

Airbus A-380



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May 1, 2005

AOE 4124

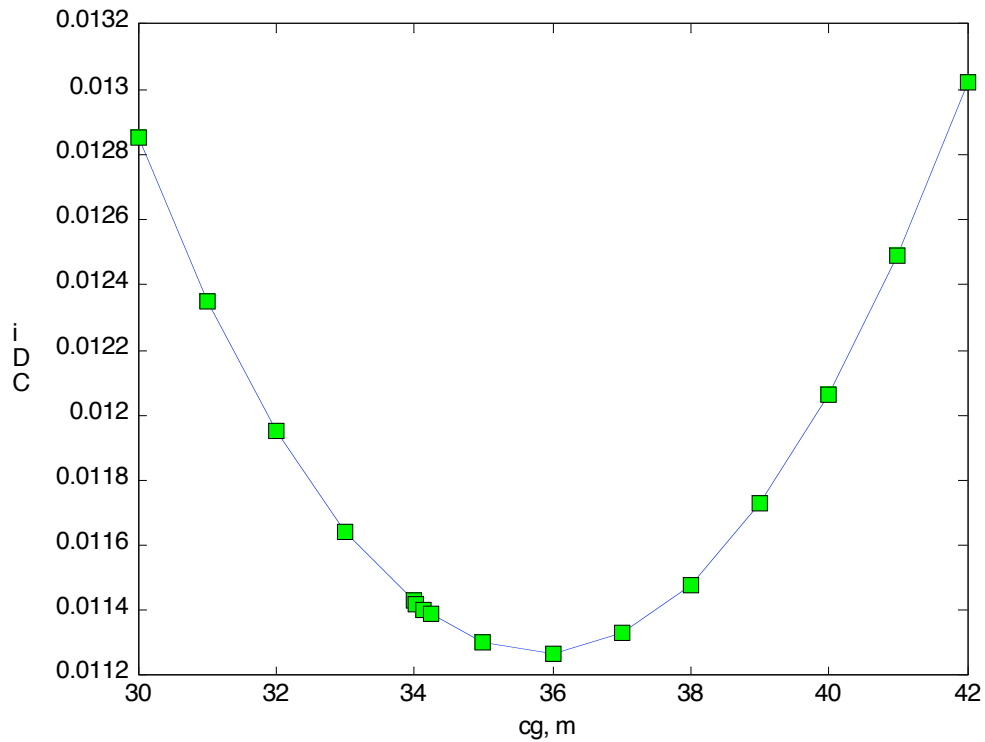
A-380: Quick Look

Specification	
Length	72.75 m
Width (max)	7.14 m
Height	24.08 m
Planform Area	845.0 m ²
Wingspan	79.80 m
Root Chord	16.60 m
Tip Chord	4.69 m
Taper Ratio	0.28
LE Sweep	37°
Tailspan	30.38 m
MTOGW	560,000 kg
Payload	84,000 kg
Max Ramp Weight	562,000 kg
W/S Max	662.7 kg/m ²
Range	14,816 km
Ceiling	13,100 m
Max Speed	Mach 0.89
Cruise Speed	Mach 0.85
TO Field Length	2987 m

