

High Lift Devices

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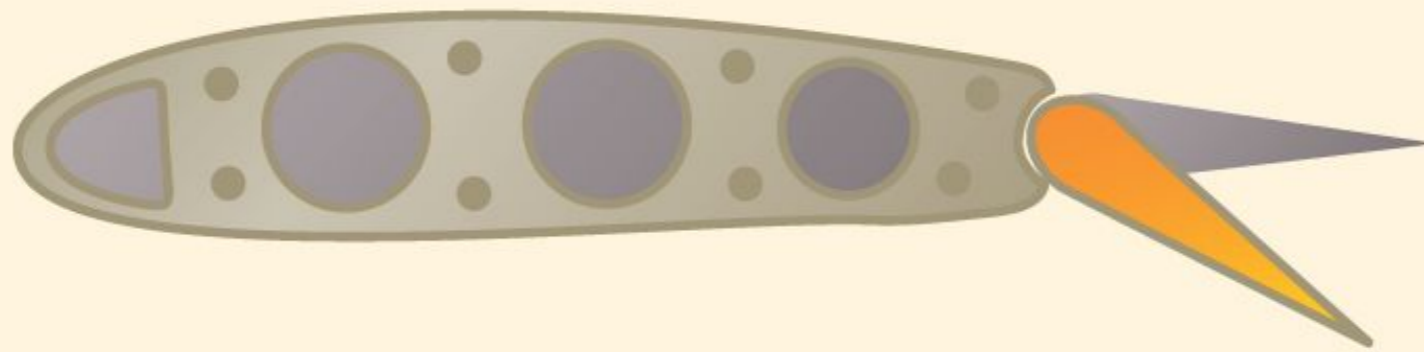
PURPOSE OF HIGH LIFT DEVICES

To reduce the take-off and landing distances.

FLAPS

- A hinged portion of the trailing or leading edge which can be deflected downwards and so produce an increase in camber and, sometimes, an area of the wing.

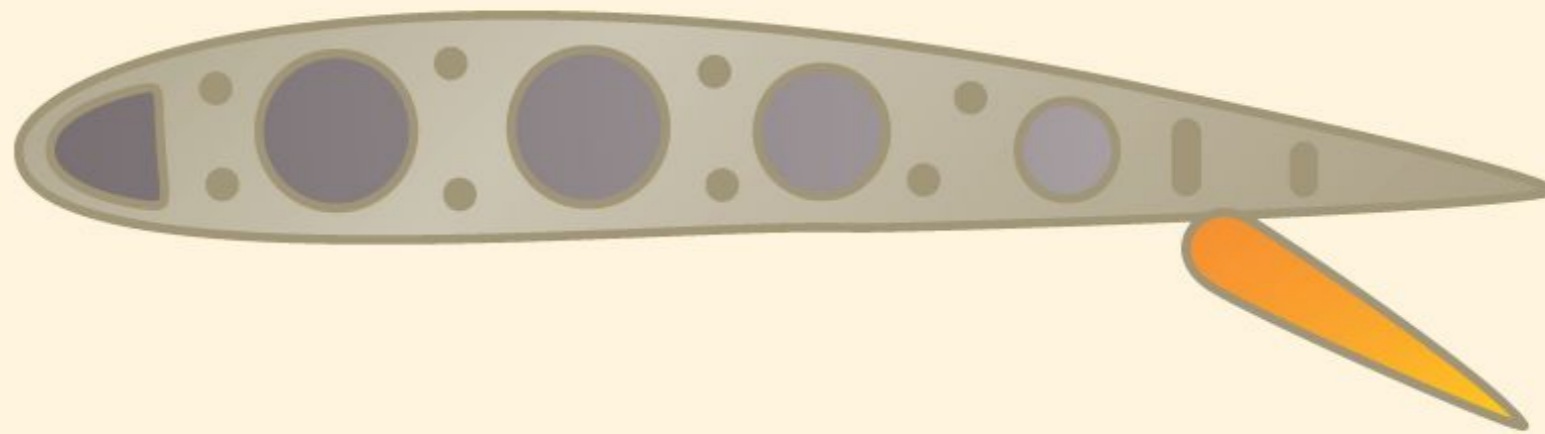
Plain flap



PLAIN FLAP

Simple construction, good increase of lift, but high drag.
Mainly used on low speed aircraft.

Split flap



SPLIT FLAP

It is a part of the lower surface of the wing trailing edge, the upper surface contour being unaffected when the flap is lowered.

