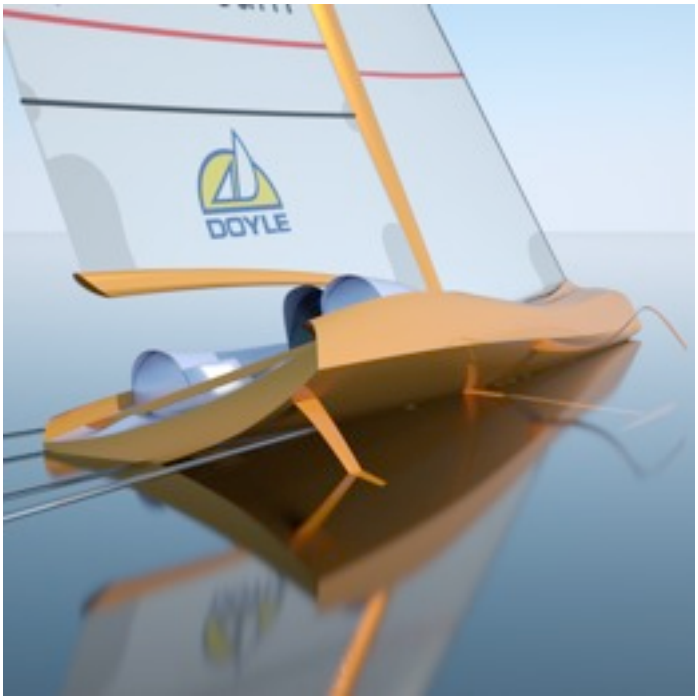
CAN A MONOHULL EVER SAIL FASTER THAN A MULTIHULL?

It’s been the prevailing wisdom for decades, centuries even, that a monohull cannot sail as fast as a multihull and as if to prove the point, multihulls have been out there smashing all kinds of speed records for leaving monohulls bobbing in their leftover slop. But conventional wisdom is not always right, especially when challenged with some fresh, innovative thinking. Recently Vlad Murnikov, a Russian born engineer and designer, launched SpeedDream, a quest to build the world’s fastest monohull. Murnikov claims that his design will indeed sail faster than any multihull of the same length and has produced some compelling reasoning to back up his lofty ambitions.

In the spirit of full disclosure Vlad Murnikov invited me to be his partner in this quest, but that does not alter my curiosity. Most of my sailing has been done in monohulls and I have seen (bicycles and tricycles as we mockingly called them) fly by, flying a hull, leaving us trimming our sails desperately trying to reach hull speed.



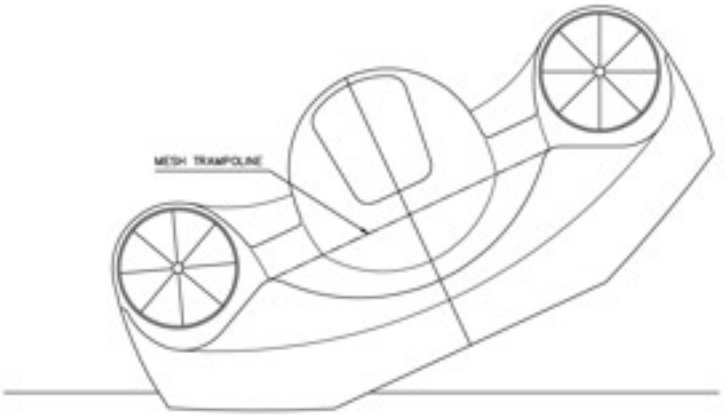
It is an interesting question so I decided to probe deeper. Here are some basic facts; boat speed is all about increasing power and reducing drag. Sure there are some other factors but it's a power/weight/drag ratio that leads the way when discussing raw boat speed. Multihulls do have a distinct advantage in this area. Their hulls are slender, and when one lifts out of the water, the other is not much more than a knife edge slicing through the waves. They are also wide which means that they are able to generate a lot of power through their stability, and stability leads to the ability to carry lots of sail. So what's not to like about a multihull?

A monohull, by contrast, needs to lug around a pile of lead which helps things a little when the wind is up, but is still there like an unwanted cousin at Thanksgiving when there is no wind. There is simply no way to get rid of it. This additional weight can be mitigated to a degree by being able to move the chunk of lead, in the form of a canting keel, and placing the weight where it has the most effect. You are, however, still carrying the lead around and all boats, until SpeedDream, not only carry this lead, but they drag it through the water, a double insult.

