FlyAway in AWE

Varese, Sept. 16th, 2006

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Volar V.I.A. - Overview

- Volar V.I.A. (acronym for Volare Velocità, Ingegneria, Acrobazia which sounds in english as “Fly away in Speed, Engineering, Aerobatics”) is a joint initiative of:
  - Politecnico di Milano – Italy's most renown technical university
  - Aero Club d'Italia – National Aero Club, delegate of FAI
  - Federazione Sportiva Italiana Volo Acrobatico – Italian Sport Aerobatics Federation
  - Federazione Club Aviazione Popolare – Italian E.A.A. Chapter
  - Torlino Vimercati Air Racing Association – Private association promoting pylon races
  - Aero Club Milano – Oldest Aero Club in Italy, still the most representative
- Goals:
  - Design, build and FLY a light airplane destined to sport activity, specifically basic aerobatics and pylon races
  - Define a sporting FORMULA to be exported in other universities to create a “circus” of contests to be flown by students which also built the planes

Volar V.I.A. - Overview (2)

- How to reach these goals?
  - Design: as experimental activity in students academic syllabus
  - Build: as experimental airplanes according to Italian rules for homebuilt
  - Fly: by coordinating Universities, relevant Air Sports Federations and flight schools (most operated by non-profit Aero Clubs) for training and tutoring of university student pilots as integration of relevant curricular activities
  - Compete: by spreading the Formula in other Universities, in Italy and abroad, to widen the base of competing pilots and have more airplanes flying one against the other
  - Improve: through competition in making ever better planes and fly them more and better

What a plane are we designing?

CAP-21DS “The Silver Chicken”

What a plane are we designing?

Macchi MC.72

What a plane are we designing?

How are we doing it?

- Designing the plane
- Building it as experimental, amateur-built plane in the frame of Italian Homebuilt Federation (FCAP)
  - Reference rules: ENAC (Italian CAA) Circ. 15/C
  - Airplane will get an Experimental CoA
- Flying it
  - For test flights
  - For CoA issue
  - To compete in a dedicated Formula
    - Basic aerobatics
    - Pylon races
- Having students flying it
  - Getting their own JAA-PPL under special low-cost agreements
  - Competing in dedicated contests

Doing it, hands on

- Project is spread over several years, possibly 100+
- Students may get their University Degrees using project-related experimental activities as doctoral thesis
- 15-16 students are involved each academic year
- Practical activities are developed under FCAP guidance
- Several experts are involved to go deep in specific arguments:
  - Rules, regulation, and certification
  - Aerodynamics, powerplants, on-board systems
  - Construction techniques
  - Project and airplane documentation
  - Tooling and materials
  - Maintenance and operation
  - Flying techniques and sport activities

Key Persons

- Prof. Alberto Folchini - PoliMI
  - Project Supervisor
  - Academic and didactic referee
- Dr. Eng. Luca Salvadori, FSIVA President
  - Tutor
  - Aerobatic activities referee
- Mr. Giovanni Gatti, Pylon Races organizer
  - Pylon Races activities referee
- Dr. Eng. Rodolfo Galli, FCAP President, retired ENAC Technical Director
  - Regulations and FCAP referee

Project status

- Project started in March, 2006
- 15 students of PoliMI involved so far
- 3 students ready for degree (Nov 2006)
- Design specifications frozen
- General airplane configuration frozen
- Powerplant selected
- Three-view outline frozen

Operational specifications

- Two seats, side-by-side for better training environment
- Full dual controls
- Basic positive aerobatic capabilities, including fully-developed upright spin
- Good speed characteristics
- Benign stall and near-stall behaviour
- Easy maintenance
- Easy assembly and disassembly for road transport

