VITTORIO PAJNO

SAILPLANE DESIGN EXAMPLE

Design calculation example
Structural dimensioning
Technical specifications - Design rules

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CONTENT

PART 1

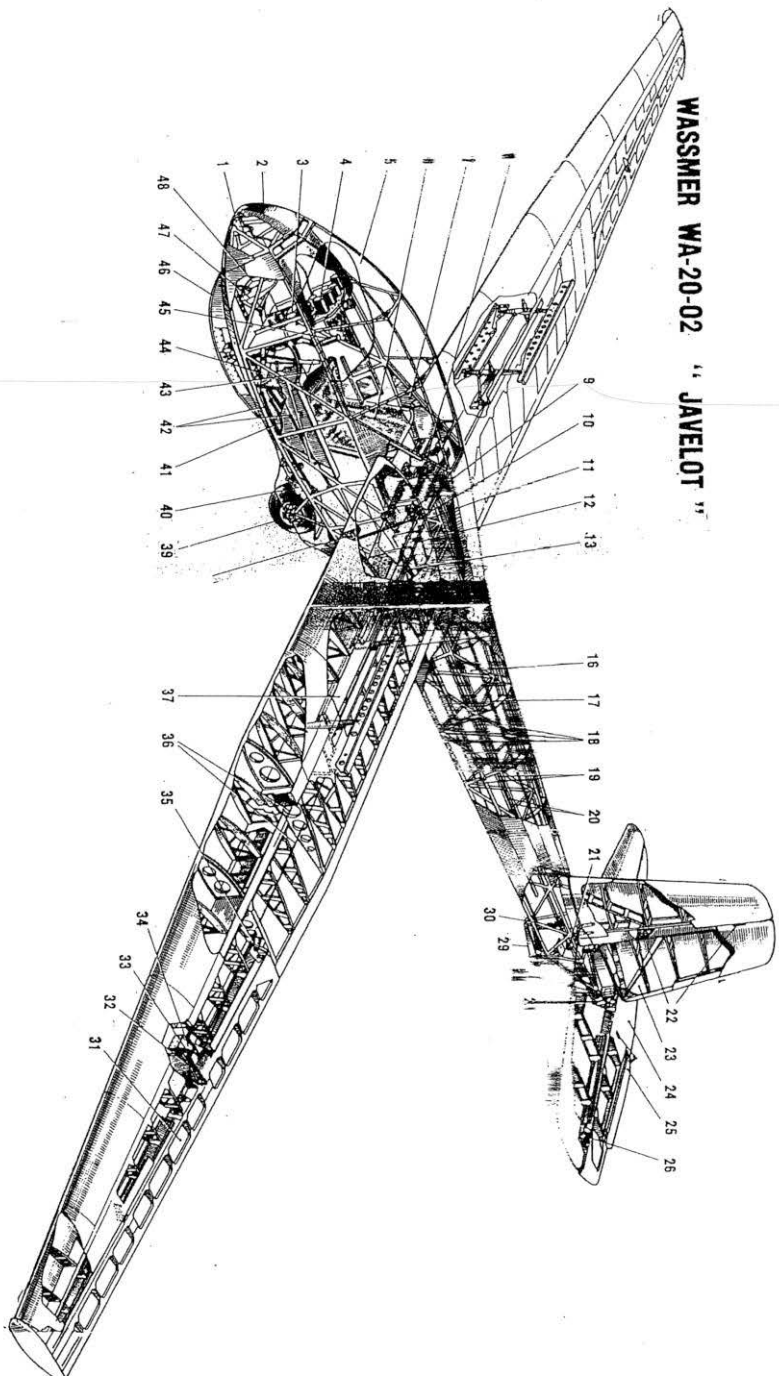
PART 2

PART 3

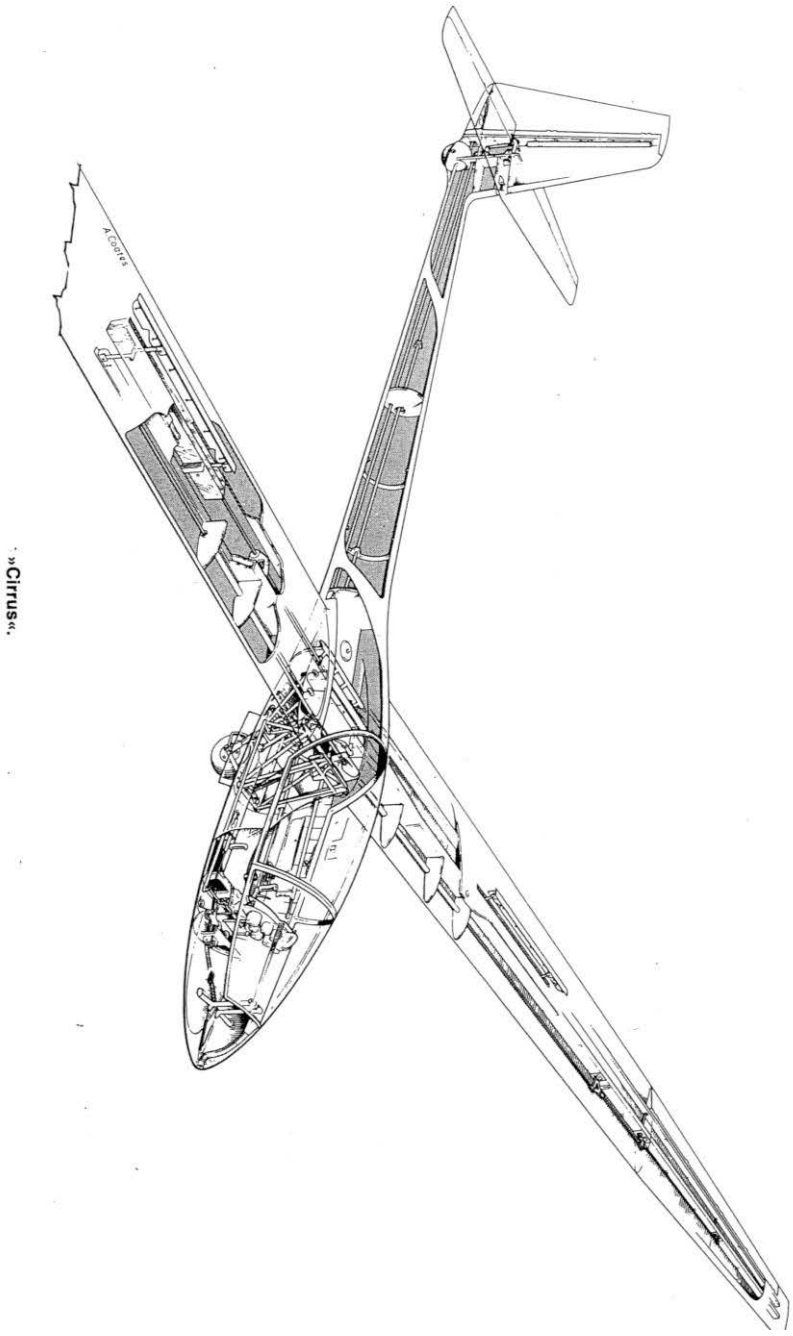
SECTIONS:

