Abstract

The wing of the paraglide with parameters adjusted for beginner pilots, along with the flight safety system

For the emergence of hereby presented soft-wing aerofoil several factors had significant influence. First of all, it is the resultant combination of passion for design and a passion for flying, and personal experiences. The author starting from participating in a paragliding course and becoming an independent paraglider pilot encountered a number of difficulties, which he decided to solve in the field of design. The lack of cheaper hardware dedicated to novice pilots, providing raised safety standards, allowing for fun in flying led to the formulation of the design guidelines. The principal assumptions are: safety, easy take-off and landing, facilitation of recovery from deformation, increase in static and dynamic stability, use of colours to help the supervisor to identify the location and lack of deformation, elimination of the problem of filling the cells with snow, sand, leaves and grass, easier drying of wet aerofoil. It was decided to also design safety-raising system for registration and monitoring of flight parameters in near-real time.

The design process consisted of several stages from the selection and modification of the aerodynamic profile, through geometrical setting of wing parameters, computer flight simulations, analysis of the distribution of pressure and flows, resistance tests all the way to the production of a prototype. Its verification was done in flight, the parameters of which have been registered by a purposely designed device. After low flights from small hills, manual tows, low flights on mechanical winch, the high level flights were held (height approx. 300m) during which the actual functionality of the wing was examined and the wings behavior in terms of compliance with the requirements set by European Standard EN 926-2 for class A paraglider was observed. An extremely easy start was observed. Trim speed was more than 36 km/h, minimum speed was 23 km/h, the static and dynamic stability was also very well presented. From gentle spirals the exit occurred automatically. It was also found that the test glider comes out of parachutal state by itself. Turns are performed predictably. During the flight with trim speed there is no automatic twisting which could lead to a spin. Also checked was the behavior of the structure during the recovery from a spin, the glider stops the spin below 90 degrees. The landing proceeded without any disturbance and without the need of using special techniques. All elements of normal flight did not cause any dangerous situations.

During the process of checking the behavior of the wings in order to ensure safety, two-way radio communication with a follower was maintained and a flight monitoring system was used.

Extensive analysis and accurate selection of wing parameters resulted in a solution tailored to the skills and expectations of novice pilots. The main advantages of the presented solutions include: high safety level, low weight, long control pathways, simplifying the risers, simple pre-flight inspection of the wing, no bottom plating eliminates the problem of impurities inside the cells, the color of the wings signaling the emergence of a dangerous situation, static and dynamic stability of the wing, easy towing.

The designed wing was named “Latawica”, taken from Slavic mythology.