

# Operational vs Structural vs Aerodynamic Goldilocks Zone for Wingspan and Winglet Strategy

## Focus Question:

How does the amount of efficiency, wing-bending stress, subsequent fuel penalty for added structure weight, and wingspan limits imposed by airport gates determine the extent to which adding winglets vs extending the wing is more effective?

## Importance:

This project has real-world relevance and educational value. It will give an audience with a more basic knowledge on aircraft design (i.e. interested high school students, younger college students) a more accessible, understandable interpretation of the tradeoffs aerospace engineers make through a high school level model, overseen by a Boeing engineer.

## Past Research and Originality:

There has been a large amount of past research on this topic, since the issue is very influential on the efficiency and thus attractiveness of an airplane type. My research is unique in that it incorporates a programmed tool, making the research more user-friendly and digestible.

## Data Collection:

All data will be quantitative.

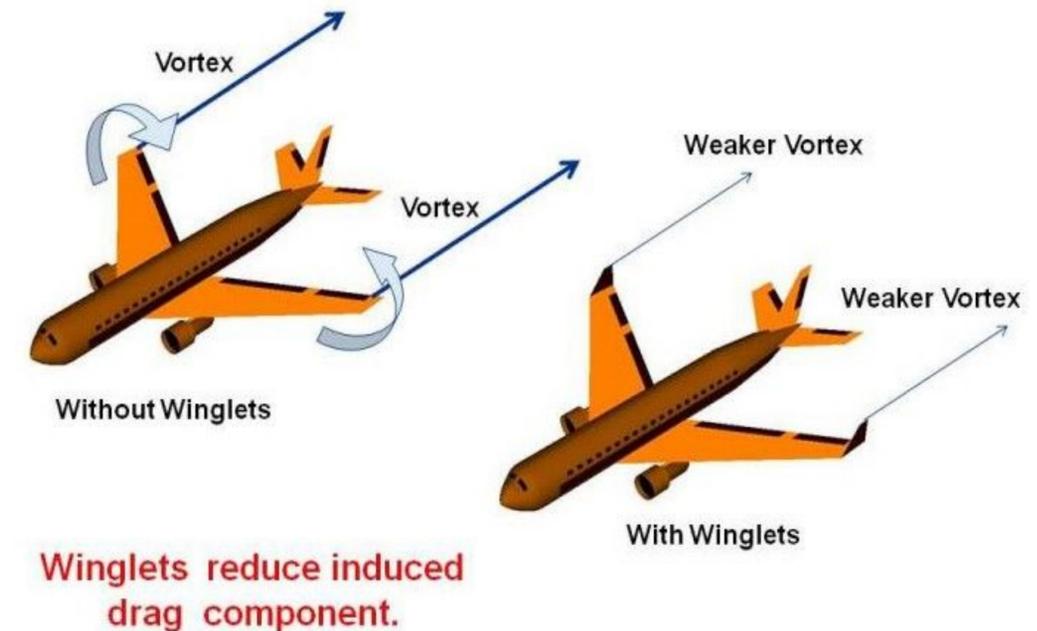


Table 1-1. Aerodrome reference code  
(see 1.3.2 to 1.3.4)

Code element 1		Code element 2		
Code number (1)	Aeroplane reference field length (2)	Code letter (3)	Wing span (4)	Outer main gear wheel span <sup>a</sup> (5)
1	Less than 800 m	A	Up to but not including 15 m	Up to but not including 4.5 m
2	800 m up to but not including 1 200 m	B	15 m up to but not including 24 m	4.5 m up to but not including 6 m
3	1 200 m up to but not including 1 800 m	C	24 m up to but not including 36 m	6 m up to but not including 9 m
4	1 800 m and over	D	36 m up to but not including 52 m	9 m up to but not including 14 m
		E	52 m up to but not including 65 m	9 m up to but not including 14 m
		F	65 m up to but not including 80 m	14 m up to but not including 16 m

a. Distance between the outside edges of the main gear wheels.