SPLIT FLAP

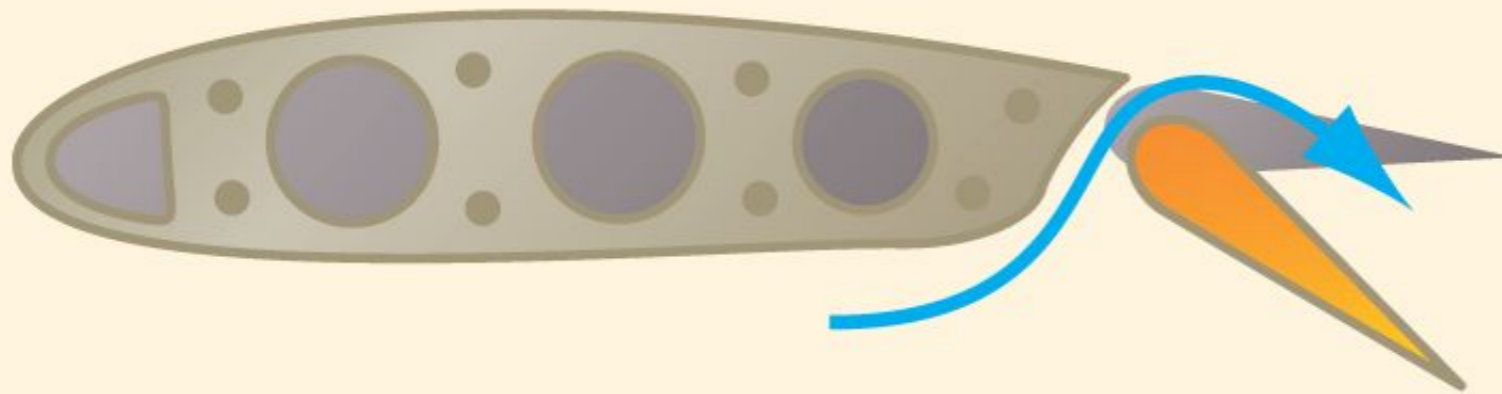
LIFT.

The split flap gives about the same increase in lift as the plain flap at low angles of attack but gives slightly more at higher angles as per upper surface camber is not increased, and so separation is delayed.

DRAG.

The drag, however is higher than for the plain flap due to increased depth of the wake.

Slotted flap



SLOTTED FLAP

When the slotted flap is lowered, a slot or gap is opened between the flap and the wing.

SLOTTED FLAP

- **PURPOSE**

to direct higher pressure air from the lower surface over the flap and re-energise the boundary layer. This delays the separation of the airflow on the upper surface of the flap.

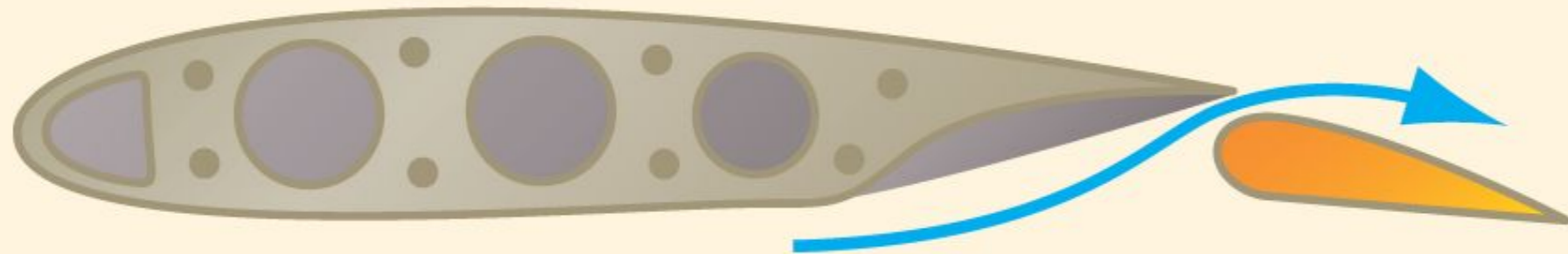
- **LIFT**

gives a bigger increase in lift than the plain or split flat

- **DRAG**

much less drag

Fowler flap



FOWLER FLAP

Moves rearwards and then down, initially giving and increase in wing area and then an increase in camber.

