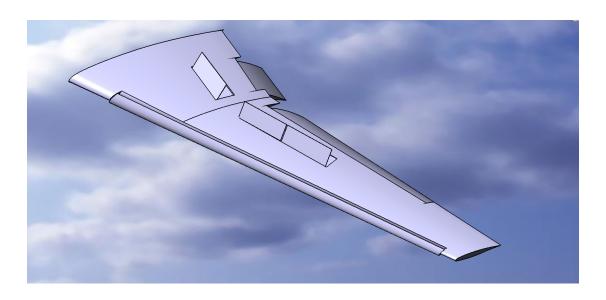
# DELFT UNIVERSITY OF TECHNOLOGY AE2100 DESIGN AND CONSTRUCTION

# Wing Plan Form Design

Workpackage 2



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# Preface

# Summary

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# List of Symbols

| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$  | Symbol           | Description  | Dimension |
|---|------------------|--|-----------|
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$  | $\overline{a}$   | Speed of sound   | m/s       |
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$  | b                | Wing span  | m         |
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$   | c                | Chord length   | m         |
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$   | $c_{l_{\alpha}}$ | Slope linear part of the lift versus angle of attack curve | 1/°       |
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$  | $c_l$            | lift coefficient (airfoil)                                 | _         |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$   | $c_d$            | Drag coefficient (airfoil)                                 | _         |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$   | $c_j$            | Specific fuel coefficient                                  | Kg/N/s    |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$   | g                | Standard gravity   | $m/s^2$   |
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$  |                  | Wing thickness   | m/s       |
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$  |                  |  |           |
| $ \begin{array}{c} C_L & \text{lift coefficient (wing)} & \\ C_D & \text{Drag coefficient (wing)} & \\ D & \text{Drag force} & N \\ L & \text{Lift force} & N \\ M & \text{Mach number} & \\ R & \text{Aircraft range} & m \\ Re & \text{Reynolds number} & m \\ S & \text{Wing surface area} & m^2 \\ T & \text{Temperature} & K \\ T & \text{Thrust} & N \\ V_\infty & \text{Free stream airspeed} & m/s \\ V_s & \text{Aircraft stall speed} & m/s \\ \hline W_F & \text{Fuel weight} & N \\ \hline                                $ | $\overline{A}$   | Aspect ratio   |           |
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$  | $C_{L_{\alpha}}$ | Slope linear part of the lift versus angle of attack curve | 1/°       |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$  | $C_L$            | lift coefficient (wing)                                    | _         |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$  | $C_D$            | Drag coefficient (wing)                                    | _         |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$  | D                | Drag force   | N         |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$  | L                | Lift force   | N         |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$  | M                | Mach number  | _         |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$  | R                | Aircraft range   | m         |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$  | Re               | Reynolds number  | m         |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$  | S                | Wing surface area  | $m^2$     |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$   | T                | Temperature  | K         |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$   | T                | Thrust   | N         |
| $W_F$ Fuel weight $N$ $\alpha$ Angle of attack     ° $\beta$ Prandtl-Glauert correction factor     - $\gamma$ Adiabatic index of air     - $\gamma$ Climb gradient     ° $\lambda$ Taper ratio     -  | $V_{\infty}$     | Free stream airspeed                                       | m/s       |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$  | $V_s$            | Aircraft stall speed                                       | m/s       |
| $egin{array}{lll} $\alpha$ & Angle of attack \\ $\beta$ & Prandtl-Glauert correction factor & - \\ $\gamma$ & Adiabatic index of air & - \\ $\gamma$ & Climb gradient & ^{\circ} & ^{\circ} & ^{\circ}$   | $W_F$            | Fuel weight  | N         |
| $egin{array}{lll} $\alpha$ & Angle of attack \\ $\beta$ & Prandtl-Glauert correction factor & - \\ $\gamma$ & Adiabatic index of air & - \\ $\gamma$ & Climb gradient & ^{\circ} & ^{\circ} & Taper ratio & -$  |                  |  |           |
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$   | $\alpha$         | Angle of attack  | 0         |
| $\gamma$ Climb gradient $^{\circ}$ $\lambda$ Taper ratio $^{-}$   | $\beta$          | Prandtl-Glauert correction factor                          | _         |
| $\gamma$ Climb gradient $\lambda$ Taper ratio $-$   | $\gamma$         | Adiabatic index of air                                     | _         |
|   | $\gamma$         | Climb gradient   | 0         |
| $\rho$ Air density $kg/m^3$   | $\lambda$        | Taper ratio  | _         |
|   | $\rho$           | Air density  | $kg/m^3$  |

# 1 Introduction

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# 2 Fuel system

Introductie

#### 2.1 Components

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#### 2.2 Required fuel tank volume

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#### 2.3 Available fuel tank volume

test

#### 2.4 Fuel system conclusion

Conclusie

# 3 Landing gear

Introductie

3.1 Landing gear functions

test

3.2 Landing gear sizing

test

3.3 Gear retraction mechanism

test

3.4 Landing gear conclusion

Conclusie

#### 4 Control surfaces

Introductie

4.1 Methods of roll control

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4.2 Roll manoeuvre simulation

test

4.3 Control surfaces conclusion

# 5 Conclusion

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