Everyone

- Truss theories and how to design a truss general research
- Reading through the home built airplanes about our truss, Ollie posted a bit on there and they gave good suggestions : https://www.homebuiltairplanes.com/forums/threads/flight-club-ultralight-build-log.33380/
- Read through our sections about the truss: https://www.blog2.flightclubaerospace.com/
- Affordaplane and Legal Eagle build manuals
- Specific qualities of the steel we're using (⅝"x 0.035" 4130 Chromoly Steel)
- Get accustomed with fusion
    - Recad the truss - cad your version of the truss

Un personaje:

- Crash section of the textbook & truss if they have any
- Beam theory

Truss Theories

https://www.sciencedirect.com/science/article/abs/pii/S1359836812002351

- Equilibrium of physical and material forces

https://www.teachengineering.org/content/cub_/activities/cub_polygons_angles_trusses/cub_polygons_lesson01_presentation_v2_tedl.pdf

- Truss made of:
    - Structural members, joints or nodes, angles, polygons
    - Distribute a point of weight over a wider area
    - Planar truss:
        - 2D plane, ex. Bike frame
    - Space truss: 3D plane, ex. Bridge

http://www.klabs.org/DEI/References/design_guidelines/design_series/1242lerc.pdf

- PSAM (probabilistic structural analysis methods) contained in the computer code NESSUS (Numerical Evolution of Stochastic Structures Under Stress)
    - Identify and quantify the reliability fo the space structure
    - I can't find the download for this??

http://www.aerostudents.com/courses/aerospace-design-and-systems-engineering-elements-1/FuselageDesign.pdf

- Fuselage Design

Textbook Notes:

Welding:

- Very durable, but may lead to warping

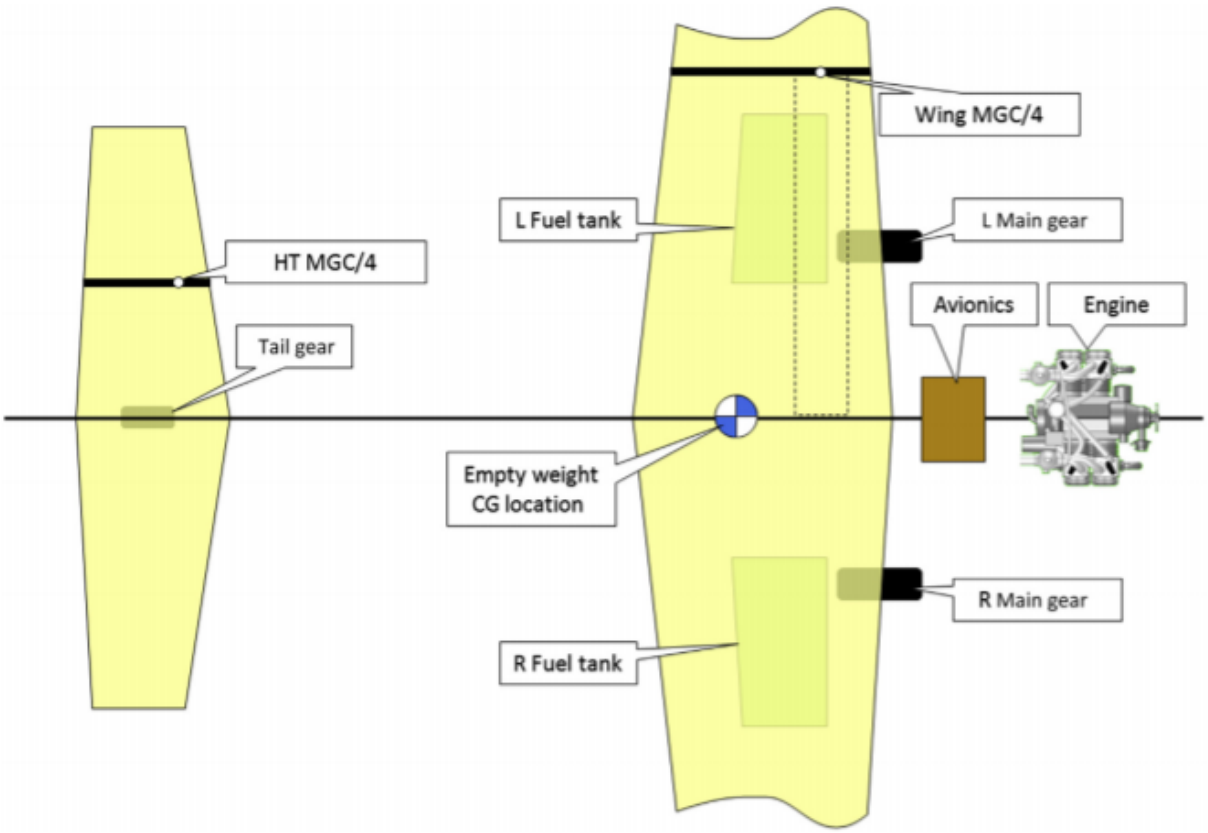
- “Critical structural parts should not be made from welded aluminum due to a reduction in fatigue life”

