

# A380 Presentation



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# Aircraft Specs

## Dimensions:

Length = 238 ft. 8 in.

Wing Span = 261 ft. 10 in.

Height = 79 ft.

Area = 8934 ft<sup>2</sup>

Sweep = 33.5°

AR = 7.67

## Weights:

Empty 610,700lb

TOGW 1,234,600lb



## Power Plant:

Ranges from  
68,000lb/engine to  
84,000lb/engine RR Trent  
900 or

81,500lb/engine

Engine Alliance GP-7200

## Performance:

Long range cruising speed  
M 0.85.

Range 8,000nm

Service ceiling 43,000ft

# Cdo, Parasite Drag (Friction)

Component	Swet (ft <sup>2</sup> )
Fuselage	41422
Engine x 4	3010 x 4
Wing	19250
V-Tail	3532
H-Tail	8488
TOTAL	84734

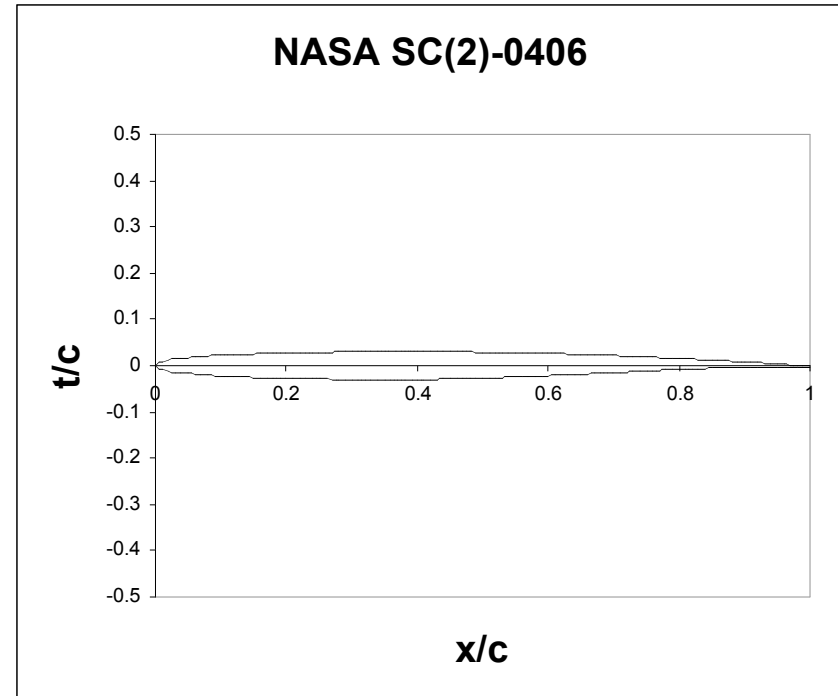
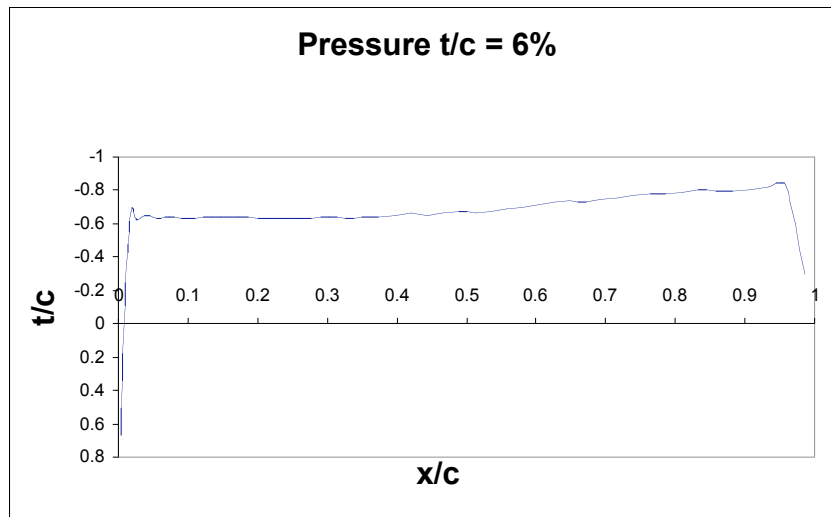
At M=.85

