

pilot

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Shark

■ Martin Mareček, foto Kamil Večeřa a autor



When I catch a fairy tale goldfish one day, she might find grant one of my three wishes close to her heart. I'll ask for a shark – one with a retractable gear.

In the meantime, I will be looking for opportunities to not only fly Shark, but also to keep an eye on further project development. Because as remarkable an aircraft as the Shark is, it's not perfect. There is no such thing, by the way. But it's definitely a plane that stands out and evokes emotion. It's sleek and certainly reliable, having recently circumnavigated the globe east to west and west to east, piloted by the youngest female pilot and the youngest male pilot. As far as I know Zara (19 at the time of the flight) and Mack (17) Rutherford have no younger sibling to beat their records. That would have stirred even more emotions, especially concerning their parents.





I didn't sleep with Shark in the hangar, but I did spend dozens of hours with her both in the air and on the ground. I flew her fast (distance Prague - Munich in an hour), slow - while shooting pictures behind P92 Echo (70 kt), in smooth evening CAVOK conditions and with a rudder in the clouds when escaping from bad weather. And so as not to fly solo, I offered other pilots a ride in the Shark with me and then asked them for their opinion. In all, fifteen people contributed to the poll, ranging in age from 25 to 60, with 50-4000 hours in microlights (half of them had less than 200 hours, the average was 700), and experience in 1-27 types (average 3.5). For most of them, this was their first encounter with a tandem cockpit aeroplane that has a sidestick and autopilot.

Before this „vox populi“ is heard, it is appropriate to recall the truth (however banal it may be) that great things do not come into being by themselves: they require a lot of



Open shaft for front weight position (for 600 kg MTOM version). The orange flag is visible from the cabin, as seen in the photo on the left

I'm not a fan of evaluating aircraft based on type rating and a few hours of cross country flying. Understandably, that may be enough for an experienced pilot to form an opinion on most features and performance. They can then present their observations either on a scale from „she is a bit rubbery and the rudder sticks“ to „she handles nicely and is stable even at low speeds“, or use

some standard methodology to test, evaluate, and finally compare the aircraft with other machines of the same category. Ideally, the approaches would combine to produce useful material that will nevertheless be lacking in one dimension. It's like going to the movies or a concert with someone you've never sailed with or spent time in a tent after a hike.

work and experience of many people - who tend to get forgotten. Because when a project succeeds, there is no need to find someone to blame. But praise should be given where it is due. So, firstly, when you get into a Shark, you need to adjust your seat. The seat itself is a beautiful piece of work by Peter Zelman, and thanks to Robert Prchlik's design, it can be set by a hydropneumatic strut so that almost



Main landing gear covers and flap suspension levers...



...which fold into a symmetrical NACA profile

Foto M. Mareček



The first production Shark is based at an airstrip near Lisbon



Socket connected to the battery

almost 300 km/h (~160 kt) in horizontal flight with an „ordinary“ Rotax 912 ULS 100hp engine under normal conditions. I have to write „almost“ because in my case it was a few knots short, while the FAI recognized record exceeds 300 km/h. However, already during my first few flights I was impressed by Shark's pleasant handling even at low speeds. Unlike many other high-performance aircraft, it doesn't have phases of flight you kind of „suffer“ through. When photographing the aircraft, in its clean configuration of course, I initially considered „speed compatibility“ with a classic P92 Echo with doors removed, but to no avail. I didn't have to do much digging to find that the Shark has its own profile. Its polar diagram, when compared to the diagrams of the profiles commonly used at the

time of design (MS313 or its modifications), shows significantly lower drag - up to a third - in the cruise speed range. Aerodynamics does not only concern the wing profile itself, but also the shape of the nose connected to the large propeller cone, and the design of the flaps, where the levers of their suspension are folded under the wing into the shape of a symmetrical NACA profile (Ján Ťulák).