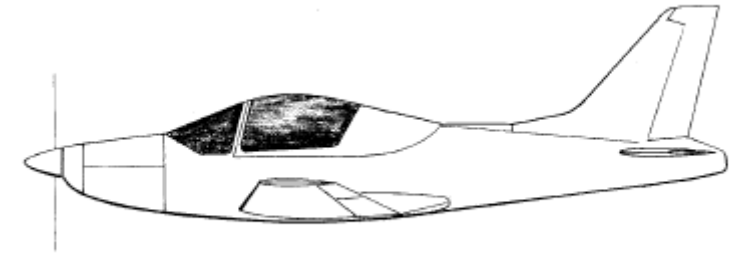
Technical specifications

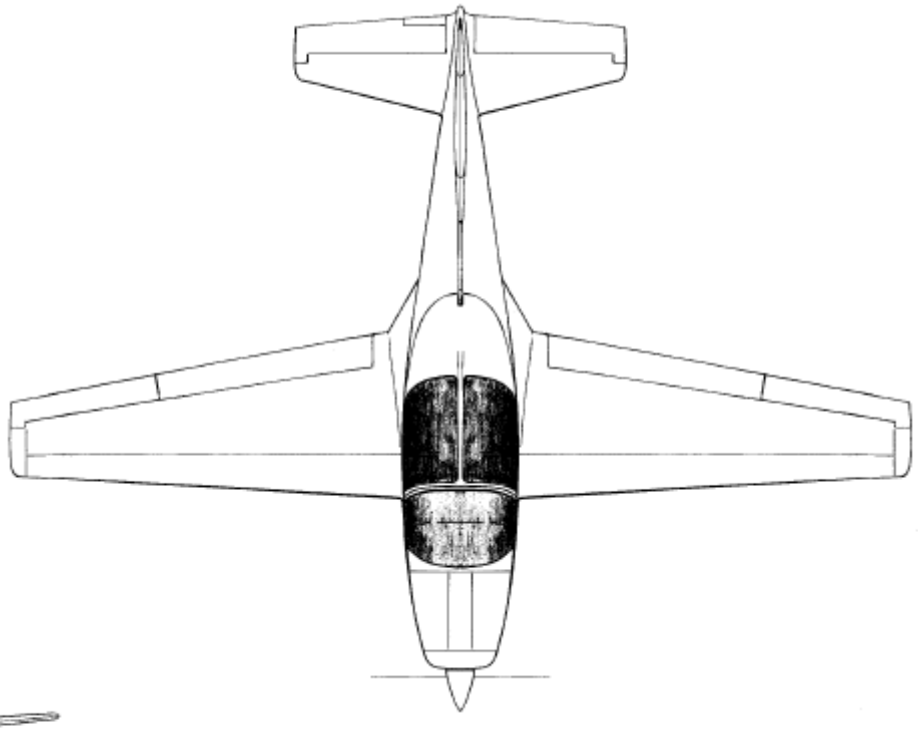
- Current specs include:
  - Low, cantilever wing
  - Low tail empennage, high-surface rudder for optimal stall and spin behaviour
  - Bubble canopy for 360° visibility
  - Piston engine, 80-150HP range, normally aspirated
  - Fixed, tricycle gear
  - Wide span ailerons for better roll response
  - Slotted flaps for better landing behaviour
  - Fixed pitch propeller to keep costs down

Choices... so far

- Engine:
  - Rotax 912, 100HP
  - AVCO-Lycoming O-200, 100HP
- Avionics:
  - Full digital suite, currently evaluating:
    - Blue Mountain Avionics EFIS and EMS
    - Dynon D180 integrated EFIS+EMS
    - AvMap EKP-IV colour-map GPS
    - BioFly 3D GPS
    - Kell Aero 3D GPS+Guidance System
- Materials:
  - Aluminium with composite fairings and non-structural parts