CDF (Friction  
Drag) = 0.00729

CDF<sub>form</sub> (form  
drag) = 0.0062

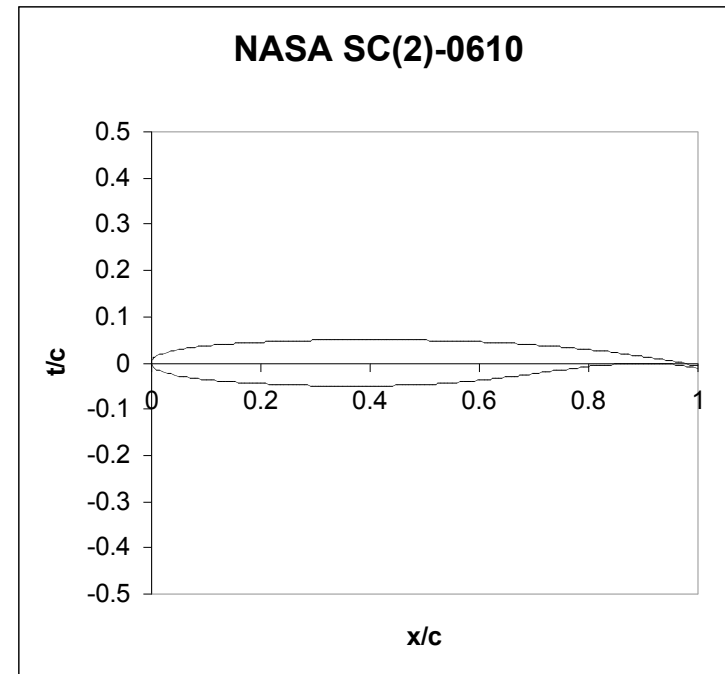
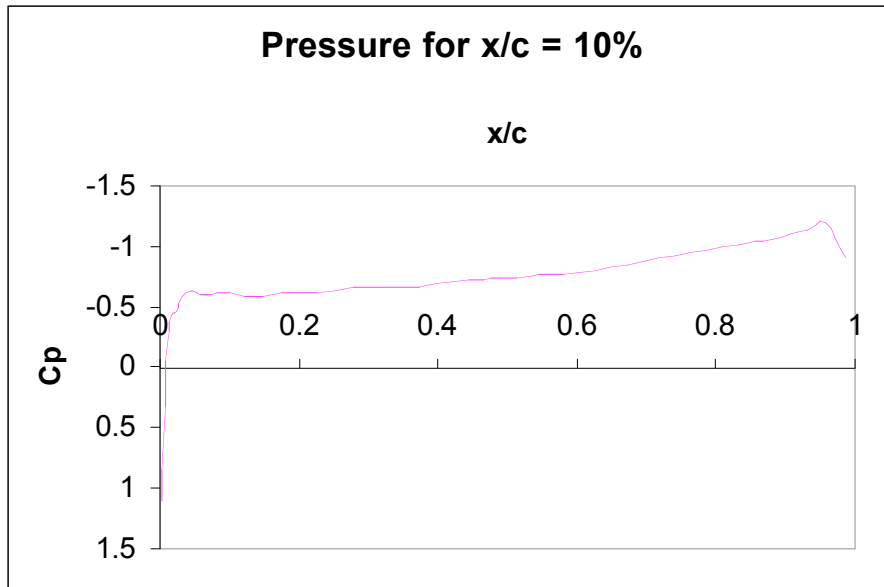
L/D<sub>max</sub> =  
 $\sqrt{\pi \cdot C_{do} \cdot AR \cdot e}$  =  
0.422