FOWLER FLAP

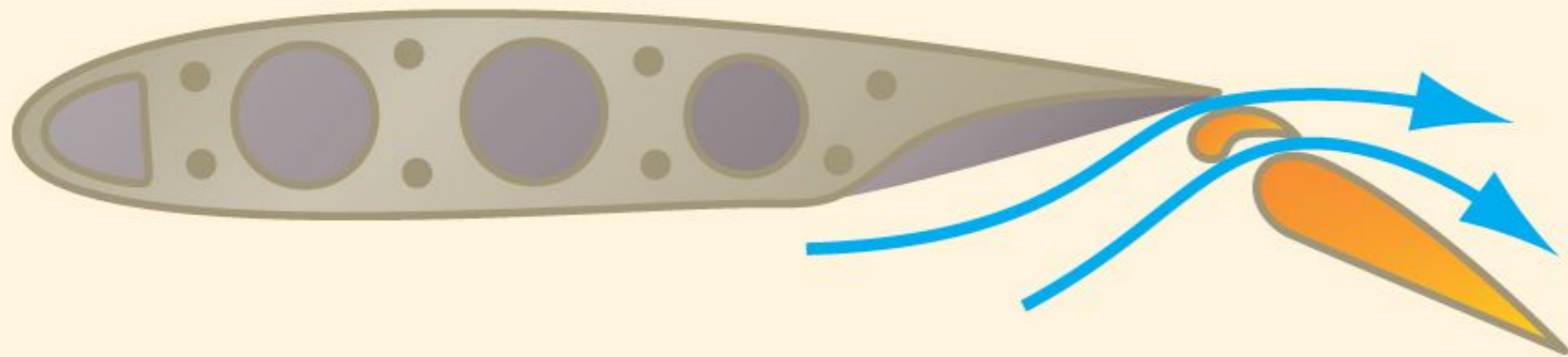
- **LIFT**

Because of the combined effects of an increased area and camber, the Fowler Flap gives the greatest increase in lift of the flaps considered.

- **DRAG**

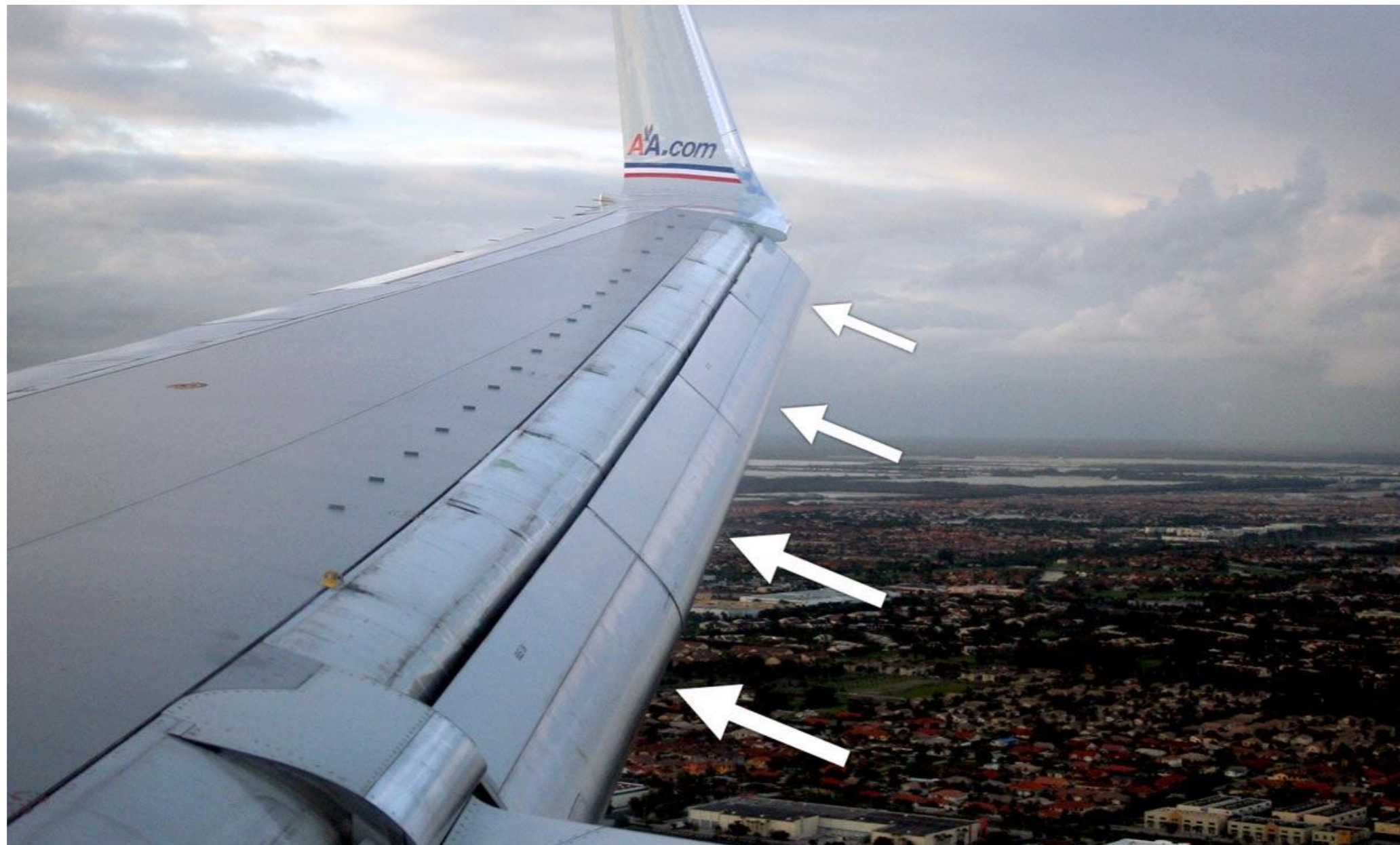
The least drag.

