AC1 Wing

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DOI: 10.13111/2066-8201.2010.2.1.13

Abstract
The AC1 wing replaces the old wing of the wind tunnel model AEROTAXI, which has been made at scale 1:9. The new wing is part of CESAR program and improves the aerodynamic characteristics of the old one. The geometry of the whole wing was given by FOI Sweden and position of AC1 wing must coincide with the structure of the AEROTAXI model.

Description of the AC1 wing

It is a complete wing, with flaps, ailerons and detachable wing tips for different configurations.
The chord length varies along the span.
Dihedral angle is added to the wings for roll stability; a wing with some dihedral will naturally return to its initial position if it encounters a slight roll displacement. The dihedral angle is 1.301°.
Wind tunnel will test the airfoil to provide lift and drag coefficients.
The geometric characteristics are:

- c_0 = 209,612 mm
- c_e = 131,086 mm
- B/2 = 813,194 mm
- CMA = 173,366 mm
- Y_{CMA} = 375,359 mm

The flap can rotate at 20° and 35° while the aileron can rotate continuously up to 30°.
The clamping of AC1 wing is the same with the AEROTAXI wing. The position of AC1 wing on the model is given by two factors: the same leading edge and tangent to the upper surface in PVS.
The geometry given by FOI Sweden is shown in the figure below:

Figure 1

The profile in PVS is shown in figure 2 and on tip of the wing in figure 3.

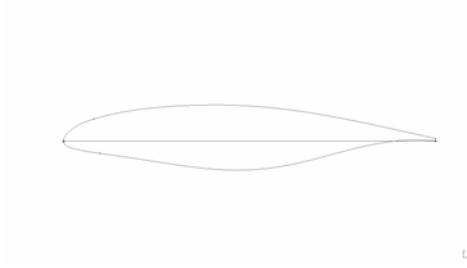

Figure 2

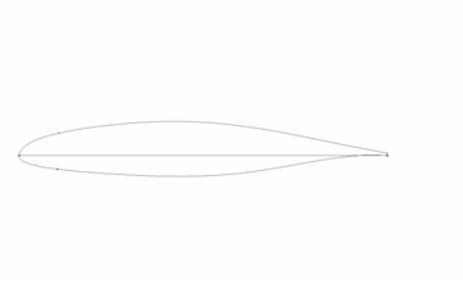

Figure 3

The wing has a small torsion, but the trailing edge is straight.
INCAS made the flaps and ailerons having the specific features shown below:

- the root chord c_{0f} = 79,538 mm
- the tip chord c_{ef} = 64,519 mm
- the leading edge is positioned at 0,6c, where c is the chord of the wing.
- the points which establish the axis of flap rotation: A with the following coordinates:
  X_A = 618,707 mm
  Y_A = ± 111, (1) mm
  Z_A = 155,217 mm
  and B with the following coordinates:
  X_B = 612,562 mm
  Y_B = ± 500, 00 mm
  Z_B = 173,493 mm
- the rotation axis of the flap is positioned at 0,765c
- the root chord for aileron c_{0e} = 56,445 mm
- the tip chord c_{ee} = 46,635 mm
- the leading edge is positioned at 0,65c
- the points witch establish the axis of the aileron rotation: C with the following coordinates
  X_C = 603,743 mm
  Y_C = ± 500, 00 mm
  Z_C = 215,978 mm
  And D with the coordinates bellow:
  X_D = 599,563 mm
  Y_D = ± 791, 00 mm
  Z_D = 222,448 mm
- the rotation axis of the aileron is located at 0,7103c

The axis of the aileron is positioned inside the profile of the wing.
The coordinates are measured from reference system of the model.
The gap between all these parts and the wing is 0, 3 mm and between them there are also 0, 3 mm.

The rotation of these parts around their axes is ensured by specific hinges shown in figure 4 and 5:

- for the flap:

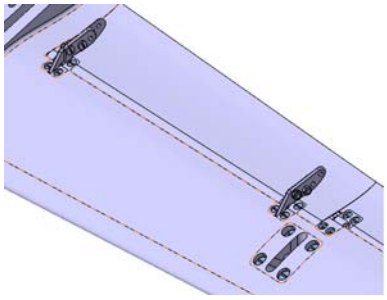

Figure 4

- for the aileron:

Figure 5

The position and clamping on the model are identical to those of the AEROTAXI wing.
We had the careening between the AC1 wing and the fuselage at the leading and trailing edge.

The position of AC1 wing is the same as that of theAEROTAXI wing on the model.
The axis of the balance feet is situated 8, 7 mm ahead the axis of the balance feet on AEROTAXI wing.

The figures below show the model with the AC1 wing and the AC1 wing, separately.