

The affects of changing the gross weight and the flap on an airplane

BY LEO



Purpose of the test

- ▶ The purpose of this test was to see if changing the amount of weight and adding a certain degree of flaps would change the distance the plane need to use to get into the air



Test Plan Matrix

- ▶ For this test I did 4 trials with the 747. I did one test with 500,000 degrees and no flaps. I did another test with the same amount of flaps and 15 degrees of flaps. In another test I used 900,000 gross weight, no flaps. I did another with the same amount of gross weight and 15 degrees of flaps.

Test Methods

- ▶ I started out by turning on the engine and making sure that I had the correct amount of gross weight and the right amount of flaps that I needed to get the results that I needed. Then I added power to the engine and I let the plane take off from the runway. After the plane was off the ground I went to the data chart and looked for the data that I needed to collect. I repeated that for the other four trials and calculated the distance that it took for the plane to take off.

Data Analysis

▶ I needed to find the Average velocity. To do that I needed to use the equation $V_{ave} = \frac{V_f + V_i}{2}$ and that would give the Velocity Average

▶ Then after I found the velocity average I used the equation

$D = V_{ave}T$ To find the total distance that the plane had traveled to get of the runway

Test Results

Trials	Flaps	Weight	Cal Dis X Dis	Cal Dis X Dis	Cal Dis X Dis	Ave Dis X Ave Dis
1	up	500,000	3,895.6 3697	3,833.61 3879	3,088.04 3,588	3,605.75 3,721.33
2	up	900,000	8,428 8,467	9,379 8,428	8,226 8,179	8,678 8,358
3	15 Deg	500,000	4083 3061	3991 2859	3475 2637	3850 2852
4	15 Deg	900,000	7669 7696	8124 7672	7624 7259	7806 7542

The results that are on the data table agrees with the lift equation because by adding flaps you are adding more wing area to the plane and you are also increasing the coefficient of lift which results in more lift and also it result in the plane using less runway to take off.

Conclusion

- ▶ Overall this proves that changing the weight of the plane and adding flaps does change how much distance that the plane needs to take off. In the data when I changed the area of the wing by adding flaps, it decreased the amount of distance needed to take off.
- ▶ Next time, if I were to do this presentation again I would try to do more trials to add more data so that it could be more reliable.