# 6% Thickness SC Airfoil



For the weight and airspeed of A380 the required  $C_l$  is 0.79. TSfoil determined that at cruise condition,  $C_l = 0.74$  and  $C_m = -0.24$

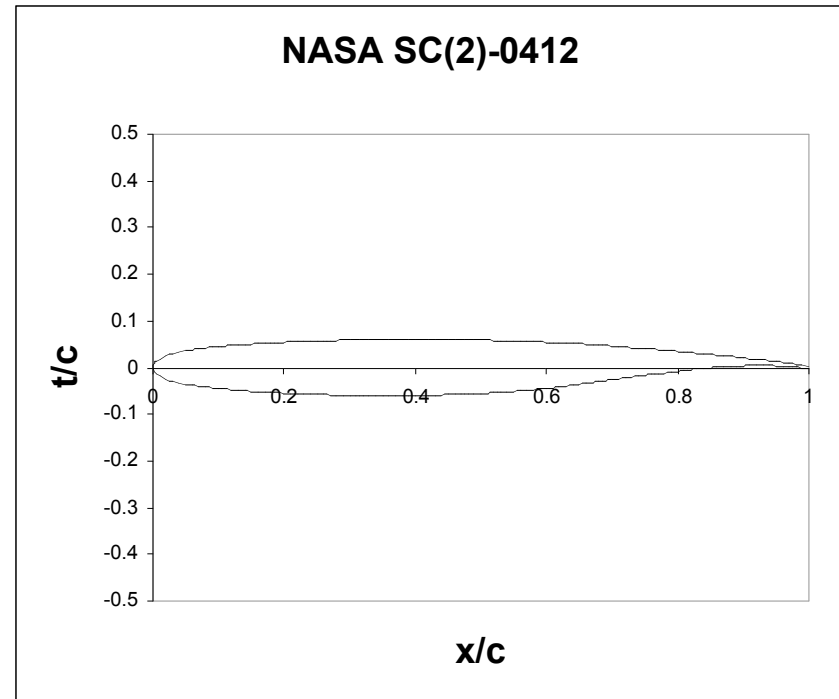
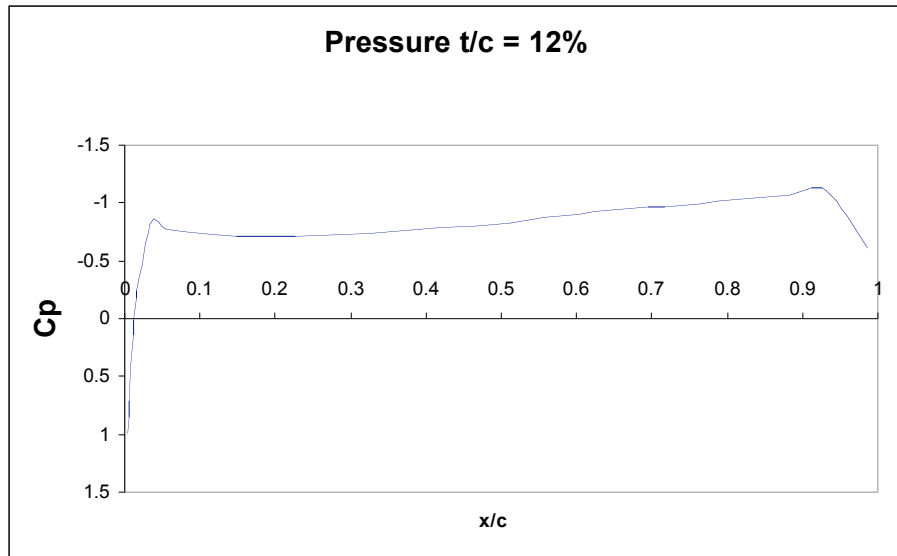
# 10% Thickness SC Airfoil



TSFoil determined that at cruise condition,  $C_l = 0.68$  and  $C_m = -0.29$ .