Then, of course, there are the strength calculations, primarily covered by Jiří Vychopeň and Ludvík Bedřich, but also the composites by Igor Špáček and Vlado Pekár, who carried out a number of tests in several iterations. Also worth mentioning is the design of the landing gear, which shortens when retracted to fit into the required smallest possible wing root. Some may argue that the user is not interested in the

anyone can sit comfortably in the cabin. They will have a good view and the controls will fit their hand. When you put your hands on the armrests, and you grasp the throttle in your left hand and the sidestick in your right, you are holding a piece of Czech aviation design history. Zelman's design of the Shark's interior is reminiscent of Professor Kovar's school or the LET L-610 in its detail. As Jaroslav Dostál, one of the main creators of the aircraft, writes: „The sidestick at first arouses distrust in an inexperienced pilot. This however changes with the first grip: in flight there is an enthusiasm that can be summed up after landing as - what seemed unusual has become addictive.“ It just simply works better than many typical and conservative solutions.

That's the magic of Shark. When Vlado Pekár, the father of the project, decided to develop a high-end UL/LSA tandem aircraft, his company from Senica, Slovakia, was the largest subcontractor of aerospace composite parts in Europe at that time (pre-2008 crisis). He was able and willing to invest even in atypical solutions, from which the best was chosen. Which, of course, attracted the best experts to the project.

A good example is the aerodynamics (Jiří Svínka, Marco Macerri, Zdeněk Ančík and Pavel Píštěčký). Shark reaches a speed of



The underside of the wing profile and the aerodynamic design of the shark's „belly“



The author of this article could happily spend the rest of his aviation life flying Shark

wing root's exact dimensions. What is important to them is that when opened the luggage compartment cover stays in open position, that there is a place for a tablet under the dashboard (a flip-up holder is envisaged in the future), the compartment for small items such as mobile phones and glasses has a grommet for a charging cable, and the socket for charging the battery can be found between the gills. So if someone accidentally discharges the battery, they don't have to remove any covers and can easily connect it to the charger or start the engine by the external power supply. There are many little things like this, most of which just help make life more enjoyable. For example, the choke control is excellent. But there are some that I would personally skip, such as the rubber pencil grommets that make pencils stick out of the dashboard. I find the kneeboard a much better place for them.

What else did fifteen users write in the poll? The design, quality of workmanship, flight characteristics across a wide range of speeds and handling were all praised. I myself would highlight Shark's range. Many pilots mentioned specific „tweaks“ or „incredibly elaborated details“. Of course, a strong above-average rating does not mean uncritical admiration.

Reservations about the cabin-locking eccentric cam mechanism lead by several shark lengths. All of us commented on its problematic operation, especially from the front-pilot seat, and difficult visual inspection – both parts are black, so it may not be obvious at a glance whether they locked and the cabin is secure. However, a better solution is already being tested and will go into production after the necessary approvals.

It is not surprising that pilots with experience on certified complex aircraft commented on places where they expected tactilely recognisable controls. The landing gear control lever does not resemble a wheel, and its resting neutral position does not distinguish between retract/extend states. On the other hand, I understand that it would be difficult to mechanically link the controls from the

front and rear dashboards. The same goes for the control of the flaps and the constant speed propeller, especially the electric version. Microlight pilots, on the other hand, don't mind at all a „buttons, LED lights and dials“ system - probably because they are used to them from their category.

The Shark 600, i.e. the version with an MTOM of 600 kg, must have a „shift weight“ in order to comply with the German regulation regarding maximum occupant weight - 110 kg for both front and rear seats. What is it? A neat heavy metal brick placed just behind the propeller in the engine cowling in the two-person configuration. To fly solo, (from the front seat) you must move the weight to a similar slot in the rear of the baggage compartment. The weight position has an electronic indication to complement the orange flag that is visible from the cabin when in the forward position. I think it is clear that neither the user nor the manufacturer (who has not yet come up with anything better) can be happy with the current solution.

