than two miles deep – so they are carefully screened beforehand.

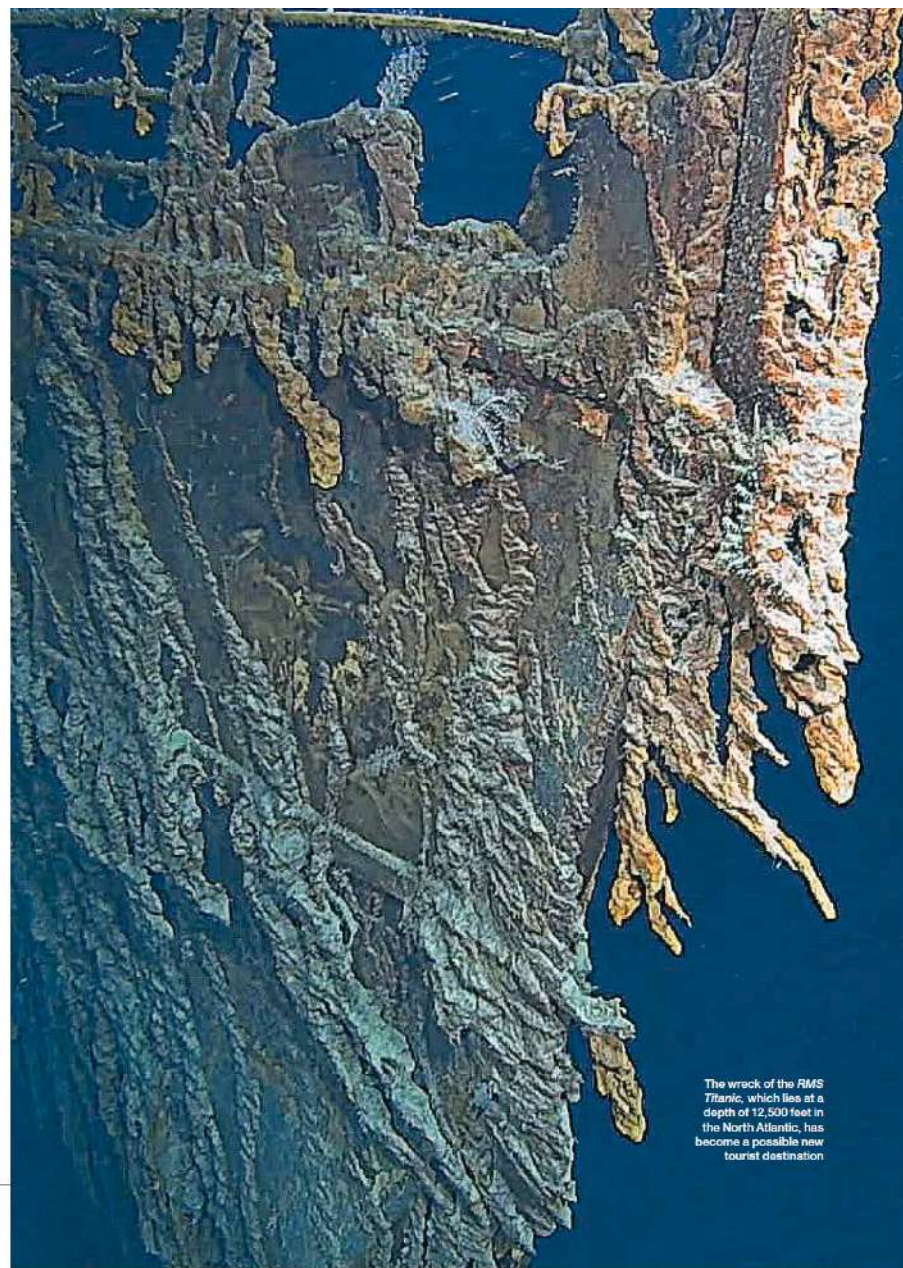
"We make it clear to all interested participants that this is a serious endeavour to support scientific research and that a participant's suitability to join an expedition takes priority over any other factors," says Elizabeth Ellis, founder of Blue Marble Private, the boutique travel agent that markets the *Titanic* Survey Expedition on behalf of OceanGate. "As you can imagine, the wreck of the *Titanic* continues to decay, so a major part of the expedition is to understand this better."

Just how quickly the *Titanic* is decaying was highlighted in August when the first manned dive to the wreck in 14 years, by a team financed by Texan private equity

THE OCEAN DEPTHS  
HAVE NEVER LOOMED  
LARGER IN THE  
POPULAR IMAGINATION

investor and renowned explorer Victor Vescovo, discovered a "shocking" deterioration caused by deep-sea currents and metal-eating bacteria. He made a detour to see the *Titanic* as he headed for the Molloy Deep in the Arctic, the final dive in an expedition called The Five Deeps, which involved voyages to the deepest points in all five of the world's oceans. Vescovo made his descents in a vessel made by Florida manufacturer Triton Submarines called the 36000/2 – the figures representing the depth in feet it can reach and the number of crew it can accommodate, respectively. With a →

ATLANTE PRODUCTIONS



The wreck of the RMS *Titanic*, which lies at a depth of 12,500 feet in the North Atlantic, has become a possible new tourist destination



A U-Boat Worx submersible gets up close to a 1943 Bristol Baufighter wreck in Maltese waters



depth range of 36,000 feet, Triton's flagship model goes as deep as the height at which an airliner cruises. Unfortunately, with a price tag of \$30m, it is not economic to use it for underwater tourism.

While submarine excursions are never cheap, their cost pales into insignificance next to the price of a superyacht sub. An entry-level submersible will set you back around \$2m, and a top-end model with all the optional extras could cost as much as \$6m. But, as Stewart Campbell, editor of *Boat International*, says: "If you're spending €50-60m on a superyacht, a couple of million extra on a submarine isn't going to break the bank."

Three of the biggest names in the private submarine sector are U-Boat Worx, Triton and Seamagine. The founder of Dutch manufacturer U-Boat Worx is computer tycoon Bert Houman, who – like so many people in this sector – was initially inspired by the adventures of Jacques Cousteau. The French oceanographer's 1956 film *The Silent World* and the subsequent documentary series that ran throughout the 1960s and 1970s introduced an entire generation to the wonders of the deep and his submarine *Denise* – known as the "diving saucer" – caught the imagination of many, including a young Houman.

"When Houman sold his company, he didn't need to work anymore," says U-Boat Worx marketing manager Roy Heijdra. "He bought a yacht and then wanted to see if he could build a submarine of his own."

That was in 2005. Today U-Boat Worx claims to be the biggest supplier of private submersibles to the yachting industry, with 60 employees and sales of up to seven models a year. But it is in the new expedition cruise market that it is seeing "exponential growth".

"They are building around 40 ships at the moment that will go to places like the Antarctic, North Pole, Greenland, the Galapagos Islands – the sort of destinations that conventional cruise ships wouldn't naturally visit. Our cruise sub series is aimed at the expedition cruise industry and they can hold up to ten guests and one pilot," says Heijdra.

The *Scenic Eclipse*, a vessel that Heijdra describes as

the most luxurious expedition cruise ship on the market at the moment, has one of U-Boat Worx's seven-seater subs on board and charges its passengers around €500 per trip. Meanwhile, Seabourn has ordered a brace of subs apiece for the two expedition cruise ships it has under construction.

U-Boat Worx's biggest competitor is Triton, whose distinctive bulbous hulls offer panoramic views of the surrounding sea. "One of the things that Triton is proudest of is the fact that people aboard our submarines connect with the ocean in a really intimate and emotional way," says marketing manager Craig Barnett. "Our acrylic pressure hulls are the clearest and strongest and most optically perfect available. They have the same refractive index as seawater and so they effectively disappear

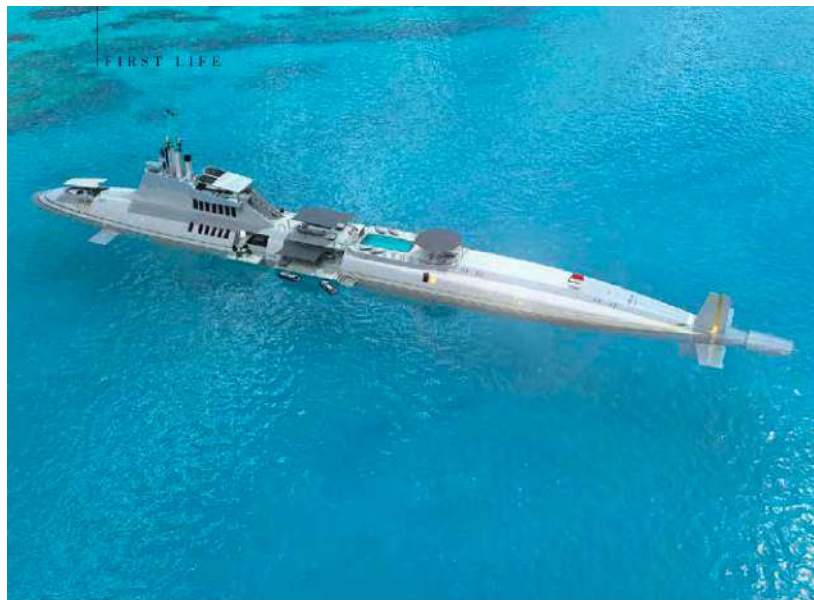
## JACQUES COUSTEAU INTRODUCED AN ENTIRE GENERATION TO THE WONDERS OF THE DEEP

when you dive. People spend the first five minutes touching the acrylic to make sure it's still there."

Triton has delivered 14 submersibles in its 12-year history and has four more "in build". Its bestselling model is the 3300/3, priced at \$3.85m, but its most exciting project at the moment is a joint venture with Aston Martin called Project Neptune. Up to now, function has been prioritised over aesthetics in the superyacht submarine sector but Triton sees a gap in the market for a sub that has the look and feel of the other elements in the owner's portfolio: the palatial home, the private jet, and the luxurious mother ship. And so the pilot of its new \$4.4m →

PHILIP ARDEN

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Top: concept design for the Migaloo M7 private submersible yacht, complete with helipad and eight suites, which converts into a military-grade submarine. Above: Project Neptune unites Triton's technical know-how with Aston Martin's craftsmanship

sub and their two passengers will sit on hand-stitched leather seats as they head down up to 500 metres into the depths.

Not that Triton is ignoring the expedition market. "There's been a changing demographic in the last ten years among superyacht owners," says Barnett. "There's a new generation of younger, more adventurous people who want to explore; go up somewhere like the North West Passage and get down on to the ice. These expedition yachts are packed with toys like helicopters, boats, land vehicles and, of course, submarines."

Attempting to provide the best of both worlds is Austrian company Migaloo, which has designed a concept for a 948-foot-long vessel that doubles as both superyacht and submarine in one. The M7 can dive to 1,500 feet and travel underwater at 20 knots. If you're interested, it's likely to cost you several billion dollars, and make you the owner of "the most expensive private object worldwide", according to Migaloo CEO Christian Gumpold.

