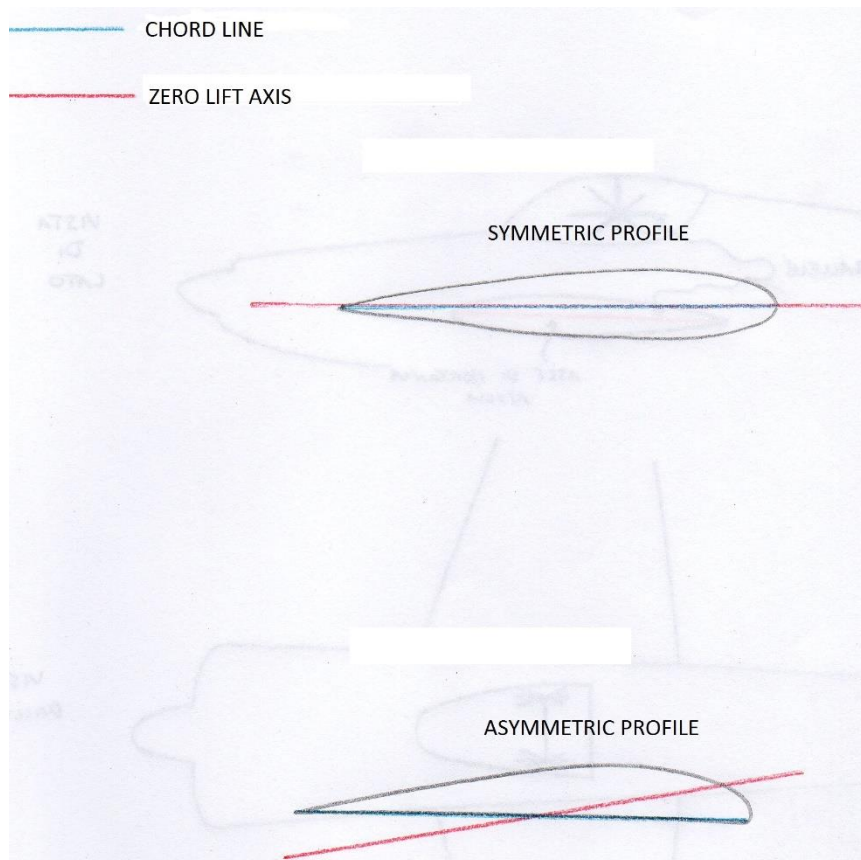


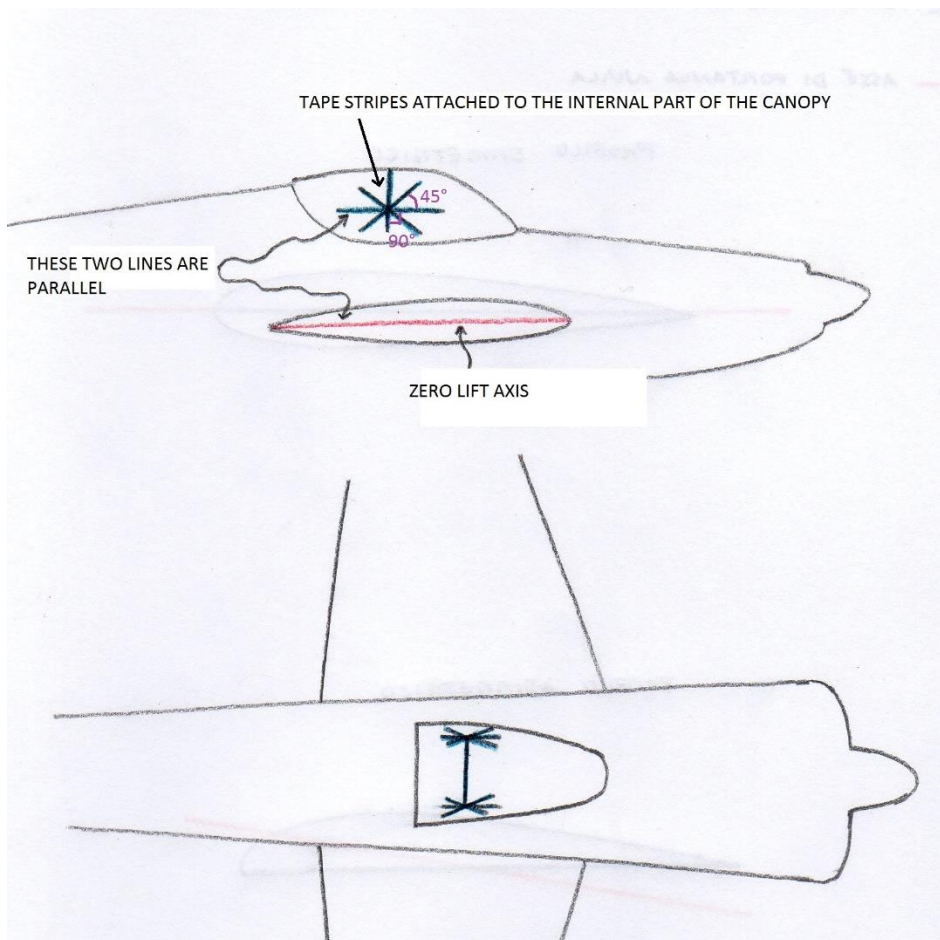
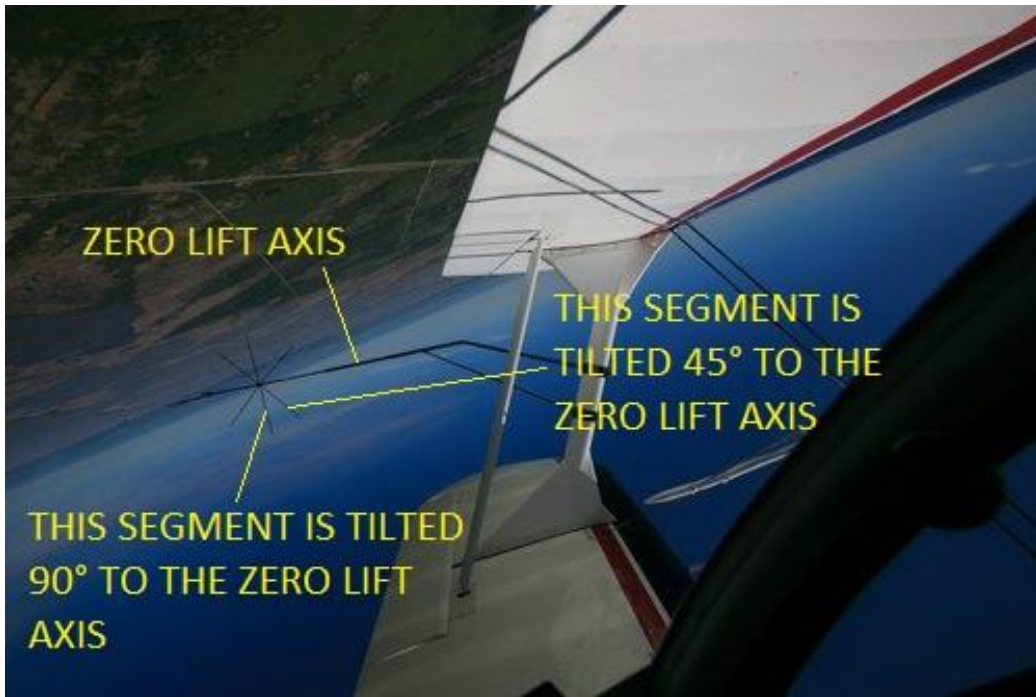
In aerobatics, during upward and downward vertical lines and during 45° upright and upside down lines, what must be vertical and tilted of 45° with respect to the horizon it's not the plane's center of gravity's trajectory, but the wing's zero lift axis.