Slotted Fowler flap



SLOTTED FOWLER FLAP

THE KING OF THE FLAPS



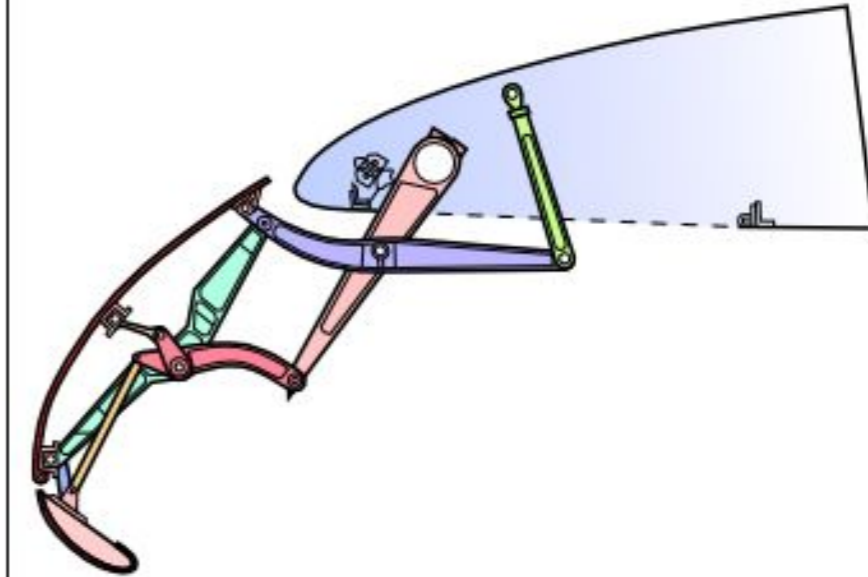
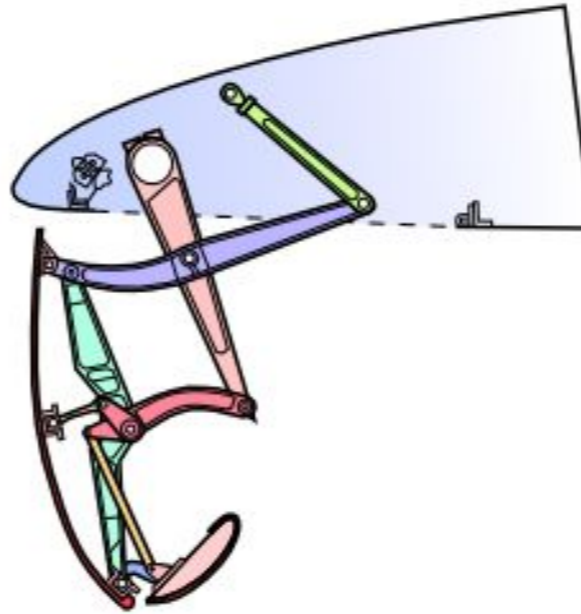
LEADING EDGE HIGH LIFT DEVICES

There are two forms of leading edge high lift device commonly in use: the leading edge flap and the leading edge slot or slat.



KRUEGER FLAP

The Krueger flap is part of the lower surface of the leading edge, which can be rotated about its forward edge.