5.3 Airframe structural layout

- Wood, welded steel, stiffed skin construction, composites are our options
- Welded steel more for high drag planes → US!

Ch. 12 Anatomy of the fuselage

- Frustrum- shaped Fuselage
    - Reduces production cost
- Steps:
    - Layout where we need things
    - Note the CG envelope
    - Estimate weight of all known components making up the plane
        - Like the CG calculator Rudy made
- It’ll look like this when the plan is completed



- 8. In Step 3, all major components constituting the predicted empty weight of the aircraft are placed in their prop

Refining the external shape of the fuselage

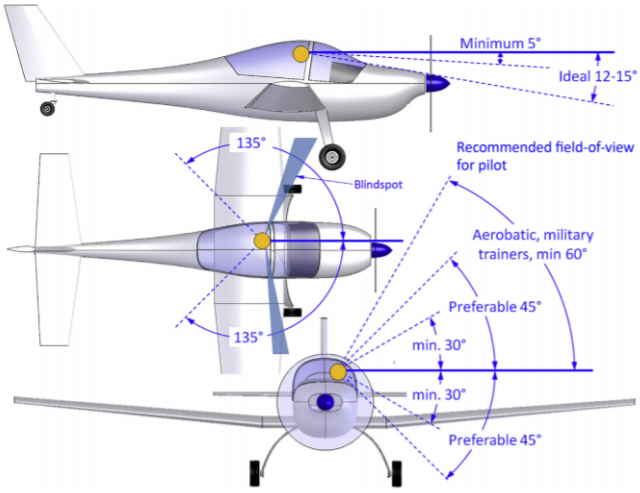
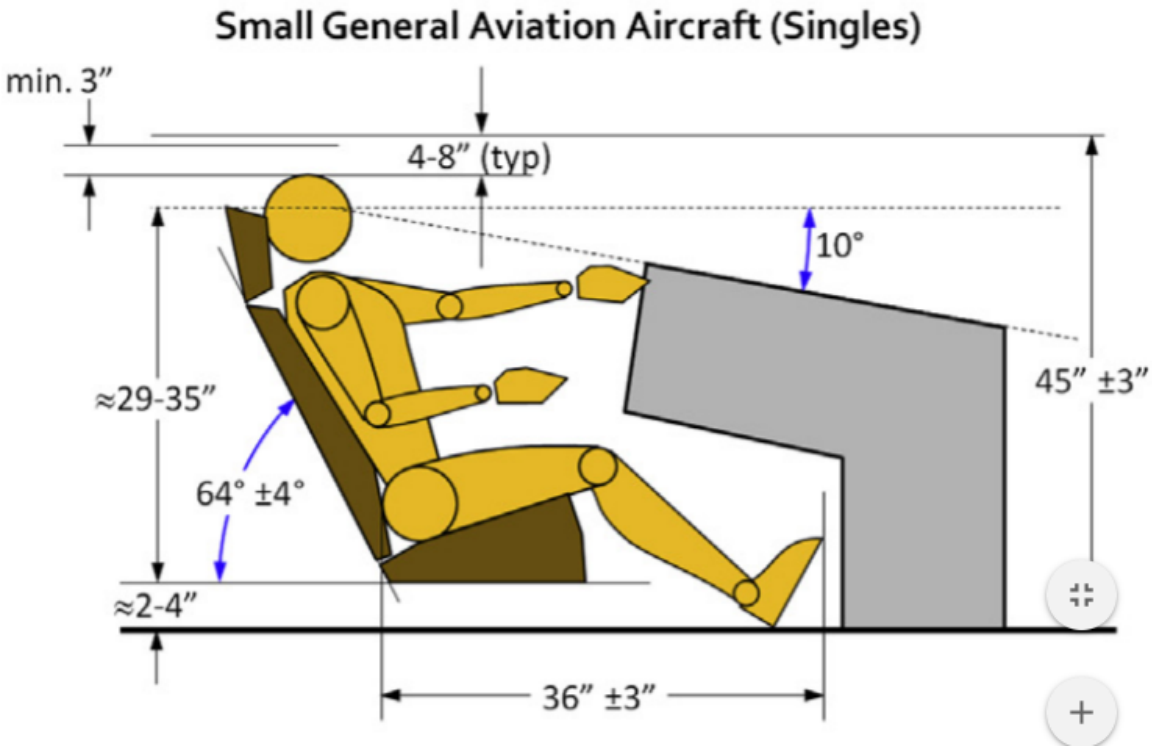
- Streamline as posible
- Take into account landing gear
- How far the pilot can see:
- 