Just as space tourism is on the rise, so interest in that other 'final frontier', the ocean depths, is booming as never before. ■



# AP

Explorer recounts making the deepest ocean dive in history



NEW YORK (AP) — Taking the hours-long journey to what is believed to be the deepest point mankind has visited in any ocean was a complicated one, and for Victor Vescovo, it meant being constantly on the alert as he monitored his state-of-the-art vessel.

But when he reached 10,928 meters into the Challenger Deep in the Mariana Trench of the Pacific Ocean, Vescovo took the advice of the man whose record he just broke — Oscar-winning director James Cameron — and took 15 uninterrupted minutes to take in the view and the enormity of the moment.

Cameron told him he'd be busy, of course, but noted that “few if any people have seen what you've seen” so “deeply appreciate how fortunate you are to see it,” Vescovo recalled in an interview.

Last month's groundbreaking mission was filmed as part of an upcoming Discovery Channel documentary series that will chronicle Vescovo's trips to the furthest parts of the world's waters — the Atlantic Ocean, the Southern Ocean, the Indian Ocean, the Pacific Ocean and the Arctic Ocean. He has done all except the Arctic plunge, which is set for the fall.

The entire journey took nearly 12 hours — four hours to descend, four hours spent at the bottom, and then about four hours to ascend again. Vescovo, a businessman and amateur pilot who has also traversed the highest mountain peaks, including Mount Everest, said the goal of the expedition was not to best Cameron's mark in the ocean, but to go to areas of the waters that were unexplored.

“I was stunned to discover when I did my research that of the five oceans, four had never had a visitation to their bottoms,” he said. “I thought it was about time that someone actually did that.”

For his journey, Vescovo traveled in a vessel called the SDV Limiting Factor, a titanium craft that is billed as the “ultimate submersible” and the only one able to travel to such depths. It was outfitted with high definition cameras that documented everything, including creatures unknown to man.

“There've been numerous new species thought found on this expedition. The scientific group is thrilled with the things that have been brought back for additional analysis. It's really great,” he said.

He saw a very unusual jellyfish in the Indian Ocean but there was also an unsettling find — trash, particularly plastic, in the deepest part of the water.

The discovery of plastic in such far reaches proves the need for more vigilance to protect the oceans, said Andy Sharpless, CEO of Oceana, which describes itself as the largest worldwide group in the world with the goal of saving the oceans.

“Vescovo's discovery of plastic in the deepest part of the ocean is disturbing but not surprising because plastic is found throughout the water column in our oceans,” he said in a statement. “That's why it can't be easily 'cleaned up.' We need to focus on reducing the use and production of plastic in order to really protect our seas from plastic.”

Patrick Lahey of Triton Submarines, which made the vessel that transported Vescovo and also followed Vescovo's dives to the Challenger Deep, said the missions show why more exploration of the oceans are critical for science's benefit.

“These are large swaths of the oceans that we've never seen that really we know virtually nothing about. I think it's important for us as human beings to study these areas,” said Lahey.

“The ocean is the life force of our planet. I think this is a great opportunity for us to learn more about it and to try to use this tool that we've developed for that purpose.”





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# 1843

STORIES OF AN EXTRAORDINARY WORLD



## Hippie Inc.

How the counterculture went corporate

DEATH IN THE ALPS • THE FEATHER REVOLUTION • UBER FOR OLIGARCHS

# #FirstWorldProblems

## Do you know a good submarine-maker?

**Meet John Ramsay,** chief designer for Triton and a man who makes Bond's Q look like an amateur. He designs the executive toy *du jour*: a personal submarine.

### What's the trend?

Nobody who's anybody in Villefranche-sur-Mer is actually *sur la mer* these days. That's so old. They're all *sous* it. As Louise Harrison, former European sales director of Triton, says, "The super-rich aren't happy to sit on the back of their yachts with a G&T anymore."

**So what do they do under the sea?** You know, the usual. See tropical fish without getting their hair wet. Drink champagne underwater in the Antarctic. Pop down to the Mariana Trench.

**The Mariana Trench that's 10,994 metres deep and only three people have dived to it?** The very same. One of Ramsay's clients has climbed the highest peaks on each continent and

### First world war U-boats were used to sink enemy ships. Today submersibles help you to avoid road traffic

been to the deepest points in the five oceans.

**So submersibles are a thing?** Absolutely. Richard Branson has one, so does Roman Abramovich.

Ray Dalio, a hedge-fund billionaire, has two. Being a middle-aged man in Lycra is out. These days it's all about being a middle-aged man in aeronautical-grade aluminium.

### Why should we trust Ramsay?

Because you're 10,000 metres under the sea and frankly it's a bit late not to. Even Vladimir Putin

trusts him: Ramsay was part of a team that rescued a Russian submarine crew from the floor of the Pacific in 2005.

### Any other reason?

In David Attenborough's "Great Barrier Reef" you see him sink beneath the waves in one of Ramsay's yellow submarines.

### Excellent, can we all live in yellow submarines now?

Alas no. There's usually enough room on a standard Triton sub for three people. And forget "live". It's more "stay briefly". Your time on them is limited, says Ramsay, by "the size of your bladder" (there are no loos). **I take it no band will begin to play then?** No. But the subs do come fitted with

surround-sound speaker systems and the "Das Boot" ping-ping soundtrack.

### So what's the point?

Looking aching on trend. Emerging from the sea in serious style: think Ursula Andress but with ballast tanks. Oh, and commuting. One customer wanted a sub so he could nip about and avoid the traffic in Miami. Submersibles: like Uber but for oligarchs.

### OK, I'll take one of the Mariana Trench ones.

Smashing. That'll be \$30m please.

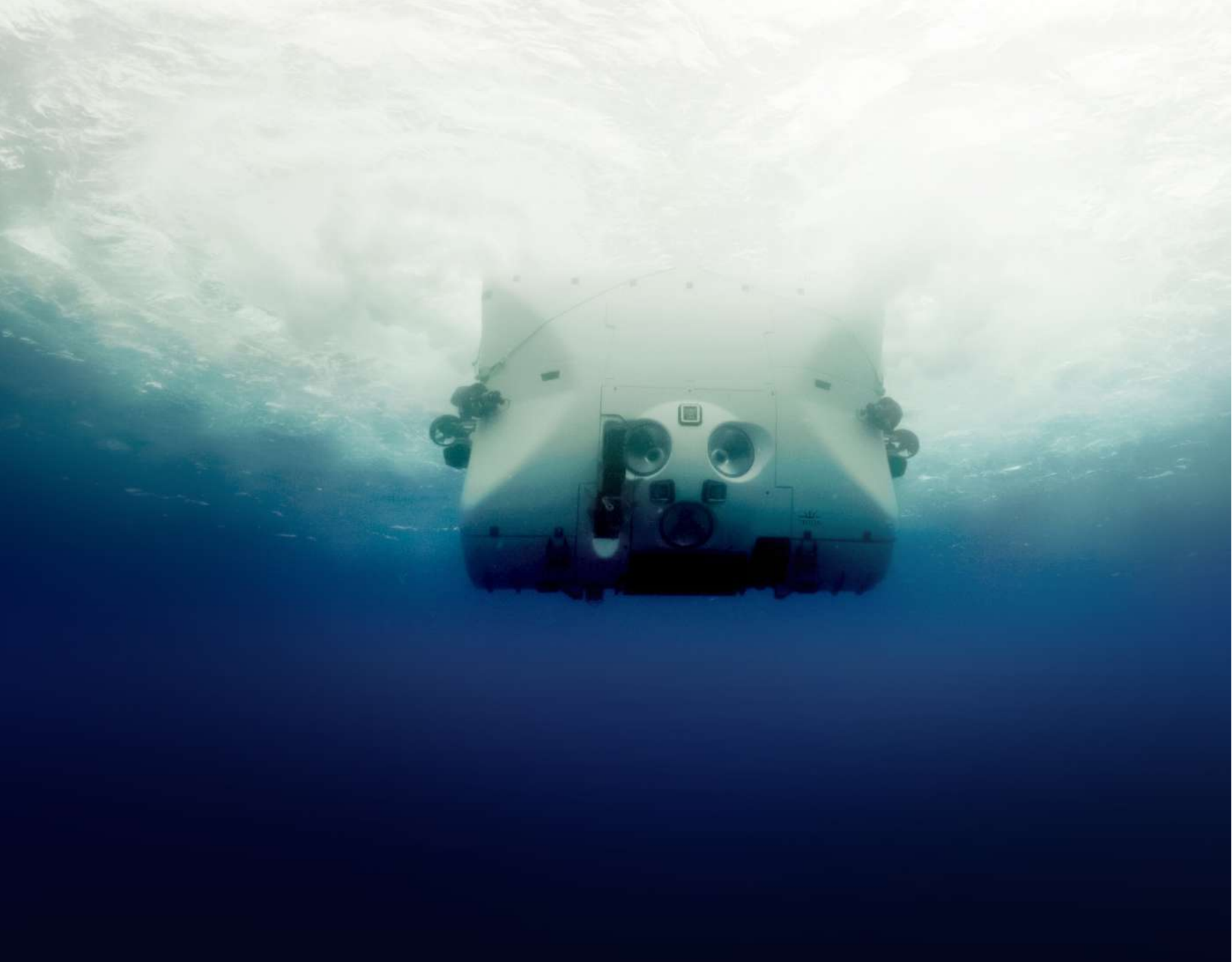
**Oh. Are any of them more modestly priced?** They start at \$2m a pop. But don't get excited: you'll need a 165-foot superyacht to store it. Even that, says Ramsay, "is still a bit of a squeeze".

**Catherine Nixey**



© HORNBY-HOBBS





## 2018

The year saw continued public interest in the Project Neptune submersible, further heightened by the joint Triton and Aston Martin design reveal of the model at The Superyacht Show in Barcelona, Spain.

Later that year Triton announced the completion of the Hadal Exploration System and the jewel in its crown - the world's first Full Ocean Depth certified submersible, the Triton 36,000/2. Following successful trials of the system, the Five Deeps Expedition was unveiled to the world and commenced its 11-month journey late in 2018.

TOTAL
ARTICLES - 1,490
REACH - 1,633,254,622
ADVERTISING EQUIVALENCY - \$15,107,605



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# The Guardian

## Wall Street trader reaches bottom of Atlantic in bid to conquer five oceans



▲ Victor Vescovo says, 'It felt great to get to the true bottom of the Atlantic Ocean for the first time in history.'  
Photograph: Richard Vancoe - Special Project Six

Insight Equity Holdings founder, Victor Vescovo, pilots \$48m submarine on historic dive

A multimillionaire Wall Street trader has become the first person to reach the deepest point of the Atlantic Ocean as part of an extreme mission to dive to the depths of the world's five oceans.

Victor Vescovo, 53, the founder of US private equity firm Insight Equity Holdings, on Friday piloted a \$48m (£38m) submarine 8,376 metres (almost five miles) beneath the ocean surface to the bottom of the Puerto Rico trench.

"It felt great to get to the true bottom of the Atlantic Ocean for the first time in history," Vescovo said. "Our depth of ignorance about the oceans is quite dramatic. Four of the oceans have never even had a human being go to their bottom. In fact, we don't even know with great certainty where the bottom of the four are."

Vescovo has already climbed to the highest peak of each of the world's seven continents and trekked to both the north and south poles. But he is not alone in that feat. At least 62 other people have also completed the so-called explorers' grand slam.