When  $AoA$  was increased to represent twist of 5,  $C_l = -.17$

# 12% Thickness SC Airfoil

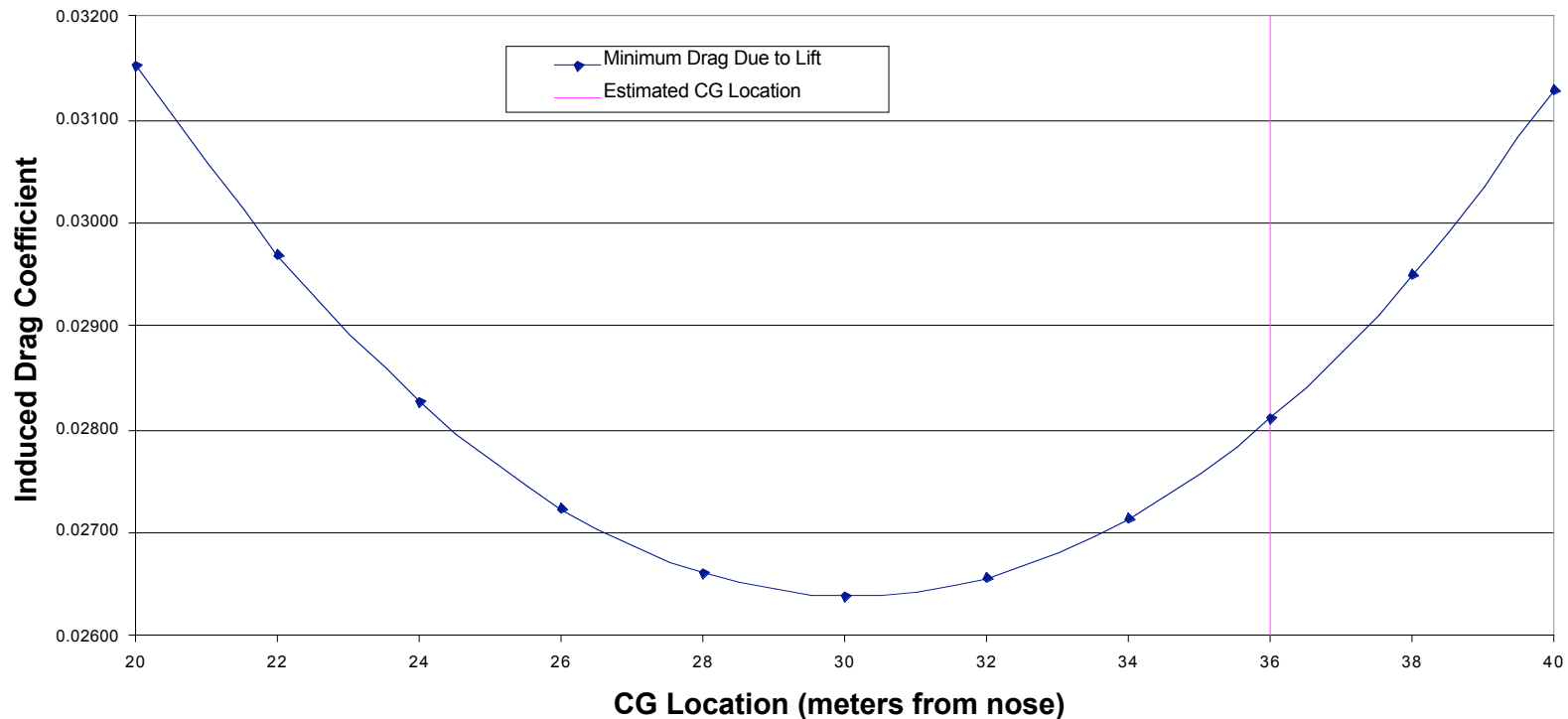


TSFoil determined that at cruise condition,  $C_l = 0.503$  and  $C_m = -0.27$ .