In the case of a wing with a symmetric profile the zero lift axis coincides with the wing's chord, while in the case of a wing characterized by an asymmetric profile (like the wing of all BoS and BoM planes) the zero lift axis is tilted with respect to the wing's chord.



The zero lift axis is so called because every time it's parallel to the relative wind the wing creates no lift; on the other hand, every time the zero lift axis is tilted with respect to the relative wind the wing generates lift. The angle between the zero lift axis and the relative wind is the angle of attack, the angle of attack is controlled by the position of the elevator, the position of the elevator is controlled by the position the stick: by moving the stick forward and backward we control the angle of attack and so the amount of lift the wing generates. If the control column is pushed back too much or pull forward too much the critical angle of attack (positive and negative respectively) is reached and the wing stalls: the relative wind's speed doesn't matter!

In order to understand when the zero lift axis is vertical or tilted of 45° with respect to the horizon, aerobatic pilots use the aerobatic sighting device. This may consists of a series of metallic rods welded together or of a series of thin adhesive tape stripes attached to the internal part of the canopy. When aerobatic pilots want the zero lift axis to be vertical with respect to the horizon they simply pull or push on the stick until the metallic rod or the tape stripe that is orthogonal to the metallic rod or the tape stripe that is parallel to the zero lift axis becomes parallel to the horizon. In a similar way, they want the zero lift axis to be 45° with respect to the horizon they simply pull or push on the stick until the metallic rod or the tape stripe that is 45° to the metallic rod or the tape stripe that is parallel to the zero lift axis becomes parallel to the horizon.



I'd like to propose to the developers the creation of such tape stripes as an addone for the Yak 1, the Yak 1b and the Bf-109E (in my opinion these are the best planes for aerobatics). Some simple rules must be respected: 1) the stripes must be on both sides of the canopy (to the right and to the left of the pilot's head); 2) the intersection point of the stripes must be directly in front of the pilot's head when the head is turned

90° to the left and to the right; 3) when the plane flies straight and level, both upright and inverted, the intersection point of the stripes must fall on the horizon.

When performing aerobatics the aircraft should be trimmed for zero G. To be more specific, the elevator must be trimmed in a way that when the stick is put in the centre the wing generates no lift. To find that particular trim position the pilot must fly the plane at cruise speed, then pull up until the plane reaches an attitude of 30-40° or so, then let go the stick and move the trim wheel until the needle in the accelerometer indicates 0G.

I'd like to propose to the developers the creation of an accelerometer as an addone.