

Test your general aircraft design knowledge

1. Are you aware of the different weight estimation methods used in aircraft design, for example Class I methods based on fuel fractions and Breguet equation, and Class II methods based on component weight estimation?
2. Are you familiar with the typical parameters used to define a wing (planform and airfoil)? Do you know the typical effect of each one of these parameters on the performance of the aircraft?
3. Do you know how is defined the aircraft wing loading? What are the consequences of a very high/low wing loading on the aircraft performance?
4. What are the effects on the aerodynamic spanwise lift distribution of parameters such as sweep angle, twist angle, taper ratio?
5. What is the difference between C_l and C_L and c_d and C_D ?
6. What is the effect of the aspect ratio on the climbing performance of a jet aircraft?
7. What is the difference between friction drag, form drag and induced drag?
8. What is the role of spars and ribs in the wing structure? Given a certain wing structural design, can you estimate the volume available for fuel tanks?
9. Why typical airliners wing have a kink in the trailing edge?
10. Can you read a loading diagram and understand whether an aircraft is manoeuvre or gust critical?
11. What is the effect of using thicker airfoils on the weight of a wing of given span? Attaching engines on the wings is beneficial or detrimental for the structural weight of the wing?
12. What are the main differences between standard and supercritical airfoils?
13. What are the so called Mach critical and Mach drag rise?
14. What is special about the elliptical lift distribution?
15. What is the so called critical angle of attack?
16. Why swept and slender wing aircraft are typically affected by pitch up tendency?
17. What is the effect of the camber on the airfoil lift capability?
18. How can you estimate the lift gradient of a finite length wing?
19. What is the role of the stringers in the skin panels of a wing?
20. What is the mean aerodynamic chord? Why is it a relevant parameter and how can you measure it?