Monohulls are also generally restricted by beam. You can design a beamy boat, pump water ballast to the widest part, cant the keel all the way to windward, but no matter what you will never achieve the stability of a

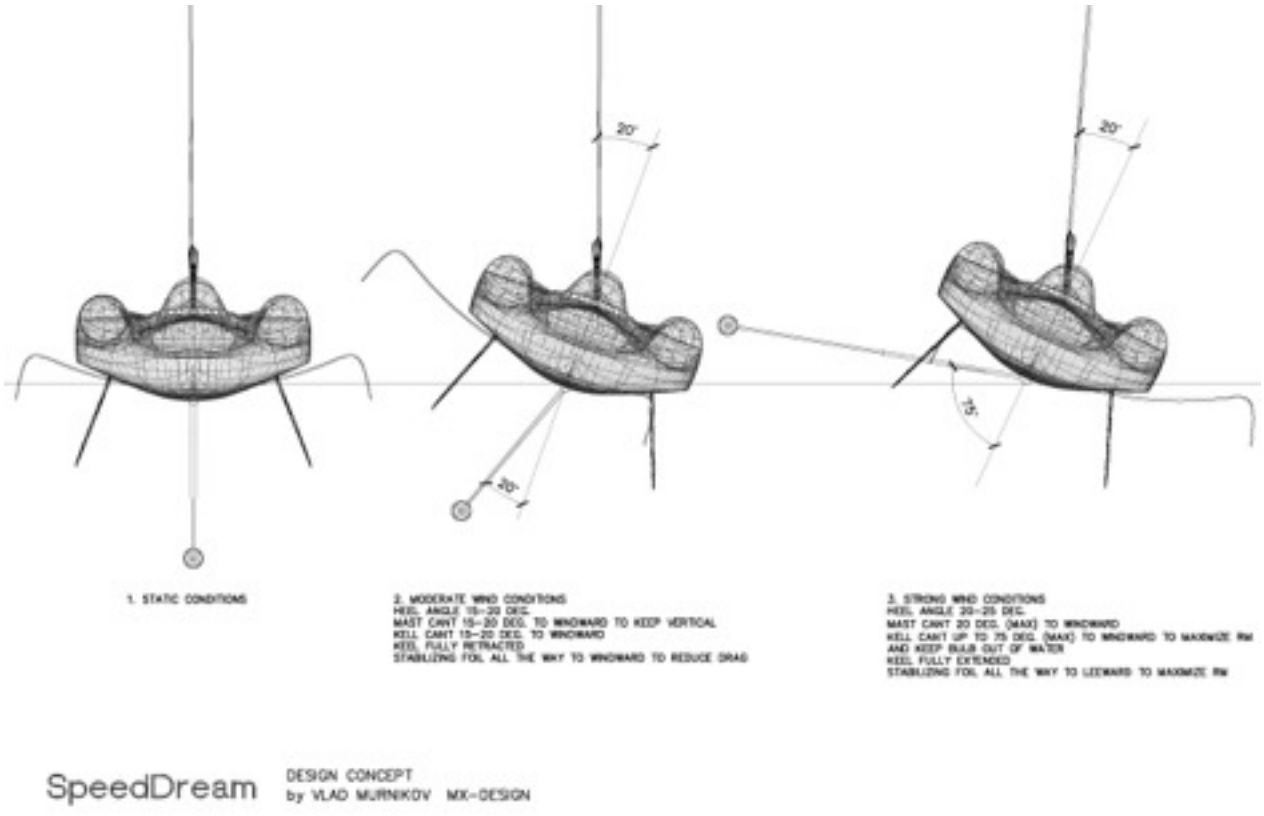
multihull and futhermore, more beam means more boat, and more boat means more drag. It's a drag just thinking about it.

So what business does Vlad Murnikov have pontificating that his boat will be faster than a multihull? What can he possibly be thinking? Let's take a look. The genius behind SpeedDream comes in a few simple, yet innovative concepts. The first is a narrow, wave piercing hull. The hull, with a razor sharp bow, is designed to slice through waves not unlike a multihull. It has very little resistance and even less wetted surface (than you would think). By that I mean the boat is designed to sail at between 20 and 25 degrees of heel, and at that angle there is very little boat in the water. Indeed there is not much more than you would find on the leeward hull of a similar sized catamaran but of critcal importance, when it comes to speed at least, is the relative shapes of the immersed hulls. The leeward hull of a multihull is slab sided with a rounded bottom, which because of the downward force of the rest of the boat, is further submerged in the water. By contrast the hull shape of SpeedDream is an efficient, flat, planing surface that skims across the water. Chalk and cheese, as they say.