PART 4

STRUCTURAL CALCULATION CONTENT

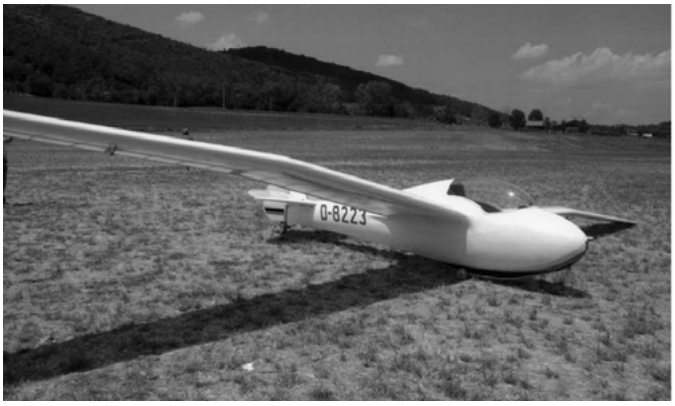


WASSMER WA 30 - JAVELOT . TECHNICAL DETAILS



SCHEMPP-HIRTH - CIRRUS. TECHNICAL DETAILS

H 17 – 1933/34



H 28. AN H 17 IMPROVEMENT OF H 17

GRUNAU II. A TYPICAL TRAINER. 1933/34

Asiago. Pavullo, Italy. 1935

Asiago. An italian trainer in Milan

Meise Olympic sailplane. 1940.

PART 3
SECTION 0
Sample Sailplane Drawing and Calculation List

The purpose of this section is to show the reader what is required, in terms of drafting, tooling, and calculation work, before proceeding with sailplane design and to the drafting of parts. What follows is the first estimate that will vary during the design phase due to the unknown problems connected to the specific sailplane being designed and the number of details required.
Adequate space is required in order to make the most of the activities and the tooling must be simple but up to date. There should be a computer, filing cabinets, two long tables with dimensions of 1.20 x 3.00 m, a drawing board with dimensions of 1.10 x 2.00 m. and equipped with a parallel rule 2.00 m long and a square, 450 x 450 mm.
It must be possible to change the inclinations of the hypotenuse square, so that we can trace inclined parallel lines.
The lists shown below are an estimate and must only be used for budgeting and planning purposes.

DRAWING LIST

TITLE	**SCALE**
Three views	1 : 10 and 1 : 25
Technical data	on A4 sheets
Mould study	1 : 1
Costs and correspondence	on A4 sheets
Bureaucratic correspondence	

WING	
Wing	1: 2 or/and 1 : 4
Wing Sections	1 : 1
Spar	1 : 2 and 1 : 4
Airbrakes	1 : 1
Aileron	1 : 4 and 1 : 1 (sections)
Bayonet	1 : 1
Wing fittings	1 : 1
Details	1 : 1
FUSELAGE	
Side view	1 : 2 (forward part and tail boom)
Plan view	1 : 2 idem as above
Sections	1 : 1
Canopy	1 : 1
Wing - fuselage fittings	1 : 1
Pedals	1 : 1
Controls	1 : 1
Seat	1 : 1
Instrument panel	1 : 1
Floor	1 : 1
HORIZONTAL TAIL	1 : 2 (to match with the fuselage)
VERTICAL TAIL	1 : 2 idem as above
MAIN LANDING GEAR	1 : 1 and 1 : 2
TAIL WHEEL	1 : 1 and 1 : 2
ELECTRIC EQUIPMENT	1 : 4
ANEMOMETRIC EQUIPMENT	1 : 4

CALCULATION LIST

Sailplane main data
Polar. Airbrakes open and closed
m.a.c. and m.g.c. calculations
Reference distances
V-n envelope
Gust envelope
Wing loads. Shear and bending
Wing loads. Torsion
Aileron loads
Airbrake loads
Wing fittings load
Masses distribution
C.G. position
Moments of inertia about the three axes
Vertical tail loads. Rudder action case
Vertical tail loads. Yaw case
Fuselage loads
Main landing gear loads
Tail wheel load
Control loads
Basic structural checks
Sailplane FEA analysis
Flutter analysis
Crashworthiness study

CONCLUSION

We suggest examining the content of this book in more depth to obtain a more detailed estimate of the time required to design the sailplane.
The time required mostly depends on the number of people involved, their specific capabilities and how they are coordinated.
Although a project manager is not indispensable he/she can be of help especially in controlling costs.