# Diver Propulsion Vehicles: Tools, Toys, Troubles

## *Benefits and risks of using underwater scooters*

*Story time: Three divers (A, B, C) went on a decompression dive to a planned depth of 50 meters. Besides double cylinders of back gas, each diver carried two deco cylinders with EAN50 and pure O2, respectively. Due to the expected strong currents at the site and the amount of gear carried, the team decided to rent DPVs for this dive.*

*After an initial descent to about 30 meters, the team followed a rubble-covered slope leading to the target of the dive, a deep reef starting at 42 meters. Currents that day were even stronger than expected, pushing the divers along from behind and downward. The team stopped and briefly turned around to verify that their scooters were up to managing the amount of flow, which was confirmed. The divers continued and arrived at the top of the reef shortly after.*

*A minute or so later, diver A (in the lead) looked behind and was able to see only one primary light instead of the expected two. The team was missing a member. A and B turned around to work their way back against the current, eventually spotting C, who was signaling for attention. C had accidentally fouled the propeller of her DPV on a coral whip and was stuck in place.*

*Attempts by the team to untangle the scooter were unsuccessful: The whip had wrapped around the prop shaft and become firmly lodged in the narrow gap between the propeller and the DPV body. The team decided to cut the whip and end the dive, tow C and her disabled scooter to an area the divers knew to be sheltered from the current, and begin decompression.*


*A tech diver tests new technologies mounted on a double DPV. Photo: Nicola Boninsegna*

*However, while the scooters were able to manage the current with a single diver, this was no longer the case with two divers being towed by a single DPV. Despite the team's best efforts, progress back up the slope was minimal. All the while, the divers kept racking up decompression time. After a few minutes, the team decided to call it quits, ascend in blue water and drift with the current.*

*The team deployed DSMBs immediately after the first gas switch in order to alert the boat crew to the change in situation. By the time the divers surfaced, land was almost out of sight. Fortunately, the boat crew had been paying attention and was able to pick up the team after surfacing, more than two kilometers away from the planned point of exit.*

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**DPVs** (**Diver Propulsion Vehicles**), or **underwater scooters** are becoming increasingly popular, for good reason: They offer the opportunity to cover more ground, save gas by reducing exertion, and improve safety by enabling divers to push against currents. Plus, they're a lot of fun.

However, the use of DPVs also comes with new ways of getting yourself in trouble – some quite obvious, others less so. I've used DPVs extensively in technical diving and trained quite a few students in their use. In this article, I'd like to explain some of the considerations when diving scooters, and how to address them. I hope it goes without saying that this article is in no way intended to serve as a substitute for a course with a qualified instructor.

