ADDITIONAL INFORMATION
WING STRUCTURAL ANALYSIS IBIS Magic GS-700

The service bulletins that the company publishes are a summary about all the studies and analyzes that the company makes previously.

- The structural analyses about the wing loads for the airplane Magic GS-700 was accomplished under the normative FAR 23 – LTF-UL Part C. (Strengths Requirements) in which they take maximum takeoff weight MTOW as study reference, being this argument a conservative analysis that not despise the wing and fuel mass.

    - Taking a total gross weight of 570Kg (MTOW), the results for the *Load Factor Limits* is **n = 3,3 g.** with a *Safety Factor* of **Fs = 1,5** (LFT-UL 303).

    - Taking the real lift load of 455Kg (MTOW – W_{wing} – W_{fuel}), the results for the *Load Factor Limits* is **n = 4,0 g.** with a Safety Factor of **Fs = 1,5** (LFT-UL 303).

- The distribution loads of lift were determined for stations, through the whole wing surface (figure1), for the different Load Factor Limits.

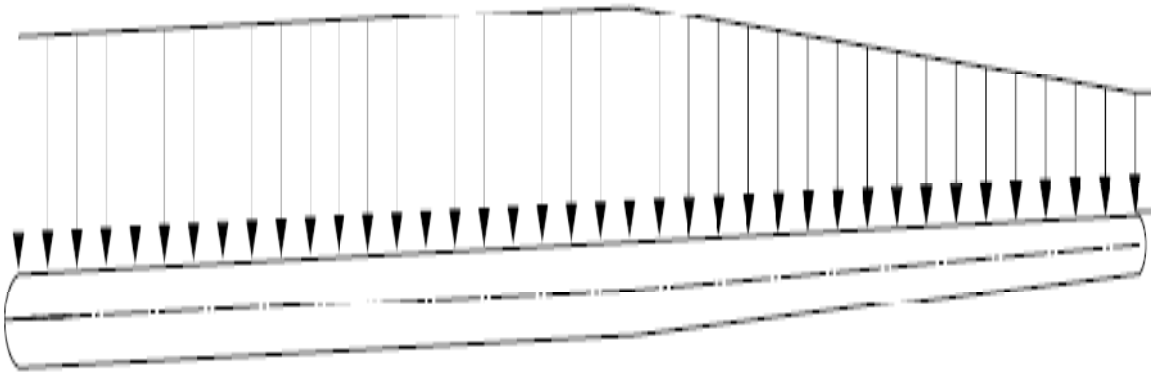

Figure1. Distribution Loads.

Example: n = -2g. (Table1).

d(ft)	Chord (ft)	W (ft)	n	Pst (lb)	Pst Acomular (lb)
1,034	4,7	1254	-2	123,157	123,157
1,034	4,7	1254	-2	123,157	246,315
1,034	4,7	1254	-2	123,157	369,473
1,034	4,7	1254	-2	123,157	492,630
1,034	4,7	1254	-2	123,157	615,788
1,034	4,7	1254	-2	123,157	738,946
1,034	4,433	1254	-2	116,161	855,107
1,034	4,185	1254	-2	109,662	964,770
1,034	3,93	1254	-2	102,980	1067,751
1,034	3,7	1254	-2	96,953	1164,705
1,034	3,4	1254	- 2	89,092	1253,797

Table1. Lift Distribution.

Beside analyze the stresses generated in the wing structure, under the negative load factor n = -2g, stability was also studied under such compressive loads to analyze that this loads doesn't cause a lateral deflection on the strut which cause instability up to fail by buckling

NEGATIVE LOAD FACTOR LIMITS. ***n = -2g***

With a negative load factor limit of n = -2g, and 1254Lb of load on each wing (figure2), stability was studied to ensure that the structure does not fail by buckling

Analyzing the wing structure on the negative load distributions, this will be subject to compression loads would cause a lateral deflection.