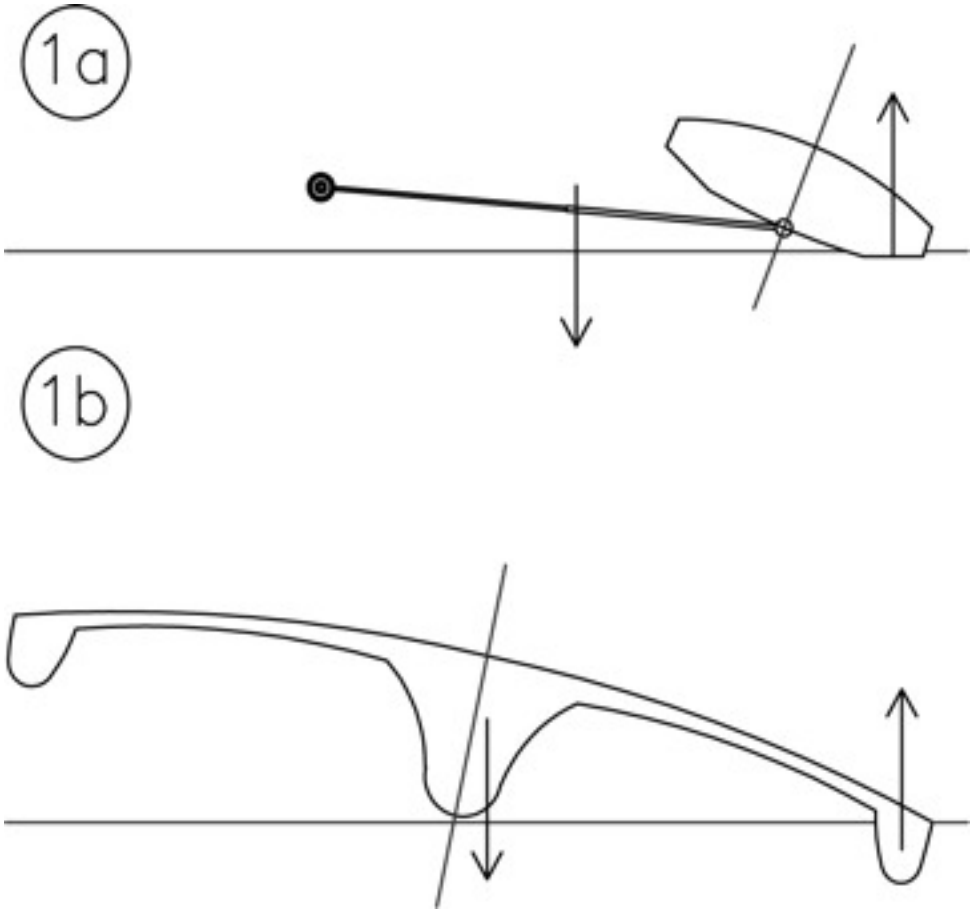
So there is not much drag but you are still dragging a sizable chunk of lead around. Well yes and no. For sure you are dragging the keel through the water at low wind speeds. Same applies to a catamaran or trimaran. Until

they are able to fly a hull they are dragging it along. As soon as the breeze pipes up the hull lifts free of the water and away you go. Same thing with SpeedDream. Vlad Murnikov explains. “The geometry of most modern canting systems allow for a maximum cant of up to 50 degrees. If you go beyond 50 degrees the loads grow dangerously high. For SpeedDream we have developed a proprietary system that allows much higher cant angles while at the same time being able to significantly reduce loads.”



What he means by this, is this. With the boat sailing at it’s optimum angle of heel and the keel canted all the way to windward, the keel, bulb and all, fly free of the water. In fact you can think of it like this. The hull is like the leeward hull of a catamaran; the keel and bulb is like the windward hull of a catamaran, only with a lot less windage. Better yet, the keel is not only