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**The Five Deeps Expedition is the first to attempt to reach the deepest point in each of the Earth's five oceans**

## The Five Deeps Expedition is the first to attempt to reach the deepest point in each of the Earth's five oceans



Guardian graphic. Source: The Five Deeps Expedition

Desperate to prove himself as the world's "ultimate explorer", Vescovo set himself a fresh challenge: to dive to the deepest point of each of Earth's five oceans.

He will now head to the South Sandwich trench in the Southern Ocean, about 100km east of the South Sandwich Islands. That trench, 8,428 metres below the surface, is unnamed and Vescovo hopes his dive there in February will grant him naming rights. Getting to the bottom of the ocean is not easy, or cheap. The pressure is more than 16,000 psi (pounds per square inch) - more than 1,000 times the standard atmospheric pressure at sea level. In order to withstand it safely, Vescovo ordered his specially built submarine at a cost of \$48m.



▲ Victor Vescovo will now head to the South Sandwich trench in the Southern Ocean.  
Photograph: Caladan Oceanic



The 11.2-ton Triton submarine, named Limiting Factor, has a 9cm-thick titanium hull built using advanced forging techniques and tested in Russia to conditions equivalent to 13,198 metres, or 20% greater than the ocean's deepest point.

Vescovo is able to sit back and relax in the vessel's leather armchairs as it descends to 10,950 metres in less than two-and-a-half hours. Pilots can explore the ocean using four cameras or look out into the dark depths through three acrylic viewports.

Vescovo, who will be followed on his adventure by cameras from the Discovery Channel, said: "I've always loved a great physical and technical challenge and, like those currently attempting to push space technology to the limit, I thought it would be a great goal to push the absolute limits of marine technology.





After the Southern Ocean, Vescovo will dive 7,725 metres to the Java trench in the Indian Ocean. The fourth dive will be the deepest - 10,925 metres to the Mariana trench, the deepest point in the world.

Twelve people have walked on the moon but only three have ventured to the Mariana trench's Challenger Deep. Two explorers - Don Walsh and Jacques Piccard - reached it in 1960 and the Titanic film director, James Cameron, went there in 2012.

The fifth dive will be in the near-freezing waters of the Molloy Deep in the Arctic Ocean. "We sincerely hope to make history, both technically and scientifically, on this expedition," Vescovo said.

He is travelling with Alan Jamieson, a marine biology lecturer at Newcastle University, who has embarked on 50 deep-sea exploration missions and hopes to make fresh discoveries about life at the very depth of the world's oceans.

"Currently, we know more about the intricacies of the lunar surface than we do about the depths of our oceans," Jamieson said. "The discoveries made on this expedition promise a world of new scientific innovation in almost every area of biological, geological and oceanographic study."

in almost every area of biological, geological and oceanographic study."

Vescovo has always been a high achiever. He was in the top 5% of his MBA class at Harvard business school, picked up a master's degree at the Massachusetts Institute of Technology and a double major degree in economics and political science from Stanford University.

He started mountain climbing in 1998 and last year became the 12th American to complete the explorers' grand slam. Only 17 people, including one woman and two Britons, have completed the "true" explorers' grand slam to reach both the North and South Pole and climb the seven summits. A further 46 people, including Vescovo, have completed the slightly easier "last degree" of the explorers' grand slam, which requires travelling to within one degree of the poles and not to the exact point.

When all Vescovo's dives - which will include additional trips to locations including a possible site of the MH370, the Malaysia Airlines flight that went missing in 2014 - are complete, the submarine and its support ship will be available for another super-rich adventurer to buy - for a cool \$48.2m.



JAMIE ANDERSON  
TODD ANDERSON  
JERRY JACOBS  
JOAN LIVINGSTON  
SHELLY LYNCH  
TIM MARTIN  
TUFFY STONE  
AND MORE

# CAPTURE

MAGAZINE  
\$9.00

## INNOVATION

# TAKING A REAL PLUNGE INTO THE DEEP

*If your yacht's tender only prowls the surface,  
perhaps it's time to submarine.*

*by Douglas Bradley*



My very brief encounter at the helm of a submarine was spent concentrating on the instrument cluster. Aboard the Florida (SSBN 726) a small turn of the wheel was registered a mere moment or two later when the 560-foot Ohio Class ballistic missile sub subtly changed course. While it can maneuver with a bit of alacrity, I wasn't about to test the humor of 150 sailors on board. And while it's fascinating on many levels to plunge below the surface in this giant ship, you really don't get to see what's going on outside the hull.



# ALL ABOUT DISCOVERY

The real fun of plunging into the deep blue sea is visual exploration, and for that task, Triton's deep-diving submersibles with 360-degree views are just the ticket. It's the opposite of my Navy submarine example that prowls the deep. Instead of steel, Triton encases its occupants in a transparent acrylic pressure hull, an enclosure that president and co-founder Patrick Lahey characterizes as optimized immersion. It's an experience where occupants and their surroundings are magically brought together when the hull and water appear to become one.

From its founding ten years ago, Triton designed and constructed personal submarines that have been deployed for underwater film making, exploration and personal use by owners around the globe. When you consider that most of our planet is submersed, there's a whole new world to discover for the first time, no matter how much you've explored terra firma.

Lahey was always attracted to underwater exploration. He started diving in his early teens and began a career as a commercial diver as a young adult. His first experience in a submarine was during work under an oil rig in a one-person submersible. Patrick was smitten. The comfort, security and speed of the vessel was a dramatic improvement over SCUBA diving. After the oil and gas career, he participated in the design, engineering, manufacture and testing of underwater vehicles, including a 165-foot submersible that held 30-people.

Co-founder and CEO L. Bruce Jones adds an impressive career in all aspects of submersible experience from deep diving and diesel electric submarines to developing one-atmosphere under-sea resorts and residence concepts. Jones has served as Chairman of the Manned Submersibles Committee of the Marine Technology Society, member to The American Bureau of Shipping's Special Committee on Underwater Systems & Vehicles and is a review panel member of the Society of Naval Architects & Marine Engineers - U.S. Coast Guard Submersible Safety Panel.

# THE SUBMARINE AS YACHT TENDER

As one might expect in the specialized business of designing and building small manned submarines, Triton's original market was substantially commercial. But along with drilling rig inspection and repair, filming and exploration, well-heeled retail customers ordered a personal Triton to launch from their large yachts.

When Lahey and Jones decided to pursue the yacht tender market, more than a few people scoffed at the idea. However, since the smallest and least expensive submarine Triton produces, the single occupant 3300V1 MD, begins at \$1.8 million, it's a good bet that prospective sub buyers would own a pretty large yacht.

The Triton team settled on the 1650/3 LP model for these consumers and labeled it The Super Yacht Sub. This low profile, three-person sub is light enough at 4,000kg (8,800-pounds) to deploy from a small tender garage with existing cranes then dive to 500 meters (1,650-feet) for amazing under-sea journeys. The base price of \$3.5-million includes all sophisticated comfort and control systems, including air conditioning. Added mechanical arms and lighting are among many features that can be personalized.



10 | JUNE 2014

CONTINUE



## ASTON MARTIN CALLING

The Triton team displayed their products at major yacht shows, especially at gatherings of super yacht models. At Monaco, the company was approached by luxury sports car builder Aston Martin. It seemed that Aston Martin's designers were smitten with the dynamic shape of the 1650/3 and imagined how it might enhance their brand if it were customized as a special model.

Triton recognized that this kind of product partnership had great marketing value for both firms and quickly agreed. So the Aston Martin Neptune was born with the car designers in Gayton, England adding stylish body faring and customizing the appearance as much as practical without impeding the Triton's performance. In fact, performance was enhanced a bit along with dramatic new bodywork and custom interior fitment.

Aston Martin expects that most Neptune buyers will order their submersible as "bespoke", customized to their taste. It's easy to imagine that the new Triton might be painted and upholstered to match a customer's land-based Aston Martin. And this isn't the automotive firm's first adventure in expanding its fashionable brand. Aston Martin partnered with Quintessence Yachts to produce the AM37, a sleek powerful speedboat for those who wish to get to shore with style and dispatch.



Aston Martin's North American PR chief Matthew Clarke shared with me that the Neptune project had a few unique challenges for the automaker's design team. Plans for luxury seating were dampened by submarine reality. Car interiors are installed before doors are hung, so there's plenty of available opening bring in seating. Submarines don't have doors, but a hatch on top. The designers were free to employ fine leather and fashion, but the finished seats couldn't be a millimeter larger than Triton's originals.

Aston Martin retailers are able to configure and sell Neptune submarine to their prospects, greatly expanding Triton's retail network. Of course, after color and bespoke customization are specified, a trip to the Triton's Vero Beach, Florida headquarters is arranged to get a complete underwater checkout and arrange delivery options.

Then the real adventure begins.



# CENTURION

M A G A Z I N E

FALL | WINTER 2018



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CENTURION

## Fun and Games

The latest must-have toys and accessories for yacht owners. *by Josh Dean*

### FUNAIR BEACH CLUB SEA POOL

One of the few limitations of a megayacht is that it doesn't come with a beach, though more and more do have giant platforms, with bars and gyms, at the stern. Here's the perk of copper for that: an inflatable pool, shown above, surrounded by a deck large enough for lying out on and protected under the water with netting, so that you can swim in the open water without fear of jellyfish stings or shark attacks. \$23,000; funair.com

### LIFT EFOIL

Hydrofoil boards are the biggest thing in surfing, because they allow you to surf—often over huge distances—without waves. (The key is a winged keel

under the water that provides lift.) This is the first hydrofoil board with an electric motor, which means you can ride up to 20 miles per hour anywhere there's open water. All you need is the handheld Bluetooth controller, a charged battery, and good balance. \$12,000; liftfoils.com

### SEABOB FS SR

The Seabob is, in essence, an underwater Jet Ski. Just grab the handle, let the throttle (there are seven speed settings), and hold on as it propels you across the water, either on top or underneath for as long as you can hold your breath. The FS is the fastest of all Seabobs and comes with an HD camera embedded in the nose. \$16,775; seabobadventures.com



## YACHTING

### JETLEV FLYER JF-300

It seems that every generation has promised us jet packs. And only Jetlev, a German company, has actually marketed one—on this case, a pack that uses jets of water for thrust. The JF-300 is capable of 47 mph and flies up to 33 feet in the air, which is as far as you can get on the tethered hose that carries the water up from a small, autonomous carbon-fiber boat that trails behind. \$113,895; jetlev-flyer.com

### TRITON 3300 SUBMERSIBLE

For the first decade of Triton's existence, cofounder and president Patrick Laffey would travel to boat shows, make his pitch, and, he recalls, "get basically ridiculed." Now, his submersibles—single-person submersibles—are some of the most sought-after toys in the yacht world. "It's comfortable, it's quiet, it's sublime," says Laffey. "It's like sitting in your living room"—only at the bottom of the ocean, with rare deep-sea life staring back through the acrylic bubble that is Triton's trademark. The 3300 is Triton's most popular model. It seats three and descends to 3,300 feet. \$3.6 million; tritonsub.com

FALL | WINTER 2018



# Vintage

## SQUARE

富豪人生

PIAGET

本刊內容動聽、適及男性雜誌  
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Aston Martin 與美國的個人潛艇品牌 Triton Submarines 攜手創造了這款 Project Neptune 豪華個人潛艇。Aston Martin works with personal submarine manufacturer Triton Submarine to create the Project Neptune luxury personal submarine.