## Evolution of DPVs

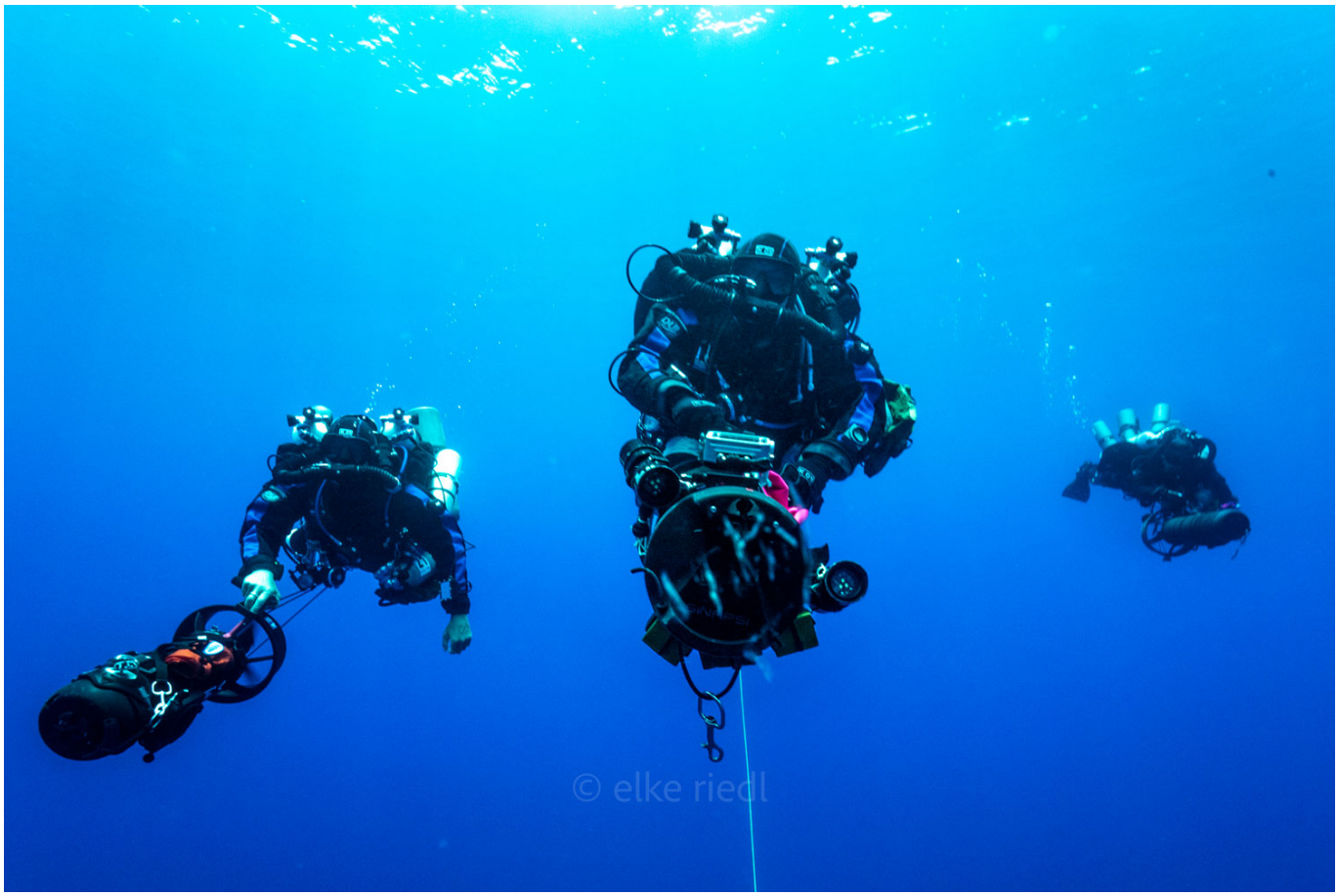
In recent years, advances in **battery technology** have fuelled a rapid evolution of DPV design. The scooters I learned on were roughly the size of a scuba cylinder, powered by a lead-acid car battery with a runtime of about 50 to 60 minutes at a moderate pace. These days, a similar amount of power can be packed into a device not much larger than a commercial hair dryer, while scuba tank-sized scooters can have battery durations of many hours and move at speeds faster than you want to go at most of the time.

## With great power…

In **recreational diving**, scooters are mostly used to add variety to the dive experience. They allow divers to cover more ground and maybe visit several sites in a single dive. Especially newer users tend to find the sensation of going fast underwater *per se* quite exciting. I've seen otherwise mature adults zoom around like four year-olds on a cotton-candy high, reluctant to let go of the trigger. Less frivolous uses in recreational diving include saving gas by reducing exertion, as well as resisting currents.

In **technical diving**, the emphasis shifts somewhat. Here, DPVs are strictly tools (albeit still fun, admittedly). Reducing exertion becomes more important with depth, and the ability to resist a current can make the difference between finishing your decompression in a previously agreed, sheltered location, and drifting out to sea while waiting for the computers to clear. In cave diving, the speed of a DPV allows divers to significantly extend the range of exploration, visiting sections of cave that would otherwise be out of reach.

I do most of my diving in a location with powerful currents (Puerto Galera, Philippines), and we consider DPVs a pretty essential piece of safety equipment for deeper technical dives – they allow us to go where we want, and avoid being swept where we don't want to go.




*A team of three explorers manage a long decompression in strong currents thanks to more powerful DPVs. Photo: Elke Riedl*

## …comes great responsibility.

Scooters are fast; that's the point. A well-practiced diver is able to maintain a constant swimming speed of about 15 meters per minute without undue exertion. Even a mid-range scooter can easily triple that. In 15 meters of visibility, losing contact with one's team or buddy can be a matter of seconds if the divers move in different directions. **Solid team discipline** is a must, and carrying a torch is a good idea even on day dives – not to see better, but to be seen more easily.

A second consideration related to a DPV's speed is **equalisation**. While scooters should only be used to go horizontally, depth changes while on the trigger do happen, either inadvertently or when motoring down or up a sloping reef. In shallow water especially, rapid depth changes can cause equalisation issues or barotrauma.