FIGURE 12-16 Recommended pilot's field-of-view.
- Space for pilot recommendation:
- 

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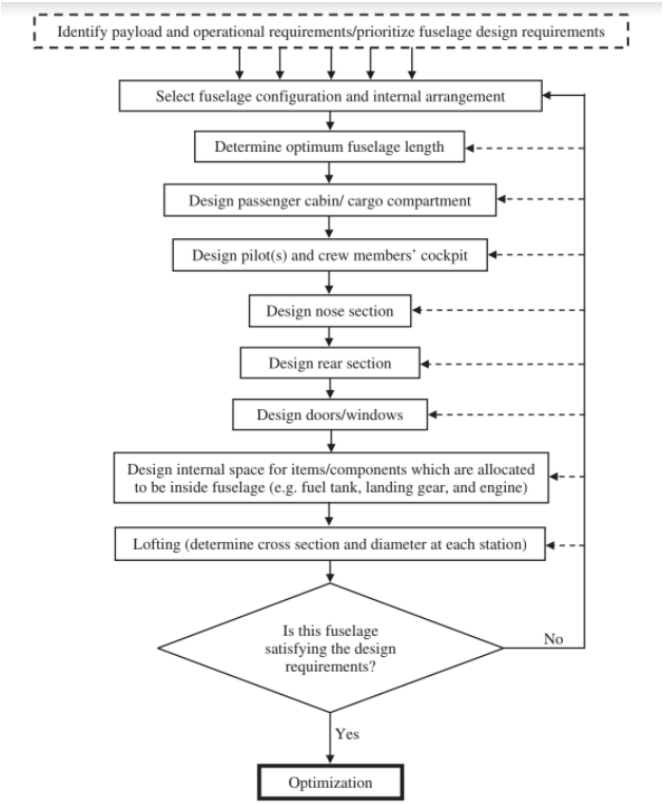
[Aircraft Design MS](#) **db**



6 Basic Requirements;

1. Keep the fuselage as small and compact as possible.
2. Arrangement to be symmetric from the top view as far as possible.
3. There must be sufficient space to accommodate all of the items.
4. Usable loads such as fuel must be close to the aircraft center of gravity.
5. The pilot cockpit must be allocated the most forward location of the fuselage, to enable the pilot to view the runway during take-off and landing.
6. Arrangements must be such that the aircraft center of gravity is close to the wing/ fuselage aerodynamic center.