跨界合作的美事又一格！來自英國以生產豪華車款聞名的 Aston Martin 與美國的個人潛艇品牌 Triton Submarines 攜手創造了這款 Project Neptune 豪華個人潛艇。

由 Aston Martin 提供技術和設計上的支援，大幅強化潛艇的水中動力性能，將最高航行時速提升到每小時五海哩，最深潛航深度達 500 公尺，並且加入了奢華的外部塗裝、內裝設備，加上 Triton Submarines 原先就擁有的技術，便成就了一艘兼具平穩、安全、舒適駕駛空間以及高性能的個人潛艇。而這艘潛艇同時可以搭載三個人，包含一名駕駛與兩名乘客；而在航行時，透過前方 360 度的全景式窗口，把海底景色盡收眼底。

Aston Martin 也進一步提供了這艘潛艇

完整的客製化選項，內部設計還有潛艇外部塗漆都能夠根據顧客的需求搭配。要說這台潛艇是水中的奢華超跑也不為過！這艘潛艇上同時有象徵 Aston Martin 的雙翼還有 Triton Submarines 的三叉戟圖騰，向世人宣告這艘結合兩大品牌的曠世鉅作。

Legendary British carmaker Aston Martin is expanding its horizons, working with personal submarine manufacturer Triton Submarine to create the Project Neptune luxury personal submarine.

Thanks to Aston Martin's technical expertise, the submarine boasts extremely high performance, with a top speed of 5 knots and a diving depth of up to 500

meters. Furthermore, the carmaker's interior and exterior design talents combine with Triton Submarines' technological mastery to give the Project Neptune submersible stability, safety and a highly comfortable cockpit. It can seat up to three people – a pilot and two passengers, all of whom can enjoy 360-degree underwater views.

Aston Martin's in-house design team is also on hand to help new owners customize their submarines, like a bespoke supercar. Project Neptune has a logo with the two wings of Aston Martin and the trident of Triton Submarines, showing the power delivered by the two luxury brands joining hands.

Text by 周宇航 Ridley CHOU · Photo from Triton Submarines



## MARINE

## \$48-million Triton 36000/2 submersible takes you to the bottom of the deepest oceans



David Szondy | October 16th, 2018



The Triton 36000/2 is built to make repeated dives to the deepest ocean sites on Earth (Credit: Triton Submarines)

If you like the water, don't mind cramped spaces, and have a spare US\$48 million lying around, then Triton Submarines has a submersible that can take you and a passenger to the bottom of the deepest ocean. With its support ship thrown in for the sticker price, the Triton 36000/2 Hadal Exploration System is designed to make repeated visits to the nadir of the seabed for science, exploration, or the ultimate joyride.

Submersibles have come a long way in the past half century. In the 1960s they were the reserve of major navies, scientific institutes, and pioneering deep-sea engineering firms. Today, they've become the playthings of the very rich. For the right price, you can buy a wide variety of underwater vessels, with Triton even working on a luxury submersible with Aston Martin.

But as with all luxury items, the private submersible market is a game of oneupmanship and the Triton 36000/2 is about as oneupmany as you can get. This isn't just an acrylic sphere with electric motors and some ballast that can be dropped off the boat dock of a superyacht for a quick spin around the coral reef. It's a cutting-edge deep-sea vessel that can rival the real record breakers. And though anyone with the scratch can buy it, the system is also being marketed to governments, philanthropic organizations, and research institutes.

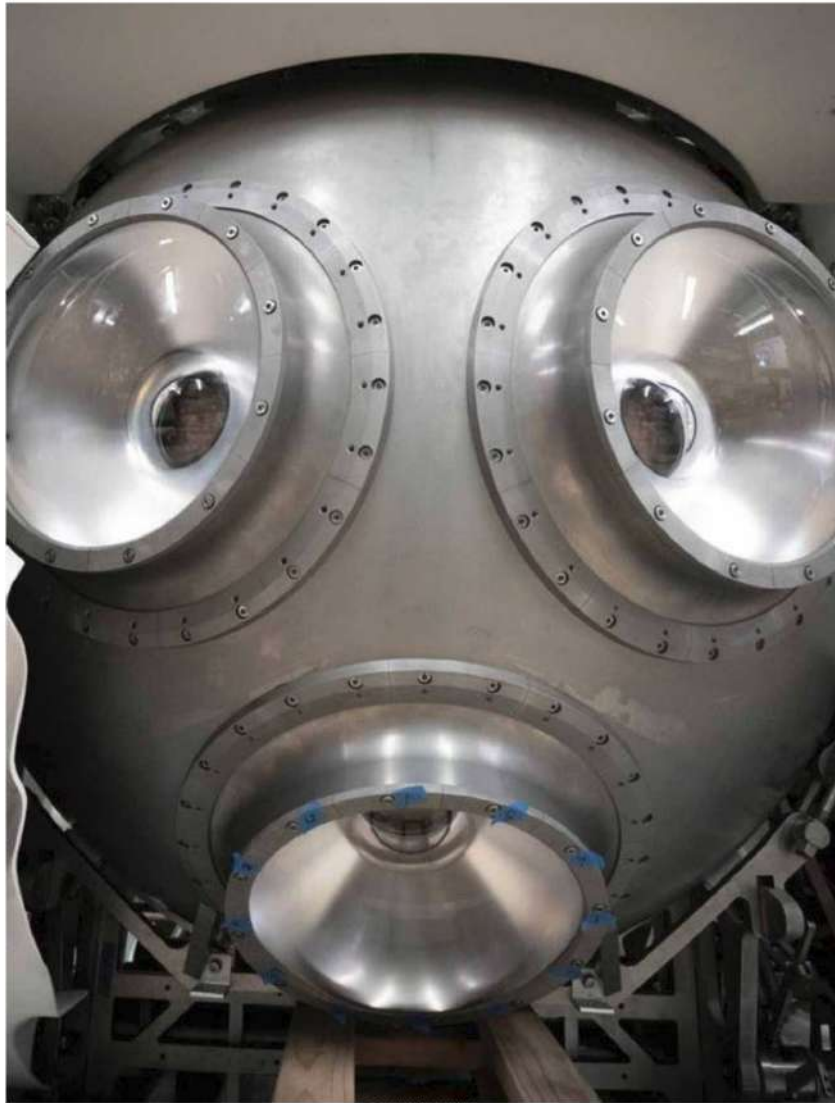


What sets the Triton 36000/2 apart is its spherical, 3.54-inch-thick (90-mm) titanium pressure hull that Triton says took new, advanced forging techniques to produce without any welds or similar weak spots. With an inner diameter of 59 in (1.5 m), it can carry two passengers in its ergonomically-designed leather seats to the deepest spot in the ocean - the Challenger Deep, which bottoms out at about 36,000 ft (11,000 m). At that point, the water is always near freezing, in total darkness, and the pressure is in excess of 16,000 psi (1,089 ATM).

This is a place that only three people have visited before and only as one-offs. According to Triton, the Triton 36000/2 has been tested at the Krylov State Research Center in St. Petersburg, Russia to 20,305 psi (1,382 ATM), as well as on deep dives in the Bahamas. It has a pressure safety factor at least 20 percent greater than it will ever encounter. In addition, it can go to those depths repeatedly on trips of over 16 hours - including the 2.5-hour descent. Triton claims that this repeatability is a first for manned submersibles operating at such depths.

To achieve this, the 11.7-tonne (25,700-lb) vessel has a 64-kWh, 24-V electrical power system running on Li-Fe-P batteries that supply the life support systems, manipulator, 10 electric thrusters, four wide-angle cameras and ten 20,000-lumen LED lamps. In the event of an emergency, it has life support for 96 hours and can jettison its batteries, thrusters, manipulator, and ballast to achieve positive buoyancy.





Because the Triton 36000/2 is designed for extreme ocean depths, the purchase price includes its support ship, the DSSV Pressure Drop. This 224-ft (68-m) diesel electric vessel displaces 2,000 gross tons and can carry 47 passengers and crew as well as the Triton 36000/2. The former US Navy submarine seeker and NOAA science and survey vessel has a stern-mounted A-frame for releasing and recovering the submersible, as well as a climate-controlled hangar, support systems, wet and dry labs, specimen freezers, and a media suite. In addition it has the latest Kongsberg-Simrad EM-124 multi-beam sonar for topographic mapping of the ocean floor.

And like any good seller, Triton is also throwing in three unmanned landers with L3 Systems-supplied acoustic modems to aid in the Triton 36000/2's navigation and to relay communications to the mothership. They also have six push-core samplers for collecting geological and biological samples from the seafloor, as well as up to 10 L (2.6 gal) of seawater. They can also record data on the way up and down using their conductivity, temperature and depth sensors, and their time-lapse cameras.

The Triton 36000/2 is currently on a world expedition during which it will conduct over 50 dives to the five deepest locations on Earth. These include the Puerto Rican Trench, the Meteor Deep in the Southern Ocean, the Molloy Deep off Greenland, and the Challenger Deep in the Marianas Trench, along with other dives to historic shipwrecks. Once these are completed, the Triton 36000/2 submersible will be available for delivery in 2019.

أرماني | تناعم الأناسة والتفرد

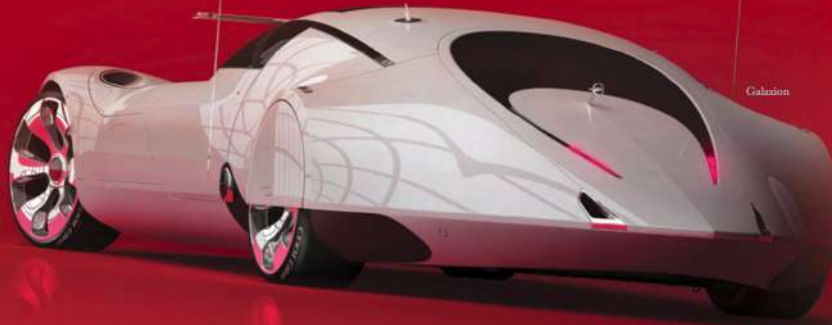
العربية

# Robb Report

101 - ذو القعدة 1439 هـ • أغسطس 2018 م

## آلات الأحلام

1955 Ferrari 500 Mondial • Airbus ACJ319 • AS2 Supersonic Business Jet  
Galaxion • Intensa Emozione • Lamborghini Marzal  
M5 Private Submersible Yacht • Pentagramma • Perini Navi's Maltese Falcon  
Porsche 356 • The Big Falcon Rocket • Triton's Project Neptune



Galaxion

Rolls-Royce Phantom VIII

ذروة التميز



## الغوص في الأعماق

أحلام تتحقق | غواصة فاخرة

إن هذه الآلة الفادحة على الغوص تحت سطح الماء ستسافر بأسلوب  
أسلوب مارتن وبلاجات التقنية الثورية إلى أعماق البحار.