Other comments were made only sporadically. For example, the armrests above the handy compartments in the sides of the cabin have been criticised for being attached with velcro, without hinges or at least defining spikes. Some people would like the foot pedals for the rear foot controls painted a contrasting

colour to make them visible; some would even like more legroom in the back! :-)

Surprisingly no one complained about the relatively low speed for operating the landing gear except me. With the hydraulically adjustable propeller, however, it's no problem to quickly slow down to the required 70 kt in the downwind position. But then, of course, you become a candidate for the slowest aeroplane for the rest of the circuit. I've also encountered the opinion that it's best to extend the landing gear later, after the third turn, but I don't like that. I have had one surprise in connection with the landing gear. After deployment, the flight manual prescribes a double check. In addition to the three green lights on the dashboard, you need to check the relative position of the two black arrows for each leg through the three visors. On one occasion I was landing in twilight and the thought flashed through my mind that the mechanical indication would be hard to see. I looked into the porthole and what did I see – everything beautifully illuminated by white LEDs.

The other pilot comments in the poll are not critical: only expressions of their individual preferences. A minority are fundamentally uncomfortable with the tandem arrangement, wanting a resting area next to them, or someone with whom they can feel to be in a closer contact, as compared to when the person is

The rear dashboard is quite minimalistic



seated behind them. But everyone appreciates the excellent view, especially from the front seat. It is not surprising that some older pilots, albeit experienced in one or a few types with cruise speeds of 80 – 100 kt, state that the Shark is too fast and complex for them. This is even if the types they have flown have a manually adjustable propeller or retractable landing gear. In my opinion, the meaningful use of the Shark's potential is in cruising. This involves more demanding preparation and, especially



Sidestick

given the speed, the ability to be more „ahead“ in flight. For some, this may be beyond their comfort zone; they prefer to stick to regional trips at sightseeing speed in an aeroplane with analogue instruments they are used to (and can see well :-)). The hourly cost of the eventual rental plays a role, of course. If we measure the flying experience by time spent in the air rather than distance covered, then a fast and expensive plane may not be attractive. After all, the survey included a question on the highest acceptable rental price. With two exceptions, the answers included a disproportionately low price. Not surprisingly, one of the realists was a pilot who owns and operates two aircrafts himself.

I was expecting some respondents to have reservations about the autopilot and the large display (in our case, the Dynon SkyView HDX touchscreen) bringing all the information together. After all, the Shark is a microlight aircraft. I waited in vain; probably because both make sense for the hi-end category, even for pilots who otherwise prefer



A cockpit as if from Maranello



„round analogue instruments“. The avionics is intuitive, including setting frequencies and transponder codes, the autopilot in basic mode confirms activation with a voice into the headphones after a long press, and maintains current heading and altitude. Both can then be easily changed. I myself have used the autopilot in this way very often. If I could wish for anything, it would be that the backup instrument (digital combined speedometer, altimeter, attitude indicator, etc.), which is also



Single cockpit lock located behind the pilot's left shoulder



Prototype of the new lock control




visible from the rear seat over the pilot's shoulder, be programmed for normal operation as a simple analogue circular speedometer.

Having circled back to advantages, this once again brings us to what makes flying with the Shark so enjoyable. And that's the vast majority of it all. As a rule, I use an aeroplane as a vehicle for the experience. The Shark is an exception. Flying it is an experience in itself. So, I will now go search for that genie lamp. ■



Foto Tobias Barth



 www.shark.aero
 [sharkaeroaircraft](https://www.instagram.com/sharkaeroaircraft)
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Technical specifications

Wing span	7,9 m
Length	6,85 m
Height	2,5 m
Wing area	9,5 m ²
Engine Rotax 912S	75 kW (100 HP)
Empty weight	295 kg (325 kg full options)
Max. take-off weight	480 / 600 kg
Max. permissible speed V_{NE}	333 km/h
Max. cruising speed V_H	300 km/h
Optimum cruising speed	250-270 km/h
Stall speed, clean	80 km/h
Stall speed, full flaps	64 km/h
Max. climb rate at the MTOW	7,2 m/s
Fuel capacity	100l
Fuel consumption (economy)	15 l/h
Maximum load factor	+4/-2
Maximum ultimate	+6/-3