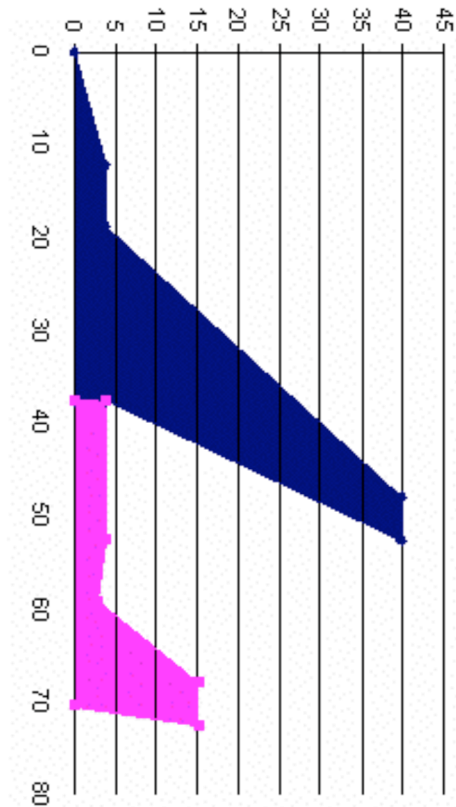


Picture courtesy of www.airbus.com

A-380 LAMDES Model

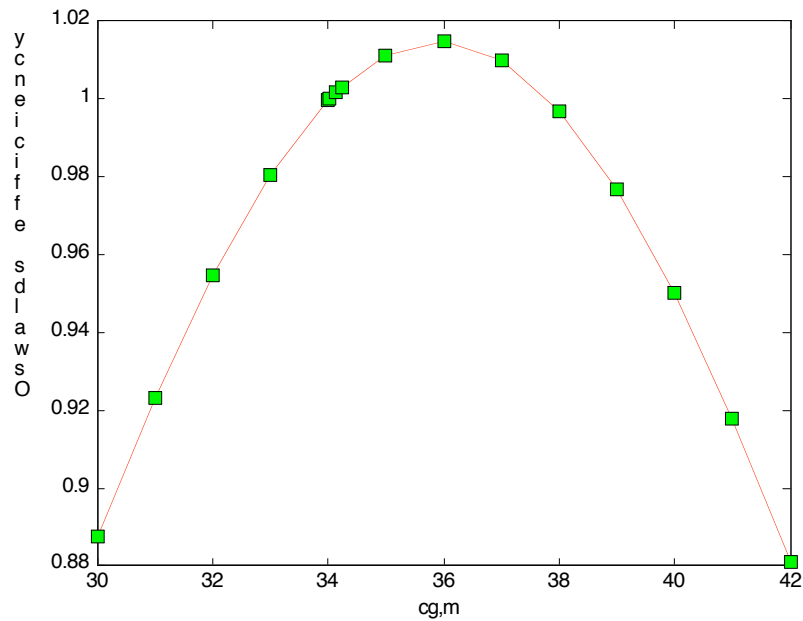


Min. Induced Drag vs CG location

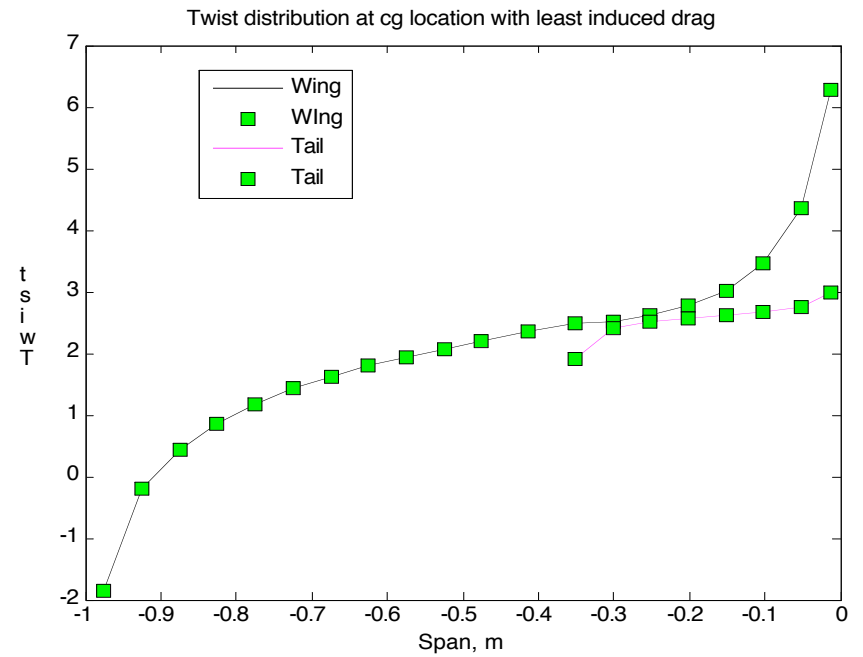


- The Static Margin was found to be 36%

LAMDES Cont'd

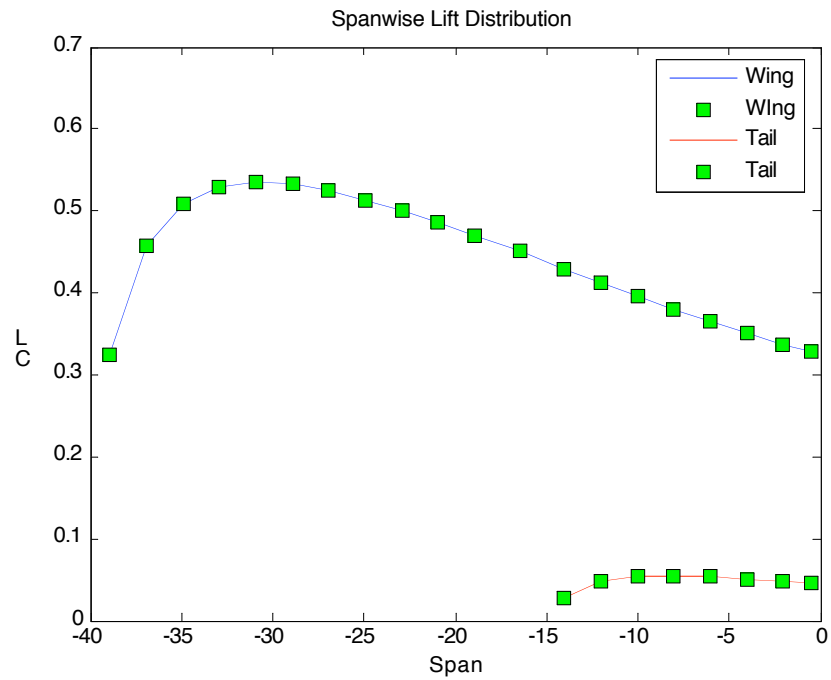


Oswald Efficiency vs. CG location

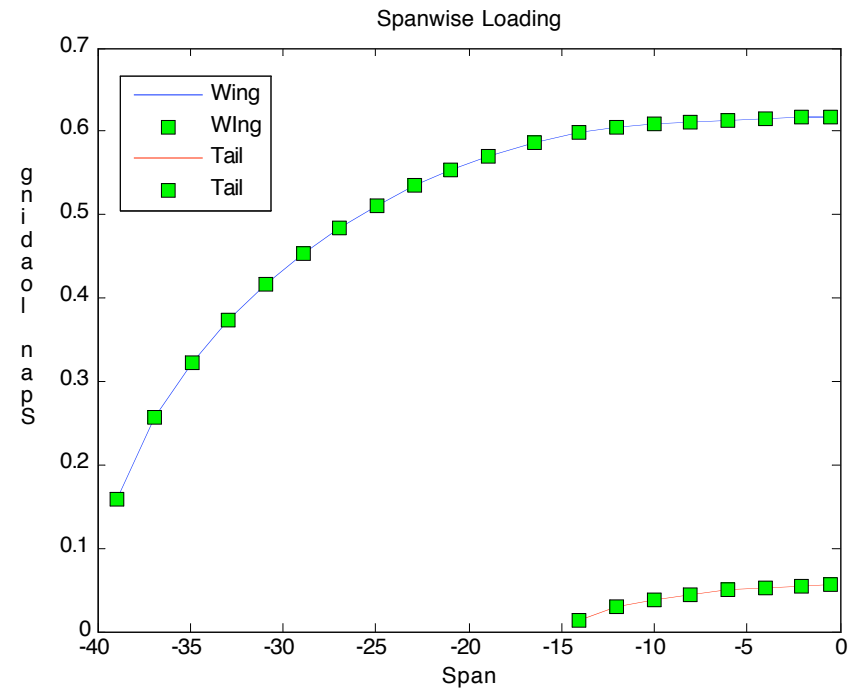