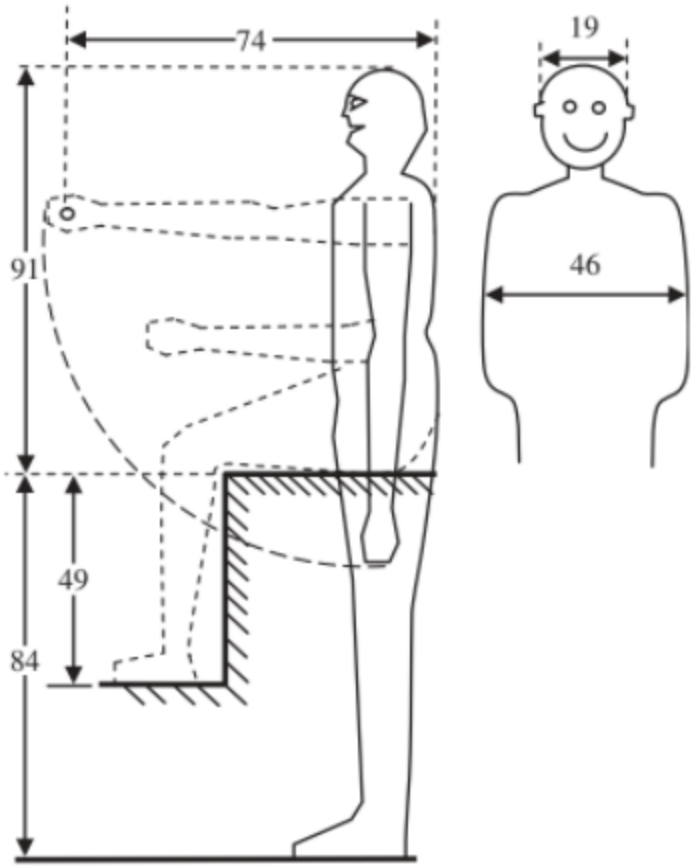


Figure 7.6 Linear body dimensions (cm)

- To avoid take off rotation or landing with a high AOA: rear fuselage upsweep angle must be taken into account
    - Cessna is 10 degrees

Do we have a specified length or width?

Limitations to welded steel

Advantages:

- Weld: 100% of OG
- Rivets: 75%
- One continuous structure
- Easier than riveting

Disadvantages

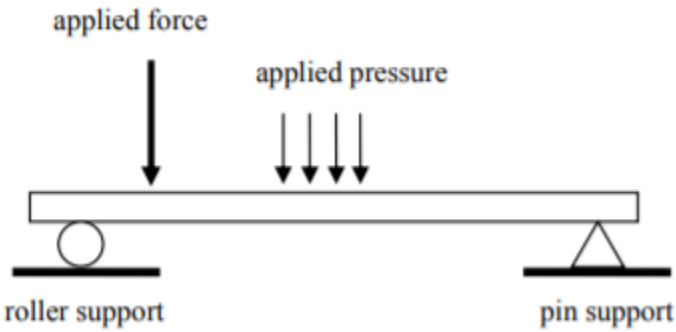
- Do not allow any form of expansion - Contractions will make it weak
- Prone to developing cracks after some time
- Hard to get right

    - Internal and external distortions can happen while the areas of the connection are exposed to diff heating in welding
- Fatigue can take place if the weld is not great

From Legal Eagle:
ALL TRIANGLES!!!

- Triangularly braced
- 
- You can separate it a bit and it'll make it easier to weld

Beam Theory

- Calculating the load-carrying and deflection of beams
- Doesn't really apply because it is only for transverse loads
    - Not compression/ tension which is what we want
    - Maybe applies for battery and pilot
- 

    - Transverse loads
- Cross-sections don't deform

A future read:
https://www.homebuiltairplanes.com/forums/threads/best-fuselage-shape.33673/page-3#post-535958