كان تطوير الغواصات المخصصة للاستعمال الشخصي، يتركز حتى هذا العام على مزايا الأداء، الوظيفي أكثر منه على الشكل، كانت الأغلبية الزجاجية التي تتخذ شكل قفازات، والسرعات البطيئة التي تمنحها الغواصات عبر مسارات متعرجة، تعد مثالية للقيام برحلة قصيرة ممتدة حول جدار مرجاني، كانت غواصات الماضي تشبه في مظهرها مخبراً للأبحاث وتبدو وكأنها دُفعت بعظم الموافقة من جاك كوستو، لكنها لم تكن في الخيال تزدحم بكثير من ملامح الفخامة، أما اليوم، فستقلب غواصة بروجيك نبتون هذا الواقع رأساً على عقب، انبثقت الغواصة محدودة الإصدار من مشروع تعاون مشترك بين شركة سابمارينير للغواصات وشركة أستون مارتين، انطلقت الجهتان، اللتان لم تكن شراكتهما مرجحة، في تطوير غواصة تستوعب لثلاثة ركاب وتستطيع البقاء تحت سطح الماء لمدة ثمانين ساعة، والغوص حتى عمق 1,640 قدماً، إذا كانت علامة ترابتون قد ظهرت في كثير من الأفلام الوثائقية التي تتناول بعثات استكشافية تملأ أعماق البحار والمحيطات، فإن أستون مارتين تضيف هذه المرة إلى هذا المجال ملامح رهي لم يشهدها من قبل، ساعد فريق التصميم لدى صانع السيارات البريطاني شركة ترابتون على إعادة تصميم الخطوط الخارجية لتشكل الغواصة نبتون بموازاة إضاءات التحسينات على مشورتها الداخلية، على

www.tritonsubs.com

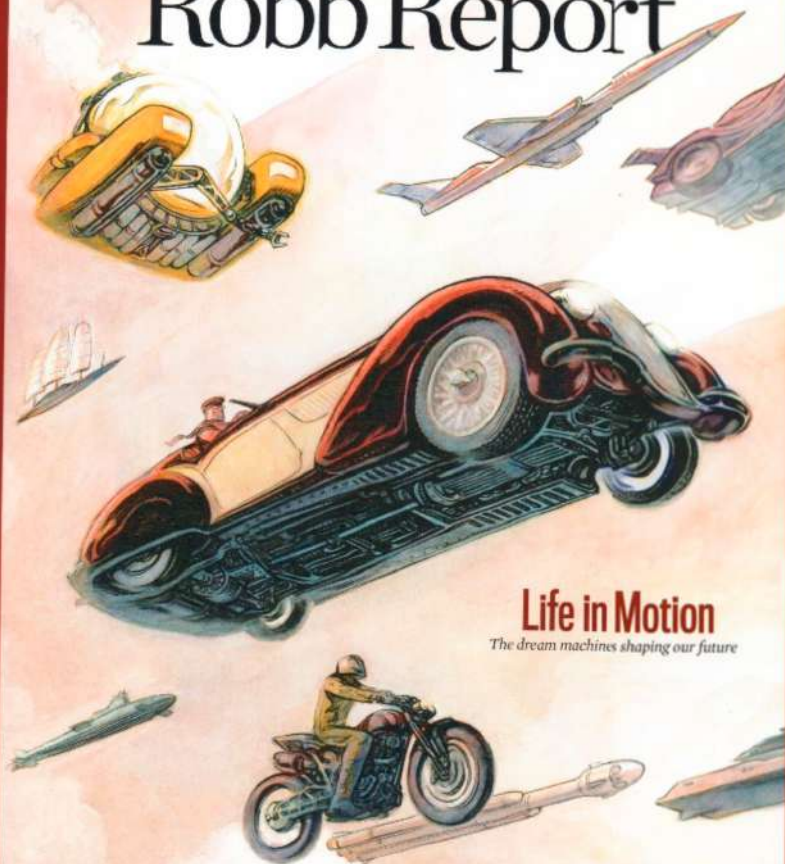


غواصة Project Neptune من ترابتون.



LUXURY WITHOUT COMPROMISE

# Robb Report



## Life in Motion

The dream machines shaping our future

AUGUST 2018

Until this year, personal submarines were more about function than form. The bubble-like glass covers and slow, meandering speeds were ideal for taking a leisurely jaunt around a coral reef. They had research-jab looks with a Jacques Cousteau seal of approval, but not a lot of panache. Project Neptune will change all that. The limited-edition sub is a joint project between Triton Submarines and Aston Martin. The unlikely partners have been working on a three-person submarine that can stay underwater for eight hours, with a deep dive of 1,640 feet. The Triton brand has appeared on many documentaries combing ocean depths, but Aston Martin has added levels of style that this segment has never seen. The British carmaker's design team helped Triton in redesigning Neptune's body style while giving it an upgraded interior. Its "sprint" speed of five knots may not sound like much, but it has four times the acceleration of Triton's flagship 3300/3. "We afforded as much attention to the hydrodynamics as the visible surfaces," says Marek Reichman, Aston Martin's executive vice president and chief creative officer. "None of the detail will never be seen, but its effect will be felt." The custom interior includes hand-stitched leather and carbon-fiber trim, with a focus on ergonomics. "It was assembled without obstructing the panoramic sight lines that Tritons are famous for," says Marek. When Triton begins delivery of its production models in early 2019, Neptune will push the personal submarine concept into a whole new realm. tritonsubs.com —DEBI WARD



TRITON'S PROJECT NEPTUNE

## DEEP DIVE

This new submersible brings Aston Martin style and technical breakthroughs to the ocean depths.

92 AUGUST 2018



Home » Gear » Technology » The £4m Aston Martin submarine: James Bond defictionalised

## The £4m Aston Martin submarine: James Bond defictionalised

Whet your appetite for Bond-style ocean exploration

Words: Harvey James

Straight from the flowing nib of Ian Fleming's fountain pen comes the [Aston Martin](#) -designed submarine in collaboration with [Triton](#). At once a testament and homage to the idiosyncrasies of each company.



The interior is adorned with Aston Martin's hand-stitched leather and high-performance carbon fibre, and the exterior has seen the traditional submarine lumpiness transformed into a sort of hydrodynamic razor blade.





Marek Reichman, Aston Martin EVP and Chief Creative Officer announced, “we have afforded as much attention to the hydrodynamics of the underside as we have the visible surfaces. Some of that detail may never be seen, but its effect will certainly be felt.”

It’s this attention to quality and to timeless style that we have come to know and love of Aston Martin. But equally, Triton’s reputation as “the most experienced civil submarine and submersible manufacturer in the world” had to be upheld here, ensuring the design was watertight and completely safe.



Not only is it a Bond villain’s fantasy made flesh being able to achieve depths of 500m and reaching a sprint speed of 5 knots (and approximately four times the acceleration of Triton’s current model), but it also boasts near 360 degree vision allowing passengers to soak up the alien sights of the deep sea.

On May 2nd at [Barcelona’s LYBRA Superyacht Show](#), the pair announced the completion of the design phase, moving on into the beginning of the manufacturing phase. Described by Aston Martin as being a “strictly-limited edition vehicle”, the rarity of this allegedly £4m beauty makes it all the more covetous for the super yacht market.

There are build slots still open. Go check in with you local Aston Martin or Triton dealer now before they haughtily disappear like the evil mastermind they really should be transporting.

# elite traveler

THE PRIVATE JET LIFESTYLE MAGAZINE

JULY/AUGUST 2018

## Top 100 Suites

TRAVEL THE WORLD IN STYLE  
WITH OUR DEFINITIVE LIST OF  
THE BEST ACCOMMODATIONS  
ON THE PLANET



4.4  
elite  
traveler  
JULY/AUG 2018

Keep your eyes peeled for the first collaboration between Aston Martin and Triton, Project Neptune. The very first completed model will be revealed at this year's Monaco Yacht Show in September. From \$4m, tritonsubs.com



## Technology

### INTO THE BLUE

Keep cool this summer with some of the hottest water toys out there. Whether you're a deep-sea explorer, thrill-seeking surfer or prefer to glide through the water and watch the world go by, we've got something for you. High-tech materials, mechanical precision and cutting-edge design ensure optimum safety and enjoyment, no matter your age, fitness level or confidence



#### TRITON 1650/3LP

The submersible manufacturer of choice for scientists, archaeologists and film crews, Triton creates some of the highest-performing subs out there. The Triton 1650/3 Low Profile is specially designed for superyacht use and is the world's lightest and most compact three-passenger submersible, at just under 6ft in height and weighing in at 3,800lbs. It can reach depths of up to 1,650ft so you can explore the hidden underwater kingdom and experience a part of the ocean that no one else has seen. The 1650/3LP also comes in a range of colors and prints so you can match it to your yacht. From \$3.3m, tritonsubs.com

#### MOLOKINI CLEAR KAYAK

If you're kayaking through crystal-clear waters, a transparent hull is a must for sensational underwater viewing. The Molokini kayak is fashioned from a UV-resistant polycarbonate material that, in clear conditions, allows excellent viewing of more than 75ft below. Named after an extinct volcanic island off the coast of Maui, the two-passenger kayak is incredibly sturdy, as it is made from the same material as bulletproof glass.

\$2,299, ahalife.com



#### SCHILLER S1-C WATER BIKE

Pegged as the ultimate green superyacht toy, the Schiller water bike is seriously fun — a bike/catamaran hybrid. The S1-C has a propulsion system that enables riders to effortlessly create forward thrust with easy maneuverability, and the high-pressure drop-stitch pontoons ensure maximum rider safety. The eco-friendly watercraft requires no fuel and therefore has zero impact on the environment.

\$5,500, schillerbikes.com



#### JETSURF FACTORY GP 2018

JetSurf's technical expertise in hydro-mechanical engineering means its motorized surfboards are ahead of the curve. The Factory GP 2018 is the flagship edition with a number of upgrades, including increased battery capacity and shortcut protection. Plus, it's more reliable on salt water so is the perfect gadget for a weekend away. This version is suitable for all abilities and can be customized to your liking. \$10,900, jetsurf.com

Words: Samantha Cates. Photos: Nick Verity





## 2017

The biggest story of 2017 was, undoubtedly, the joint announcement at the Monaco Yacht Show by Triton and Aston Martin of the collaboration on the ultra-luxurious Project Neptune submersible.

However, media demonstrations in the Bahamas and the announcement of the new Triton 7500/3 model - the deepest diving acrylic hulled submersible in the world, capable of taking three people 2,286 meters deep - generated quite a bit of coverage as well.

The release of BBC's Blue Planet II, with significant amounts of footage captured from a Triton 3300/3 MKII, also enhanced public interest in the range, and capability, of submersibles offered by Triton.