3-View Outline





First CAD data

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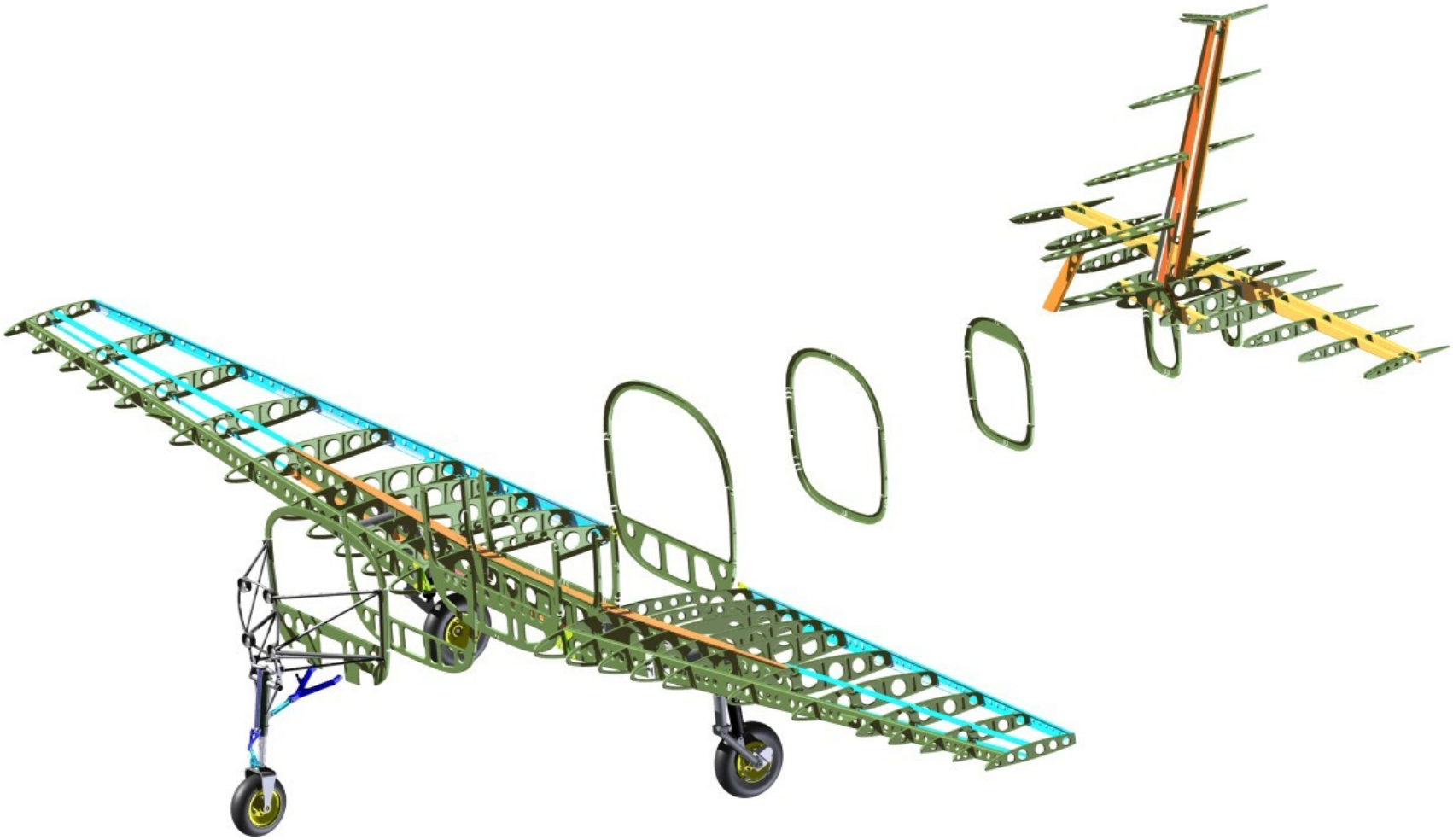

First CAD data

First CAD data

Basic data

Wing span	8,60m
Lenght	6,80m
Height	2,60m
Wing area	10,60m2
Aspect ratio	7,00
BEM	290Kg
MTOM	600Kg
Wing loading	56,60Kg/m2
Power loading	10,50Kg/HP
Engine	Rotax 912

What next?

- Project will be presented to other institutions and Universities on Sep 22, 2006 during a joint PoliMI – Aero Club d'Italia symposium entitled:

Aero-Poli – Aeronautics at Milan Polytechnic
Days of Sport and Light Aviation

- Other students will apply to replace the ones leaving after graduation and continue development
- Sponsors are sought to allow metal cut
- Agreements with flight schools are about to be finalized to allow students flight training
- Flyable prototype ready in 4 years

Resources

- Politecnico di Milano, Aerospace Dept.: www.aero.polimi.it
- Aero Club d'Italia (National Aero Club of Italy): www.aeci.it
- FSIVA – Fed. Sportiva Italiana Volo Acrobatico (Italian Sport Aerobaics federation): www.fsiva.it
- FCAP – Fed. Club Aviazione Popolare (Italian EAA Chapter): www.federazionecap.it
- Aero Club Milano: www.aeroclubmilano.it
- Torlino Vimercati Air Racing Association: www.torlinovimercati.it

- Luca Salvadori – President, FSIVA: presidente@fsiva.it
- Giovanni Gatti – President, Torlino Vimercati Air Racing Association: giovanni.gatti@gpa.it
- Rodolfo Galli – President, FCAP: segreteria@federazionecap.it

... Now what?

DO IT!