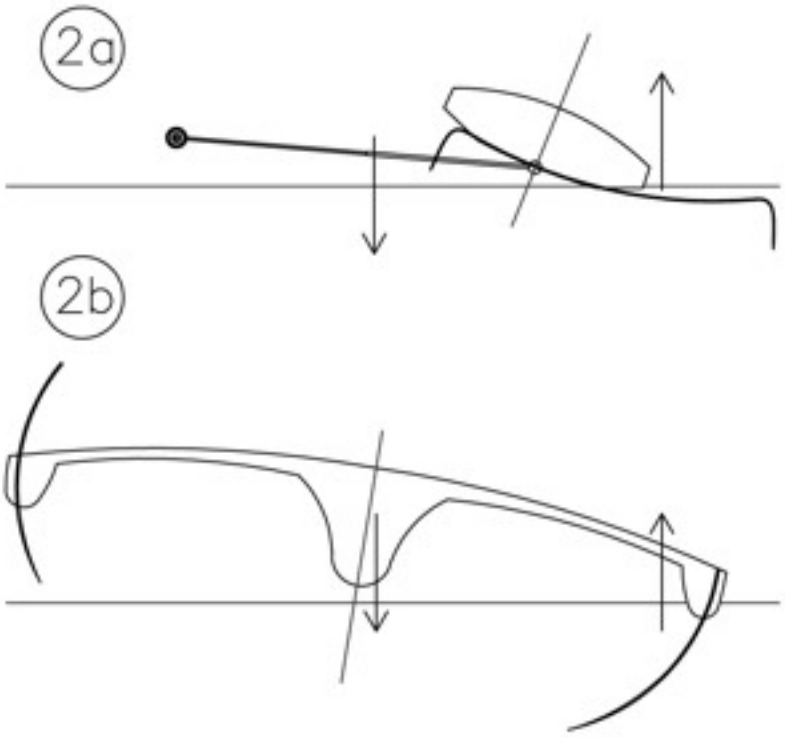
canting, it’s telescoping. This means that at lower wind speed there is only half the keel drag as the other half is tucked up inside the keel blade. As the wind pipes up you can extend the length of the keel massively maximizing righting moment without the drag of all the drag.



While theoretically it is possible for SpeedDream to match the righting moment of a similarly sized multihull by further extending her telescopic keel, it is really unnecessary. When sailing at high speed, a planing hull’s wetted surface – and her drag – would be about half that of similarly sized multihull. Even with a smaller righting moment and smaller sail area, SpeedDream would be capable of reaching higher speeds. Her high performance is derived from efficiency rather than from power.

So what you have got now is either a funny looking catamaran, or a very cool looking monohull with a huge amount of stability and very little resistance. You would think that would be enough to bring SpeedDream up to multihull speeds, but why stop there when you can go one step futher? You are going to encounter the problem of reduced lateral resistance without a keel there to stop the boat slipping sideways, but Murnikov has a plan for that. His plan goes even one better. He has designed and engineered a lifting foil that slides out to leeward. The curved foil provides not only lateral resistance, but serves to force the boat upright each time the wind tries to blow it over. Just as the wing of an airplane provides massive lift, the leeward foil of SpeedDream does just the same. The foil will be placed near the center of gravity to diminish any negative effect of hull movement on its performance and Murnikov estimates the foils will be capable of creating lift equal to 40-60% of the total displacement of the boat.

Multihull afficinados will certainly argue that their kind have been using lifting foils for a long time with great success, and it's true. Indeed L'Hydropter, the futuristic multihull that currently holds the world record for the fastest speed relies entirely on foils to lift the boat completely out of the water. The foils, however, are not very efficient. Because the foils are supported by the tubular shape of the multihull hull, the shape of the foil is restricted to a curved profile that protrudes downward, rather than out at a horizontal angle like that of SpeedDream. Who would want to fly on a plane with droopy wings, certainly not me. And to make things just a little worse, the ends of the multihull foils are pointed to minimise the jarring impact they receive as they enter the water at high speeds. Even multihull designers would concede that the foils are not as good as they could be but they are limited by the geometry of the boat.



SpeedDream's foil partially lifts the boat out of water and significantly increases her stability by moving the forces of dynamic support to leeward. In a similar way the addition of a curved foil to the multihull float helps to lift the boat and reduce drag, but it also reduces stability by moving forces of dynamic support inboard. This greatly exacerbates the main problem faced by offshore multihulls; the lack of ultimate stability.

This combination of immense power generated through a lot of sail area and stability, a very light, high tech planing hull, a leeward foil that creates enormous lift, and very little overall drag will result in a monohull that sails faster than a multihull of equal length; or will it? Stay tuned. As soon as some final engineering details are concluded the SpeedDream team will begin constuction of a scaled down 35-foot prototype.


One Dream.