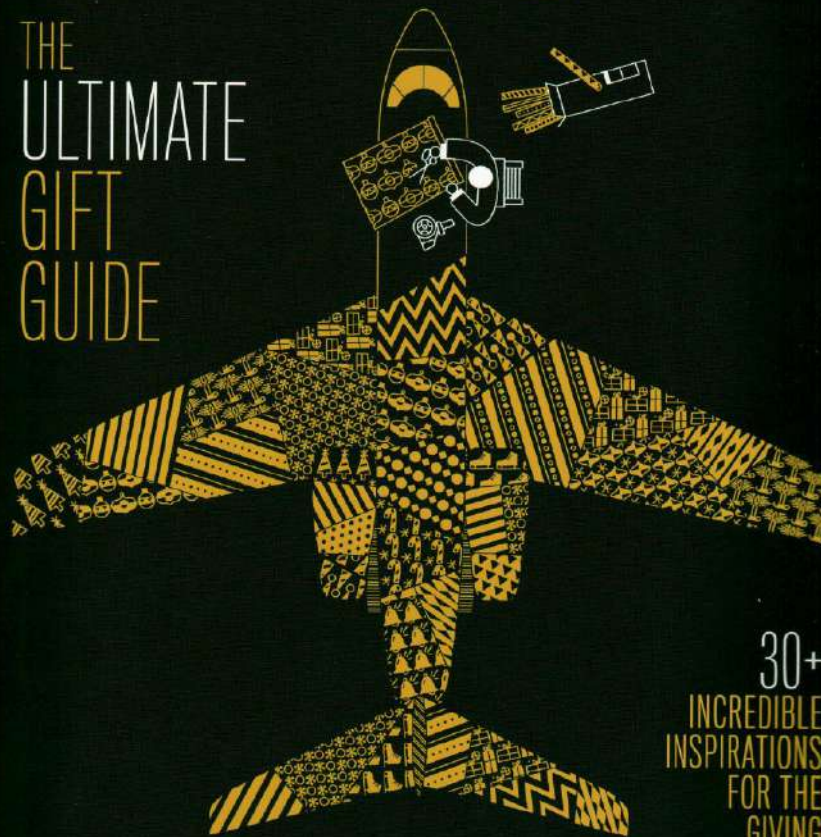
TOTAL
ARTICLES - 1,008
REACH - 1,406,660,426
ADVERTISING EQUIVALENCY - \$13,011,608



LUXURY WITHOUT COMPROMISE

# Robb Report

## THE ULTIMATE GIFT GUIDE



30+  
INCREDIBLE  
INSPIRATIONS  
FOR THE  
GIVING  
SEASON

DECEMBER 2017

BETA



Personal submarines tend to favor function over form, with utilitarian designs that resemble miniature Jacques Cousteau research vessels or torpedoes with bubbled hoods. But with its new Project Neptune, Aston Martin is planning to transform the staid submersible into a despoiling swan.

Partnering with Triton Submarines, which will provide a proven submersible platform, the British carmaker is offering guidance on Neptune's look and feel. Marek Reichman, chief creative officer at Aston Martin, says the cockpit will be as richly detailed as a DB11's, down to the stitching in the leather seats. His team will also advise on ergonomics. "We want to make it much simpler to use," he says. "Employing the right aesthetics inside the submarine will make one feel immediately at ease."

Triton is also incorporating a few of its own changes to the submersible. "We have reconsidered every aspect of the vehicle's exterior geometry and packaging, added new control systems, improved hydrodynamics, and increased the overall power," says John Ramsay, the company's principal design engineer. Triton and Aston Martin plan to launch the submersible at the Monaco Yacht Show in September 2018. —MICHAEL VERDON



### POD DIVER

CONCEPT  
PROJECT NEPTUNE

DESIGNERS:  
ASTON MARTIN  
AND TRITON SUBMARINES

COBS OF PRODUCTION:  
WATCH FOR IT AT NEXT  
YEAR'S MONACO YACHT SHOW

DECEMBER 2017



PRECIO:  
4,9 MILLONES  
DE DÓLARES

(unos 14.300 millones de pesos, así que vaya tramitando un crédito...)

## El submarino portátil

¿Sueña con tener su propio submarino? Acaba de salir al mercado el Triton 1000/7, un sumergible ideal para turismo y del tamaño perfecto para guardarlo en un yate. Pase y conózcalo, que antojarse no vale nada.

**E**ste juguete se lo craneó la compañía estadounidense Triton Subs, dedicada a fabricar submarinos para exploraciones y filmaciones. Y como en su catálogo no tenían un sumergible netamente para turismo —para pasarla bueno, mejordicho—, se les ocurrió hacer el 1000/7, que, como el nombre lo sugiere, puede hundirse hasta 1000 metros y tiene capacidad para siete pasajeros. El aparato —que a simple vista y fuera del agua parece una cafetera gigante— mide 3,8 metros de largo y 2,5 metros de alto, lo que significa que cabe en cualquier garaje de un yate bien jalado. Además, todo el frente está hecho de vidrio para que los ocupantes tengan una vista panorámica del océano, con todos los animales que se les puedan llegar a cruzar en el camino. Es una especie de burbuja con todo tipo de tecnología, para que usted se sienta muy cómodo y seguro. La batería —que se recarga en un enchufe convencional, como una

bicicleta eléctrica— le dura hasta 18 horas y tiene propulsores que le permiten alcanzar los 3,5 nudos de velocidad (casi 7 kilómetros por hora), lo suficiente para ir a buen ritmo bajo el agua, sin perderse un solo detalle. Además, viene con seis luces led externas que le garantizan iluminación hasta en lo más profundo del océano; la cabina es insonorizada y tiene flujo de aire permanente, y todo el vidrio trae blindaje especial, porque uno nunca sabe cuándo se le atraviese un inmenso animal marino.

En la cabina del 1000/7 se sentirá como en un vehículo de superlujo: hay desde asientos de cuero hasta parlantes de última generación, para que usted totee la música que quiera. El submarino se maneja con un joystick integrado a una pantalla táctil que sirve como centro de mando: le cuenta sobre la profundidad y presión en la cabina; le da coordenadas y rutas, y le avisa cuando se le está acabando la carga. Y un dato no menor: usted no necesita ninguna licencia para manejarlo, solo tiene que ponerse las pilas, aprobar un par de clases, y listo. ●



## Aston Martin is making an ultra-exclusive \$4 million submarine

by Alanna Petroff @AlannaPetroff

September 29, 2017, 11:20 AM ET

Recommend 236



0:02 / 2:51

James Bond through the years

James Bond famously captained a Lotus car-turned-submarine in the 1977 movie "The Spy Who Loved Me."

Not to be outdone, Aston Martin -- the British luxury automaker with close ties to the fictional spy -- is now planning to build a real submarine.

The "luxury submarine" will be built in collaboration with Triton Submarines, a company that produces multi-million dollar [submersibles](#) for wealthy clients.

Aston Martin is taking a lead on the design while Triton will produce the final product.

Only a handful of the subs will be created with a price tag around \$4 million. They're expected to start shipping to customers at the end of 2018.

Aston Martin is one of the world's last fully independent automakers and is best known for making beautiful, high performance luxury cars. They've notched up 11 [James Bond film](#) appearances.

An Aston Martin spokesperson insists this submarine won't dilute the automaker's brand.

"We're looking at the regeneration of our product line-up," he said.

It won't be the firm's first aquatic offering. Last year it unveiled a powerboat, and so far it's delivered two to clients.



Aston Martin is taking a lead in designing the new submarine. A firm specializing in submersibles will build it.

Aston Martin has recently been branching out into complementary side projects.

It launched a new business in 2016 -- Aston Martin Consulting -- to offer advice to clients on topics related to design, engineering and manufacturing.



Aston Martin expects to start shipping its new submarine in late 2018.

While a submarine may sound like a crazy idea to most, the top 1% might think differently. Personal submarines have become the [must-have accessory](#) for many super rich yacht owners.

And in 2013, billionaire Tesla ([TSLA](#)) boss Elon Musk [paid \\$860,000](#) to buy the Lotus Esprit that featured in the 1977 Bond movie.

Musk said at the time that he planned to turn the prop into a car that transforms into a submarine, the very thing it was built to portray.

"I was disappointed to learn that it can't actually transform," Musk said. "What I'm going to do is upgrade it with a Tesla electric powertrain and try to make it transform for real."



SEPTEMBER 2012 / BOATINTERNATIONAL.COM

THE MUST-SEE YACHTS AT MONACO

# BOAT

International

U.S.  
EDITION

» In seventh heaven on  
**CLOUD 9**

THE  
SUPERYACHT  
FOUNDS IN  
A TRAILER  
PARK  
PAGE 116

## SEMI-CUSTOM SUPER GUIDE

FIND THE RIGHT BOAT  
FOR YOUR BUDGET

WHAT'S BEING BUILT & WHERE

BEST NEW MODELS REVIEWED

ShowBoats



WILD WATER

## Deep and meaningful

The Triton 3300/3 personal submarine can explore the oceans to a depth of 3,300ft, allowing yacht owners rare glimpses of the underwater world. *Marilyn Mower* bubbles with enthusiasm



As I fly east across the Bahama Bank, even the improbable water colors below cannot dislodge the last thing a colleague said before I boarded a plane to Nassau: "Are you claustrophobic?" It's not a thought I need rattling around my head hours before taking a test dive in a new Triton 3300/3 personal submarine, the most popular sub in Triton's range.

The company has chartered the 220ft shadow vessel *Global* for the series of tests with brokers, technicians, captains – and me.

We approach the boat's huge aft working platform in a RIB, but there are no subs in sight. We quickly learn that the pair of 3300/3s and the new low profile 1650/3 are already bobbing around in position, ready for an intensive day of dives off Nassau's western shore.

*Global's* aft deck is set up with refreshments, a lounge of plush deck furniture, a big screen monitor for the safety briefing and a command center that crackles with communications between the pilots, the tender drivers and the

mothership. We see images from a trip aboard the expedition yacht *Alucia* with Japanese zoologist Takanami Kubodera, where a giant squid was filmed in the Pacific for the first time, all from a Triton sub. Seeing the scientist who has devoted his life to studying these elusive creatures finally see the monster swim past at 3,000ft is a "wow" moment. Now I want mine.

Over the dia of the videos and chatter of engineers, I hear my name. I had asked for a marine biologist as a guide and ▶

DEPTH 3,300FT



Justin Hofman, from EYOS Expeditions, obliges. He's a marine biologist, photographer, painter and all round nice guy from California. We jump in a RIB and zoom off to swap to an even smaller inflatable - used because the bigger RIB risks scratching the sub's acrylic bubble.

Suddenly I see the top of the Triton's big clear sphere rising out of the water. The hatch opens and two grinning men pop out and slide into the little rubber boat. They are practically giddy, saying things like "best experience of my life."

But I don't have time to chat - a man in a wetsuit is pulling me out of the rubber boat and guiding me across the yellow deck of the sub. "Put one foot here, the other here, sit on the edge of the hatch and

slide down." The firm hand of pilot Troy Engen guides my feet to a landing pad atop his helm console and beckons me to a seat. Hofman lands inside the same way. I'm floating, dry, and yet under water.

We go through the safety briefing: if something happens to the sub's maneuverability we have 12 hours of life support through three systems: if something happens to the pilot, turn this dial, flip this switch and there's the radio. It's neat, tidy and apparently idiot proof.