Twist Distribution

LAMDES Cont'd



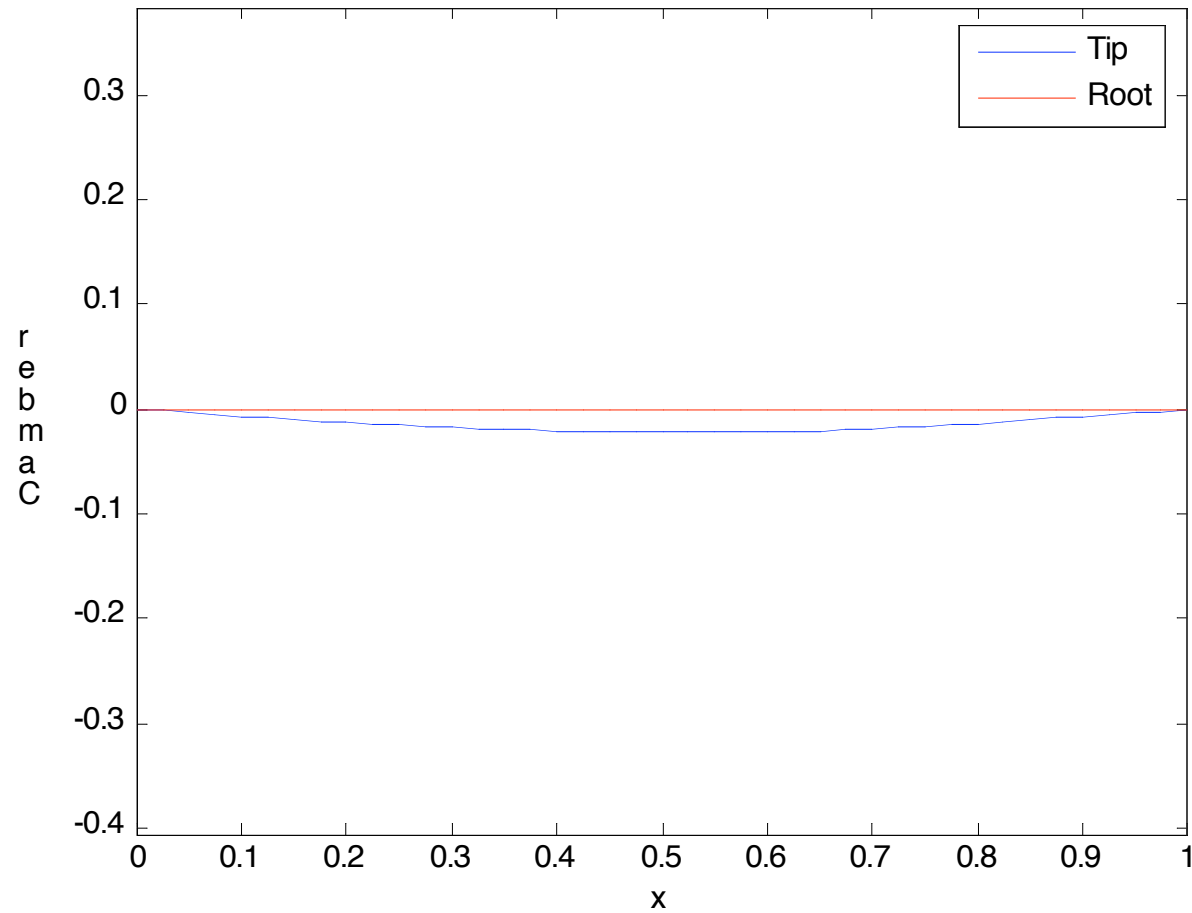
Spanwise Lift Distribution



Spanwise Loading

LAMDES Cont'd

Comparison of root and tip camber at cg of min iduced drag



Lamdes Discussion

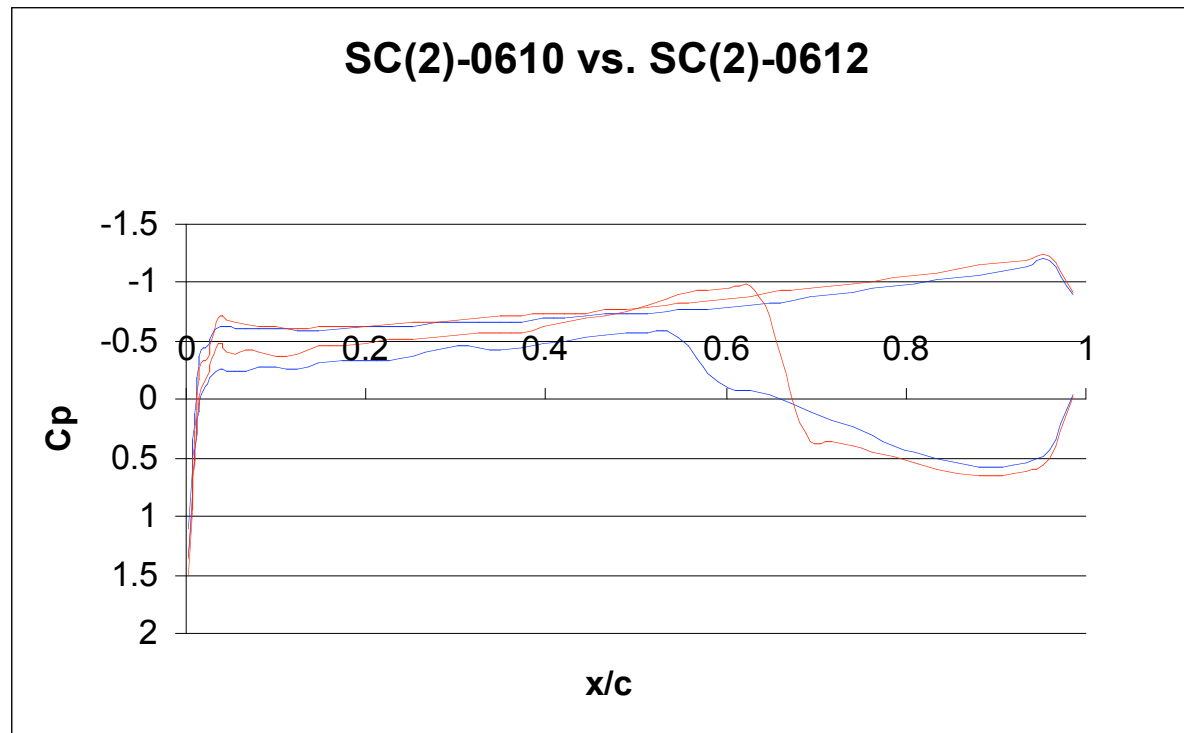
- Minimum induced drag is achieved at a cg location of 36m from the nose
- At this point, a value of E is 1.0147
- There is a high positive twist towards the root which decreases towards the tip going negative. Has a Washout!
- Has a good Cl distribution, which is more pronounced towards the tip for the wing as well as the horizontal tail

Lamdes Discussion

- Spanload is almost elliptic. Slightly more towards the tip. True for wing as well as horizontal tail.
- Camber is more towards the tip. This goes well with the negative twist at the tip

Airfoil Selection

- We analyzed the SC(2)-0610 and SC(2)-0612 airfoils as options, and ended up going with the former based on its better pressure distribution at the cruise Mach number of 0.85



SC(2)-0610 shown in blue

Friction (Cruise Conditions)

$$C_{D_0} = 0.01257$$

$$\frac{L}{D_{\max}} = \frac{1}{2} \sqrt{\frac{\pi A Re}{C_{D_0}}} = 20.59$$

$$C_{L_{cruise}} = \sqrt{C_{D_0} \pi A Re} = 0.518$$