When  $AoA$  was increased to represent twist of 7,  $C_l = -.25$

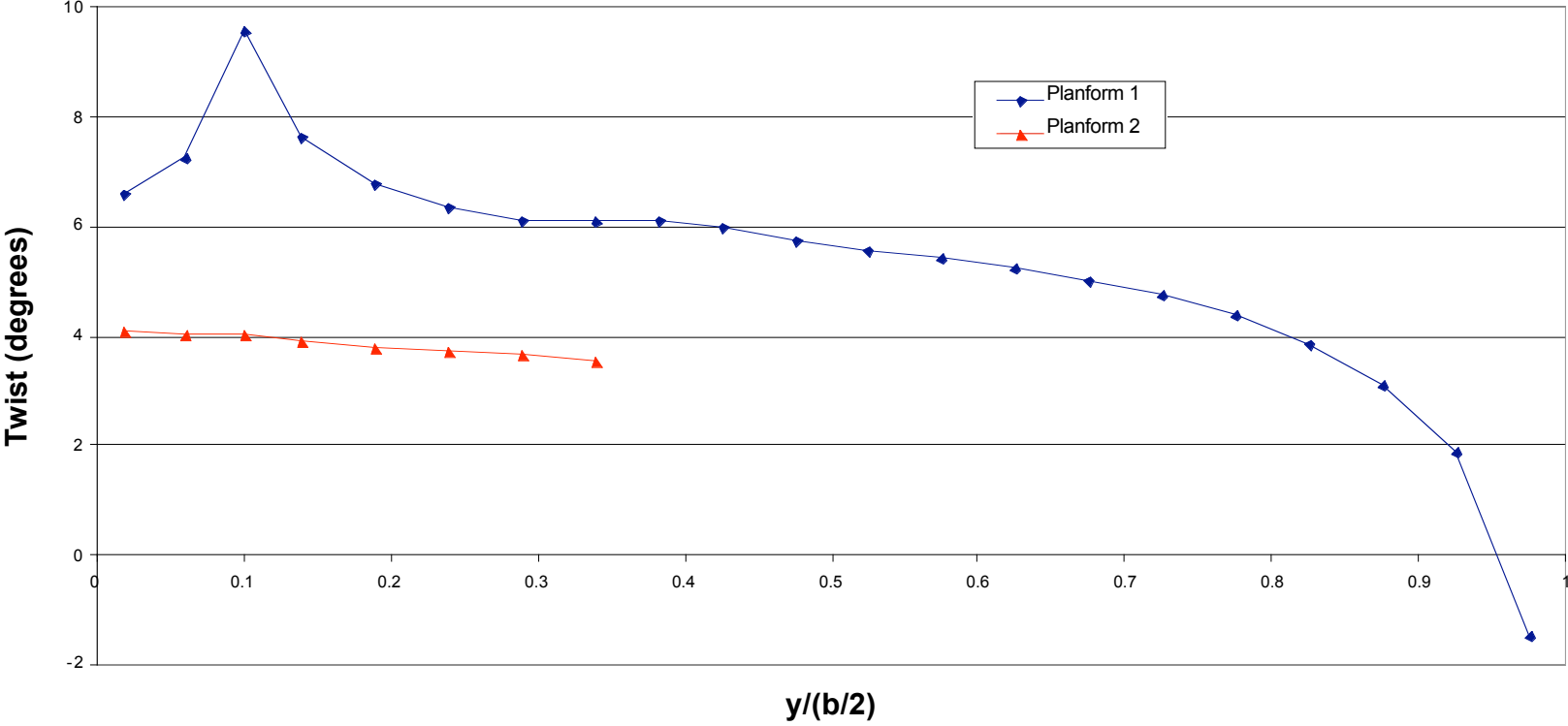
# LAMDES – min drag due to lift

Minimum Drag Due to Lift as a Function of CG Location

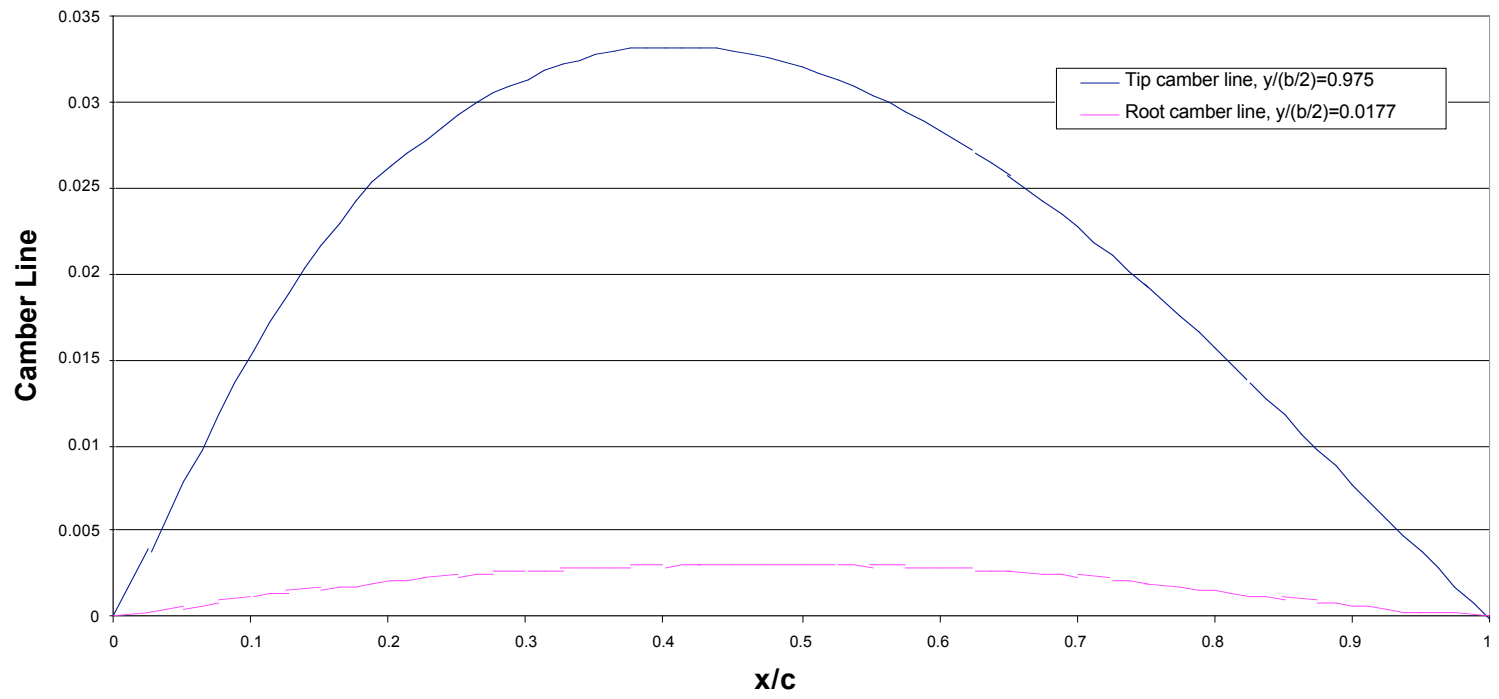


NP determined to be 36.2 m, Static Margin is 2%MAC from predicted CG from Landing gears. If CG of 30m for min drag, SM is 58%MAC. This creates larger trim drag to cause the required moments for control.