Engen, who is Triton's general manager, tells me he used to be a blimp pilot. Thirty three years ago he had the chance to descend in a sub and that was the end of blimps. I take in the cool blueness of the interior; the switches, gizmos and

**ANOTHER WORLD**  
The Triton 3300/3 offers total visibility through its transparent hull and ensures that passengers can get close to the action

the fact that no matter how far I tilt my head up or down or swivel from side to side, it's all view. The sky disappears, we start descending, and I can't process sensations fast enough. Hofman calls out species as I try to fathom my place inside this perfectly clear bubble silently dropping through another world.

And down and down until we quickly reach a deep blue depth below 500ft, where we find ourselves staring at a reef wall. Engen flips on the lights and wire coral comes to life, glowing white. As sloshy as it was on the surface, the sub is rock steady and silent



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boatinternational.com/submersibles

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ON BOARD

63



## SPECS

Depth: 3,200ft  
Crew: Pilot + 2  
passengers  
Speed: 3 knots  
Endurance: 12 hours  
Length: 19' 1"  
Width: 9' 10"  
Height: 8' 8"  
Weight: 17,640lb  
Price: from \$3.6 million

down here and we have all turned the most wonderful shade of *Avatar* blue in our little bubble. The Triton 3300/3 is so named because it can dive to 3,300ft, carrying three passengers, but our trip today is mere snorkeling depth for a sub as capable as this, Engen says.

Still, we're well below the surface and I feel no pressure in my ears. The subs stay at surface pressure inside, regardless of depth, thanks to their construction and life support systems. A visit to the factory in Vero, Florida, allows me to see how the passenger compartment is attached to the metal frame that contains batteries, thrusters, compressors, air and ballast tanks and the mechanism

for operating the robotic arms, every bit approved by DNV GL. Company president Patrick Lahey tells me DNV GL and ABS are the only two certification bodies with enough knowledge of submersibles to approve passenger subs.

But today we are scaling the reef wall and my companions are calling out the names of various wonders competing for my attention. Suddenly, they are excitedly calling out the Latin name of something and pointing, "There, to the right of that sponge. It looks like a ribbon." We hover. The "ribbon" is in fact a trumpetfish, and it seems just inches from us but is probably 10ft away, such is the magnifying effect of the 6.3in thick sphere.

From all the chatter, I gather that the fish is exhibiting unusual behavior. Engen speculates that it's dead or dying but Hofman disagrees, urging the pilot to stop for a moment. We hover and wait. Flash! Snap! The fish explodes into action, capturing something I can't quite make out. Hofman and Engen whoop - neither have ever seen this species exhibit this behavior before.

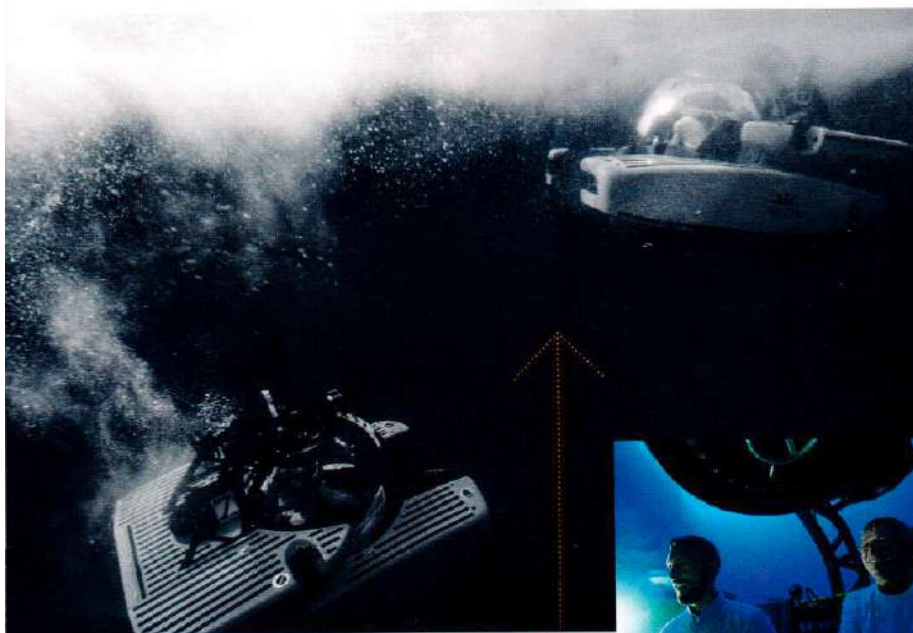
Next a lionfish comes out and challenges us, turning and presenting its venomous spines. We discuss how these invaders are thriving in the Bahamas despite the bounty offered on them by the government. They are voracious eaters with no enemies in these waters. I want to grab it with the robotic arm but it disappears into a hole in the reef. Engen says he has seen lionfish far below the depth of scuba divers - which is about the time I realize I'm way below that depth too.

All too soon, the speaker crackles to life and we're ordered up for -

SEPTEMBER 2017

TRITON





someone else's turn. We pop back to the surface, a surreal experience of color changes and bubbles. Engen opens the hatch for us to decamp into the inflatable for the ride back to *Global*, where I learn what it takes to drive one of these subs: 20 hours of pilot training.

The lessons start in the factory and then move to open water. It's not often a yacht's captain, but usually a crew member that is dispatched to be trained, and there are some on board *Global* for a refresher course. They are required to learn all the failsafe routines, and all seem to have a good understanding of the maintenance that is required; much like

helicopter pilots, they stay close to their machines.

My 3300/3 was lead acid battery-powered, but the smaller 1650/3 has lithium iron phosphate batteries and Triton calls it "the superyacht sub," since, at just 5ft 10in high, it's designed to slip more easily into superyacht garages. The idea is to embark the sub without having to do any major surgery to the internals of your superyacht. Both the 3300/3 and 1650/3 have been designed, however, with a single lift point to make launch and recovery as simple as possible.

Before I leave *Global* for the flight back to Florida, I pause to watch a clip of the legendary British

naturalist Sir David Attenborough, who had been invited to dive in a Triton sub on the Great Barrier Reef. Attenborough was visibly moved by the experience of exploring below the surface, "a privilege given to very few," he said. I feel fortunate to be one of those few, and to discover that being in a three person submarine is not the claustrophobic experience I had feared, but rather a window on an unseen world. ■

[tritonsubs.com](http://tritonsubs.com)

**ALL BEING**  
Triton's "WorldView" navigation system offers live tracking and positional data of the submersible and the host vessel

WIRED

# Triton wants to explore the deepest 2% of the ocean and it will use this submarine to do so

Triton's subs will explore the oceans' hidden depths

By BONNIE CHRISTIAN

Tuesday 20 June 2017



This submarine can take two people 2,000 metres beneath the surface of the ocean - and its makers aim to go even deeper. Florida-based [Triton](#) wants to explore the deepest two per cent of the ocean, although for the moment it's confined to the relative shallows. "We're revamping this model so it will be capable of carrying a pilot and a passenger to depths of 2,200 metres," says Patrick Lahey, the company's president.

To achieve this, Triton needs to make the cabin of its 7500/2 model (pictured) thicker to withstand deep-ocean pressure. It's currently made from 235mm-thick acrylic glass known as PMMA. The cabin for the new sub will be 261mm, making it the thickest transparent acrylic barrier ever produced. "It's possible for a person to go to the Black Sea's deepest point inside a transparent pressure boundary," Lahey says.

The first submersible cabins were built using a technique called flush casting, but the process had too many variables along the production chain that could delay the finished product. So they moved to using German company [Evonik](#), who thermally formed PMMA in an autoclave, which allowed them to create thicker cabins that could be up to two and a half metres in diameter. Each submersible, with models that can carry one passenger or as many as seven, travels around three knots per hour and can reach a depth of 1000 metres in about 45 minutes.

Originally designed as recreational vehicles for superyacht owners, Triton's submersibles are now being used by marine scientists and documentary makers such as [Sir David Attenborough](#) to research and film previously [unseen corners of the ocean](#). But Lahey wants to go further, exploring the [hadal zone](#), a series of underwater trenches that reach depths of 11,000 metres.

"Ninety-eight per cent of the ocean lies within 6,000 metres of the surface, so if we can hit 6,000 metres we can explore most of the ocean. But the remaining two per cent is actually quite a big area," he says.

Triton has designed a model that could theoretically dive to this depth: "[The cabin] couldn't be made of acrylic because it can't withstand those sorts of pressures - instead, it would be made of glass." WIRED hopes it won't be asked to do the test run.



## Aston Martin Has Unveiled a \$4 Million Submarine

The British car company plans to begin revving its engines under water.

By **Sara Clemence**

September 28, 2017, 12:54 PM EDT Updated on September 28, 2017, 1:00 PM EDT



The three-person submersible can dive to 1,650 feet and hit speeds of 3.5 miles per hour. Source: Aston Martin

It's the only time you'll want to put your Aston Martin under water.

The British automaker unveiled its first submersible design Thursday at the Monaco Yacht Show. Dubbed Project Neptune, it's a three-person vehicle with silver, blade-like pontoons and an acrylic bubble of a cabin for maximizing underwater views.

Aston Martin expects the sub will be available in about a year and will be priced around \$4 million, the company's chief creative officer Marek Reichman told Bloomberg. For comparison, a V8-powered DB11 will run you nearly \$200,000.

Reichman said the company plans to build no more than a dozen of the submersibles per year. "If you think about Aston Martin, we are a very exclusive brand," he said. "In 100 years, we've only made 80,000 cars."



An acrylic bubble of a cabin maximizes underwater views. Source: Aston Martin

Neptune is a collaboration between Aston Martin Consulting, the company's design consulting arm, and Florida-based Triton Submarines, which has been making luxury submersibles for a little more than a decade.

The model is based on Triton's Low Profile (LP) platform, specifically designed for superyachts. At just 5.9 feet tall and 8,800 pounds, it's the lightest and smallest three-person sub in production in the world, according to the company. It's capable of diving to 1,650 feet, has a speed of 3 knots, or 3.5 miles per hour. It is also air-conditioned.

Aston Martin has gradually been expanding into other luxury areas. Last year it unveiled the AM37, a 1,000 brake horsepower motorboat created with Quintessence Yachts and Mulder Design naval architects. It has also partnered with Miami-based G&G Business Developments on Aston Martin Residences, a 400-unit waterfront condo project in downtown Miami.

Reichman said the company had done extensive research into what high-net-worth individuals were interested in purchasing other than cars. Unsurprisingly, many are into boating.

"Those superyacht people, what they want to experience is changing," he said. "It's no longer about just having a launch or having your tender. It's about having some other way of entertaining your guests."





OBJET D'ART



## SEA EXPLORER

**I**N CASE YOU FEEL LIKE TAKING the occasional underwater weekend jaunt around the local coral reef, there is no better way to travel than aboard the new Project Neptune submersible. The brainchild of British luxury carmaker Aston Martin and submersible specialist Triton, the Project Neptune submersible is an exclusive, limited-edition craft that combines the former's mastery in design and craftsmanship, and the latter's state-of-the-art diving expertise.

The Project Neptune submersible is the result of transforming Triton's acclaimed Low Profile three-person craft into a sleek and elegant submarine, whose interiors and accessories are completely customisable. The craft's light and compact design means that it can easily fit onto a superyacht, allowing seafarers to explore the marine world more intimately than before.