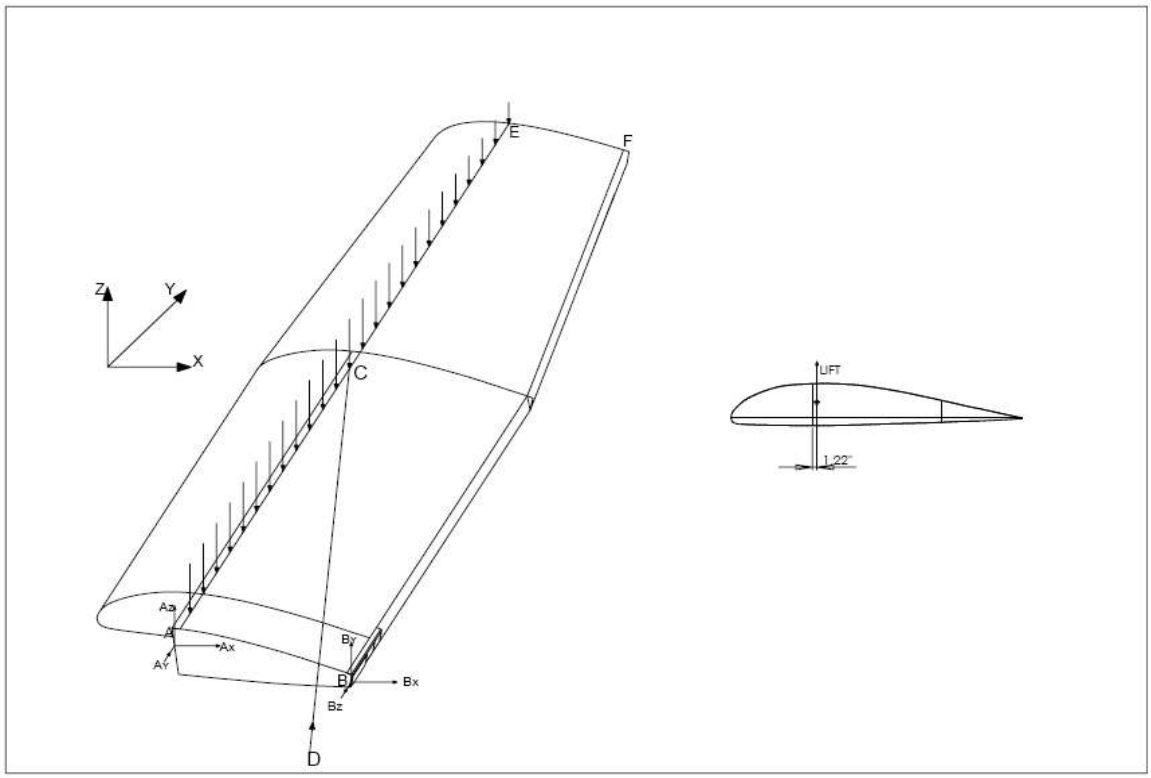

Figure2. Magic GS-700, n = -2g. Lift

RESULTS

For a lift distribution with a Load Factor Limit of n = -2g, gives a compressive load on the strut of 2360Lb (figure3).

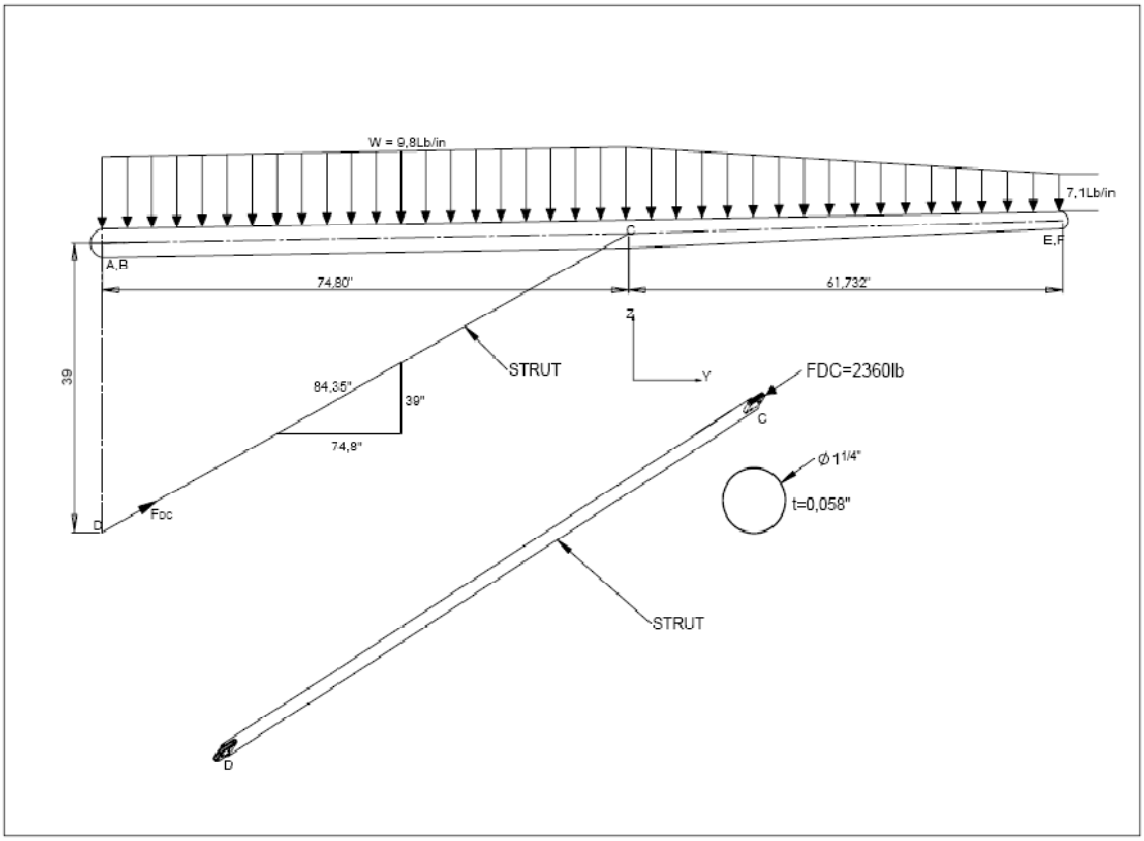

Figure3. Lift Distribution for n = -2g.

$$P_{rupture} = \sigma_y A \left[1 - \frac{\sigma_y Re^2}{4\pi^2 E}\right]$$

$$P_{rupture} = 6362Lb$$

$$FS = \frac{6362Lb}{2360Lb} = 2{,}69$$

$$\sigma_{real} = \left[\frac{P_{trabajo}}{A}\right] = 10865{,}56\ lb/in^2$$

$$\sigma_{critico} = \left[\frac{P_{critico}}{A}\right] = 29290{,}79\ lb/in^2$$

After determine the critical load $P_{rupture}$ = 6362Lb. that is the maximum load that cause the strut failure by buckling and comparing it with the real load on the strut P_{real} = 2360Lb gives a Safety Factor of FS = 2,69, which the deflection generated under this load of n = -2g not cause the structure to be unstable or fail by buckling.