Due to suit and BC compression and expansion, depth changes also cause **changes in buoyanc**y. With a scooter, these buoyancy changes can be easy to miss. For example, a diver who is positively buoyant may instinctively compensate by keeping the scooter pointed slightly downward. On one hand, this creates unnecessary drag. On the other, once the diver lets go of the trigger, they will immediately begin to rise toward the surface.

Have you ever been in a current so strong that one of your second stages began to freeflow from the water pressure? With a fast DPV, this can happen without any current at all, leaving the diver with a big grin on their face, a trail of bubbles in their wake, and a nasty surprise in their near future.

To prevent this from happening, **second stages not in use** (i.e. the alternate air source or backup) should be kept dialed down, and ideally stowed in a location where the diver would notice any freeflow. A short hose on a necklace is better than the traditional recreational regulator configuration, where the alternate is kept somewhere by the diver's side. **Checking your gas supply** while scootering is an important skill, and one of the reasons why scooters designed for single-handed use (with a lanyard attached to the diver's harness) are preferable to those requiring both hands to manage.

These important aspects – team cohesion, equalization, buoyancy, gas awareness – can easily fall by the wayside with beginner, insufficiently trained, or inattentive DPV divers.

## Navigation

Scooter dives have the potential to end quite a long distance from the starting point, possibly out of sight. If the plan for getting out of the water involves pick-up by a boat or dinghy, then the exit point needs to be communicated to the boat crew. Going fast also makes it easier to miss waypoints in the navigation and become lost, especially if managing the scooter itself still absorbs a significant share of the diver's attention.


*A team of CCR divers explore a deep wreck using DPVs. Photo: Nicola Boninsegna*

## "You can't swim your way out of a scooter dive."

DPVs can be used to visit places that would be out of reach otherwise. The most common application is in caves, but shore diving is another possibility. While 500 meters is a long swim in full scuba gear, it's not such a big deal with a fast scooter. However, if divers decide to use scooters in this way, they need to have a plan for how to return home if the scooter fails.

**Scooter failures** can happen in a variety of ways. In the past, battery depletion used to be the main issue. Given the evolution of battery technology however, this is no longer much of a concern except for long-range cave dives, or with very small (or old) scooters.

Other ways a scooter can fail include **propeller entanglement** (coral whips or fishing line), **mechanical damage** to the trigger mechanism, or damage to the **electronics**, e.g. due to overheating or flooding. Higher-end scooters come with safety features that enable dealing with *some* problems underwater, such as removable propellers or override switches that bypass the DPV's trigger and control electronics. The scooter nonetheless remains a potential failure point, and the contingency of scooter failure must be addressed in dive planning.

For many dives in open-water environments, the answer to scooter failure can be a direct ascent to the surface. If a scooter is used for a long-range shore dive however, this may be undesirable. Heavy boat traffic can be dangerous to divers on the surface, and currents can make a return to shore difficult or impossible. **Towing** by another diver can be an option with proper training and a sufficiently powerful DPV. In situations where ascent to the surface is categorically not an option (cave diving), a backup scooter becomes a necessity – a swimming diver would run out of gas before making it back to the exit. As one of my instructors likes to say, "you can't swim your way out of a scooter dive."

## DPVs and cameras

Divers scootering along a beautiful reef make for some cool video footage. However, you also have a DPV to steer, a torch to hold, buoyancy to manage, gas to remain aware of, and a team to pay attention to. Simultaneously wielding a selfie stick and making sure your hair looks right tends to be two things too many. There are options however: With prior planning and discussion among the team, you could pick a location, stay there for the duration of the shoot, then pack up and stow the camera before continuing. Another possibility is to mount an action cam on the DPV itself and record the entire dive.

## Conclusion

Whether used as toys or tools, scooters can add a lot to your diving. However, using them competently and safely requires education, training, practice, planning, and discipline. Maybe this article inspires you to give it a try and discover a new way of diving – or, if you're a DPV diver already, to expand your skill set and learn to use a scooter the way technical and cave divers do. Zoom, zoom.

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**About the author**

Tim Blömeke teaches technical and recreational diving in Taiwan and the Philippines. He is also a freelance writer and translator, as well as a member of the editorial team of Alert Diver. He dives a Fathom CCR. For questions, comments, and inquiries, you can contact him via his blog page or on Instagram.