Project Neptune is a flagship project for Aston Martin Consulting, and the company intends to offer its design and engineering expertise to a number of other select industries, infusing the brand's identity into more projects. And if Project Neptune is any indication, there is much to look forward to in the future when it comes to luxury transportation. ■



UNDER WATER

**4,000KG**

The weight of Triton's 1650/3 LP sub, making it the world's lightest and most compact three-person production submersible in its class

**US\$4M**

The approximate price of owning the luxury Project Neptune submersible, not including spares, support, and optional equipment

WORDS: NICOLETTE WONG; IMAGES: PROJECT NEPTUNE



## WHAT'S NEWS



## WHY DOES IT COST SO MUCH? THE \$6.3 MILLION SUBMERSIBLE

Triton submersibles have been used to discover new species, unearth treasures from shipwrecks and host a deep-sea wedding. The company's new 7500/3 model, a three-seat craft, is the deepest-diving acrylic-hulled submersible on the market, allowing for expansive views down to a depth of 1.4 miles. Each is made to order at Triton's headquarters in Vero Beach, Florida, and takes 18 months to build. [tritonsubs.com](http://tritonsubs.com). —Christopher Ross

## IN FOCUS

Currently on view at New York's Howard Greenberg Gallery are photographer Joel Meyerowitz's luminous shots of the personal effects of painters Paul Cézanne and Giorgio Morandi. The Cézanne series, including the pitcher at right, is also the subject of a new book, out this month.



## IF THE SHOE FITS

Until now, female fans of John Lobb shoes have had to place custom orders or, as the brand's own artistic director, Paula Gerbase, has done, settle for men's pairs. This fall the British shoemaker is stepping forward with its first women's collection: six handcrafted styles, from a low boot with palladium buckles (left, \$1,550) to a quintessential oxford. [johnlobb.com](http://johnlobb.com). —Sasha Haines-Stiles



CLOSET CASE  
THIS  
MONTH THE  
ONLINE  
RETAILER  
MR PORTER  
LAUNCHES  
MR P, ITS  
NEW HOUSE  
LABEL.  
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WILL  
INCLUDE  
MENSWEAR  
STAPLES  
PLUS FIVE  
LIMITED-  
EDITION  
RELEASES A  
YEAR.

Cotton striped shirt, \$85;  
[mrporter.com](http://mrporter.com)



**SWEET SUCCESS**  
Cherry Bombe founders  
Claudia Wu (left)  
and Kerry Diamond  
(right) in their  
new cookbook.

## WHAT'S COOKING

WITH A NEW COOKBOOK AND A GROWING CONFERENCE SERIES, CHERRY BOMBE IS A FOODIE PHENOMENON.

FOUR YEARS AGO, magazine veterans Kerry Diamond and Claudia Wu put out the inaugural issue of Cherry Bombe, a publication devoted to women in food—not just chefs, but also farmers, writers, bakers, restaurateurs and more. Nine issues later, their pink power mag has become a major brand, with a Heritage Radio show and a consistently sold-out annual conference, the Cherry Bombe Jubilee. This month, the momentum continues with the release of *Cherry Bombe: The Cookbook* (Clarkson Potter), a collection of recipes from a "Bombe Squad" of 100 contributors. And the first West Coast Jubilee will be held on October 14 in San Francisco with keynote speaker Alice Waters. "You really see women coming

together in a way they never have, not just in food," says Diamond. Wu sums it up like this: "It was time for women to join the party." [cherrybombe.com](http://cherrybombe.com). —Toriya Morrell



PHOTOGRAPH BY JEFFREY M. HARRIS; STYLING BY JESSICA K. HARRIS; HAIR BY JESSICA K. HARRIS; MAKEUP BY JESSICA K. HARRIS; PROP STYLING BY JESSICA K. HARRIS; SET DESIGN BY JESSICA K. HARRIS; PHOTOGRAPH BY JESSICA K. HARRIS; STYLING BY JESSICA K. HARRIS; HAIR BY JESSICA K. HARRIS; MAKEUP BY JESSICA K. HARRIS; PROP STYLING BY JESSICA K. HARRIS; SET DESIGN BY JESSICA K. HARRIS





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PHOTOGRAPHY: DAVIDSON; STYLING: JESSICA; COURTESY OF THE RESORTS: AMANHARA, PLAYA LARGO, AND OASIS



## DEEP-SEA DIVERS

PERSONAL SUBMARINES PROVIDE AN EXCLUSIVE OCEAN ESCAPE

words by **Shaun Tolson**

When it comes to luxury, it's pretty hard to compete with the ultimate ocean home: a superyacht equipped with a diverse fleet of vessels including the requisite toys and tenders for exploring rivers, estuaries, and islands. However, a more exciting and exclusive adventure awaits below the ocean's surface.

Triton Submarines LLC tapped into this idea long ago—that 97 percent of the ocean floor still remains unexplored—and today specializes in the production of a wide range of submersibles that can accommodate as many as seven passengers and dive to depths almost seven miles below the surface.

A number of physical features, including the incredible clarity of Triton's spherical pressure hulls made of a proprietary acrylic material that, according to Triton President Patrick Lahey, provide passengers with an "immersive experience," distinguish Triton subs from others on the market. Attributes such as ease of use and durability make them a popular choice for yacht owners as well, highlights Lahey.

Take the Triton 1650/3 (\$3.3 million), for example. This submersible can transport as many as three

passengers to a depth of 1,650 feet. And because it weighs a relatively light 8,800 pounds and measures less than six feet tall, the sub can be launched easily from most luxury yachts.

The Triton 3300/3 (\$3.6 million), in comparison, remains the brand's bestselling vessel. It weighs twice as much and is 2.6 feet taller than the 1650/3, but its ability to transport as many as three passengers more than half a mile below the ocean's surface for up to 12 hours makes it ideal for both sightseeing and scientific expeditions. In fact, the Triton 3300/3 was extensively used by the BBC during the filming of a three-part documentary series on the Great Barrier Reef in 2016.

Still, the company's most compelling sub, the Triton 35000/3, requires two years to build and has the potential to traverse previously unexplored areas of the Earth. The aquatic marvel, which features a lightweight and highly pressurized hull, costs approximately \$30 million and is capable of safely (and comfortably) transporting three passengers to the deepest point of the Mariana Trench.

"That," says Triton CEO Bruce Jones, "is the ultimate submersible." **ON**



**THE DETAILS**  
For more information, visit [tritonsubs.com](http://tritonsubs.com)

PHOTOGRAPHY: ANDREW LEE/ARTIST OF TRITON SUBS TOP; COURTESY OF TRITON SUBS (BOTTOM)







# UNDER THE SEA

MAKE A  
SPLASH WITH  
THE BEST  
OF THE FALL  
COLLECTIONS

Photography by NAVID

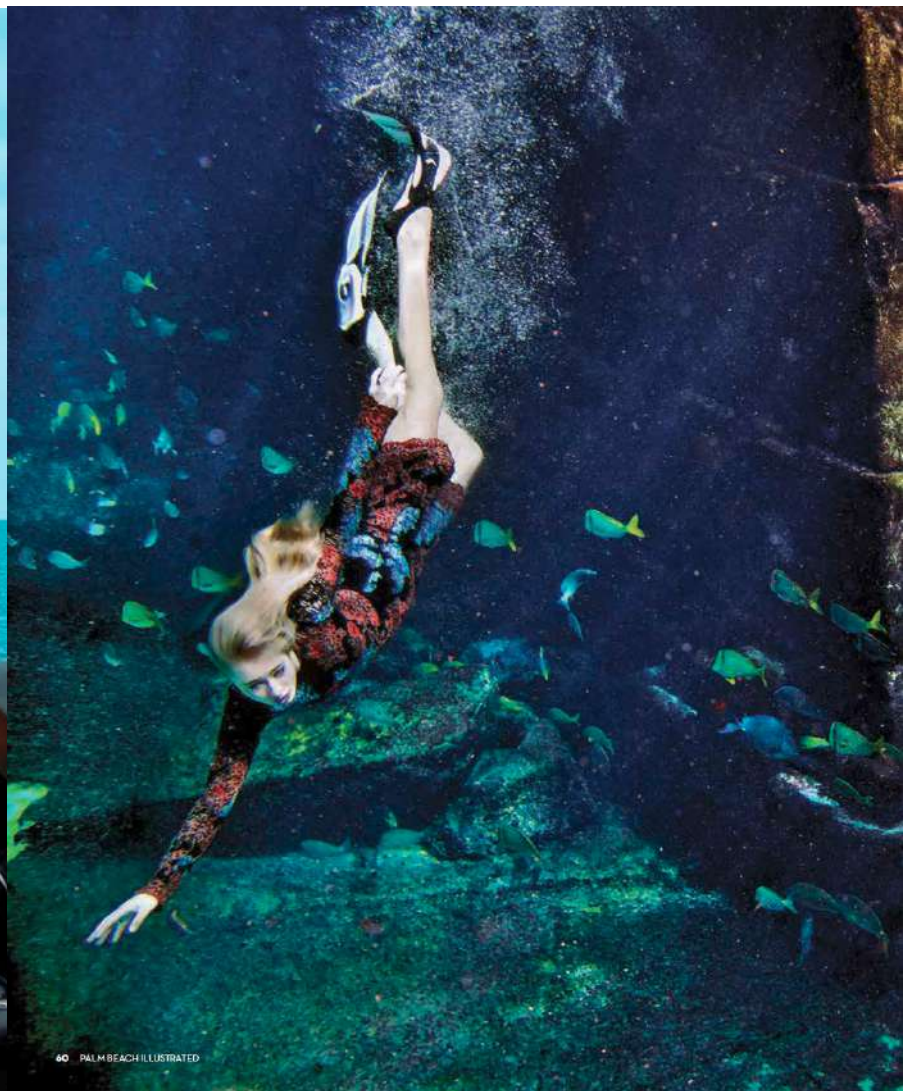
SHOT BY PAUL BEACH ILLUSTRATED ON LOCATION IN NASSAU, BAHAMAS  
ABOARD THE YACHT GLOBAL WITH TRITON SUBMERSIBLES

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TRITON







Michael Kors silver metallic blouse, pants; Traction Paris sunglasses; Eddie Borgo necklace.

Opposite page: Dolce & Gabbana lace dress. Shot on location at the Ruins Lagoon, Paradise Island Royal Towers, Atlantis, Bahamas.

For buying information, turn to page 125.

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Lois Valtio dress, boots; Eddie Borgo necklace; Michael Kors earrings.

Opposite page: Chanel tweed dress, glitter boots; Dior rings; Traction Paris sunglasses.

For buying information, turn to page 125.

60 PALMBEACHILLUSTRATED







Tory Burch metallic dress, Gucci heels.  
Shot on location at the Ruins Lagoon, Paradise Island Royal Towers, Atlantis, Bahamas

For buying information, turn to page 125.

Model: Masha Jin, Grace Hunt Model Management, Miami  
Hair & Makeup: Heather Blaine, Creative Management,  
Miami using Make Up For Ever and Redken  
Photography Assistant: Lucie Preslove  
PBI extends special thanks to the Bahamas Ministry of Tourism, Triton submersibles, Shantel Anna Politi, Bahamas and Atlantis, Paradise Island, Bahamas.







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