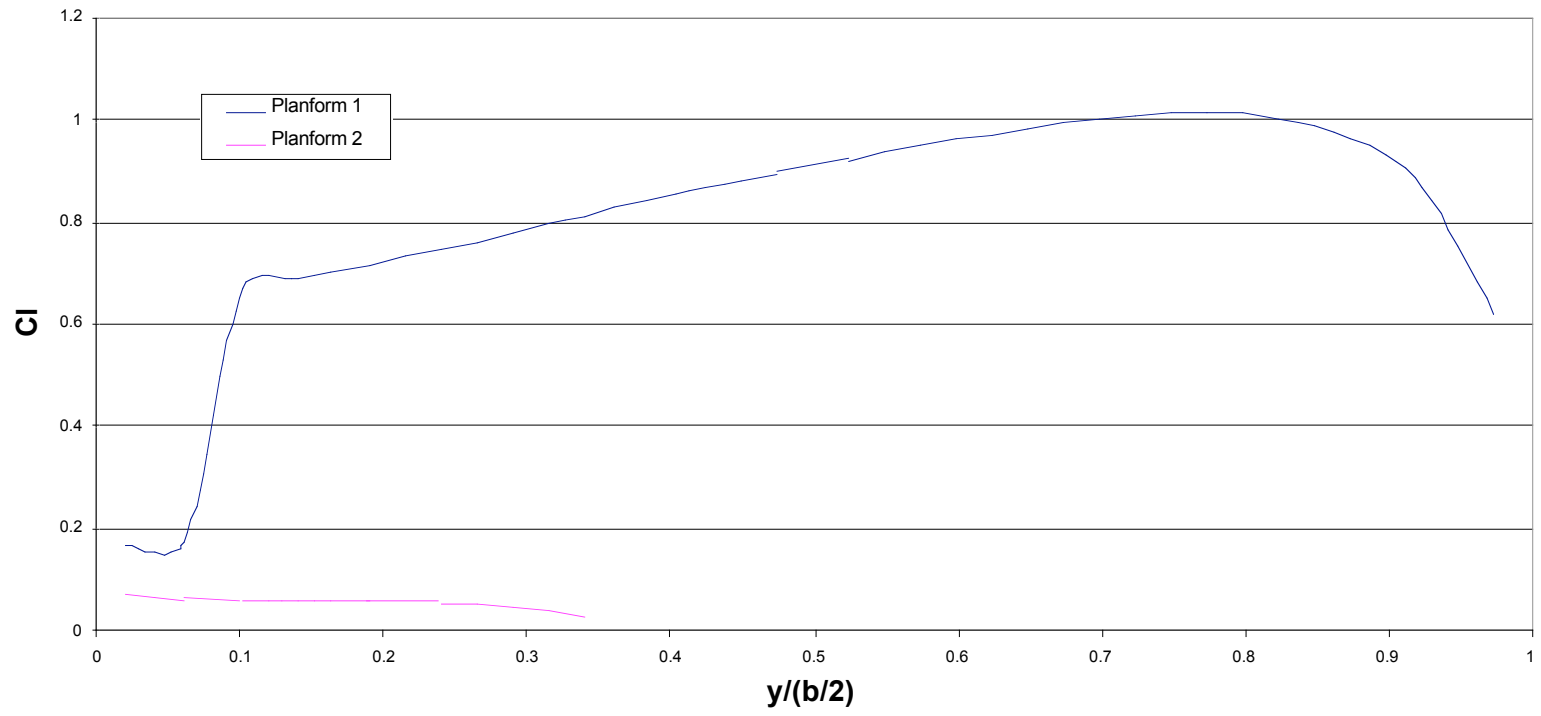
Linear Theory Twist Distribution



### Root & Tip Camber Lines



### CI Distribution



# 80 m Gate Box Requirement

AR -

$$A380 = 7.67$$

$$A340 = 9.15$$

W/b -

$$A380 = 4714.55 \text{ lb/ft}$$

$$A340 = 3865 \text{ lb/ft}$$

W/S -

$$A380 = 138 \text{ lb/ft}^2$$

$$A340 = 170 \text{ lb/ft}^2$$

Larger span loading on the A380 is the result of the 80 meter gate box. If the span were allowed to be bigger, the aspect ratio would increase thus decreasing the span load on the aircraft. This would allow for less structure in the wing, making it thinner which would decrease the drag and increase fuel economy.