VARIABLE CAMBER LEADING EDGE FLAPS

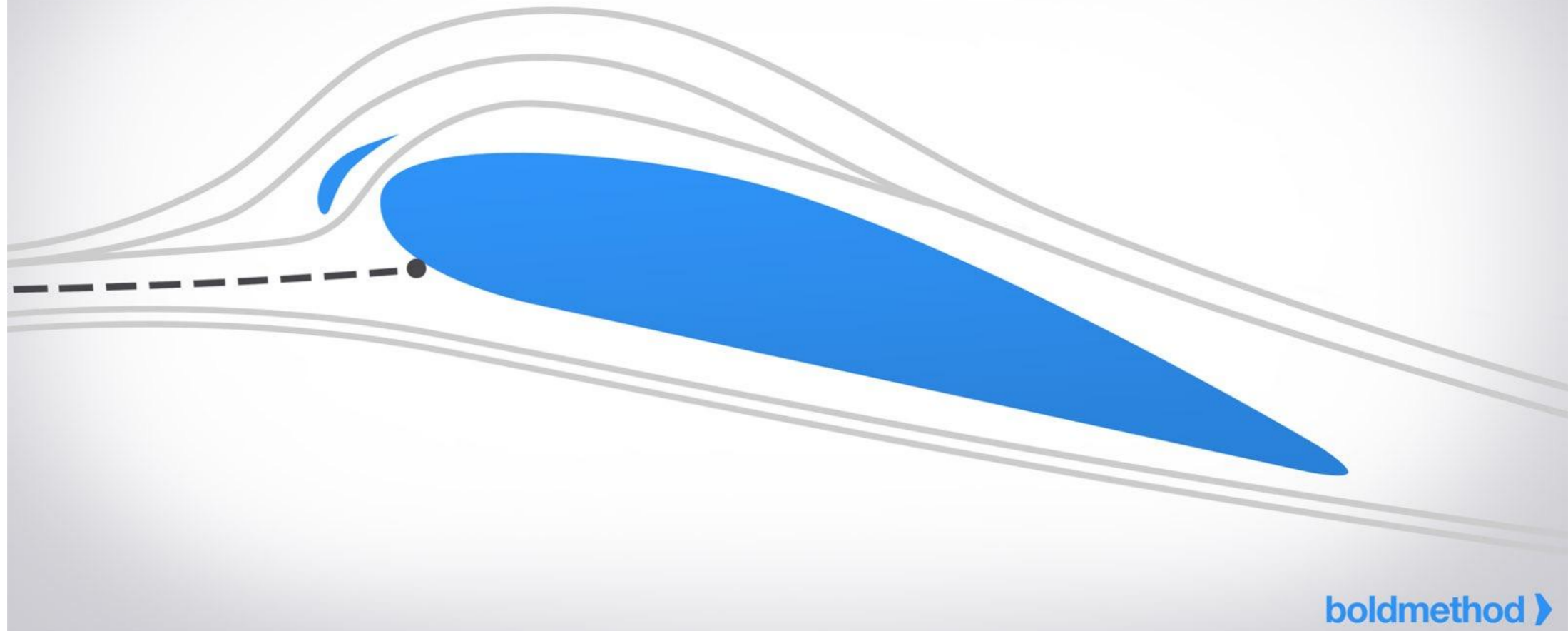
To improve efficiency by giving a better leading edge profile, the camber of a leading edge flap may be increased as it is deployed.



LEADING EDGE SLOT

A leading edge slot is a gap from the lower surface to the upper surface of the leading edge, and it may be fixed, or created by moving part of the leading edge (the slat).

Slat Open



LEADING EDGE SLAT

A slat is a small auxiliary aerofoil attached to the leading edge of the wing. When deployed, the slat forms a slot which allows passage of the air from the high pressure region below the wing to the low pressure region above it.

AUTOMATIC SLOTS

On some aircraft the slots are not controlled by a pilot, but operate automatically. Their movement is caused by the changes of pressure which occur around the leading edge as the angle of attack increases.

SEQUENCE OF OPERATION

The leading edge device must be deployed prior to the trailing edge flap is lowered.

When the flaps are retracted, the trailing edge flap must be retracted before the leading edge device is raised.



ASYMMETRY OF HIGH LIFT DEVICES

ROLL! YAW!



FLAP LOAD RELIEF SYSTEM

FLAPS OPERATION

KNOWLEDGE MAKES CONFIDENCE

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