



What is the most advanced **mechanical system** ?

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JUSTIFICATION



Advanced Mechanical System : **Airplane**

▶ **The airplane** is the most advanced among transport machine systems



System : Airplane

▶ An airplane is a machine that is **able to fly** by gaining support from the air.



Sub System : Wing

▶ A wing is a type of fin that **produces lift**, While moving through the air.



Key Element : Flap

▶ Flaps are a type of **high-lift device** the lift of an aircraft wing at a given airspeed.

OUTLINE OF CONTENT

- **Technical Content : Sub-System**
- **Technical Content : Key-Element**
- **Conclusions**
- **Road Ahead**
- **References**

TECHNICAL CONTENT

[Sub – System] Airplane's Wing



- ▶ Airplanes are a means of transport for **stable flight**. In order to fly like this stable, **wing is indispensable** among the sub-systems of the airplane.
We decide to the wings as a sub-system.
Because wing makes the plane fly.

[Key – Element] Flap of wing

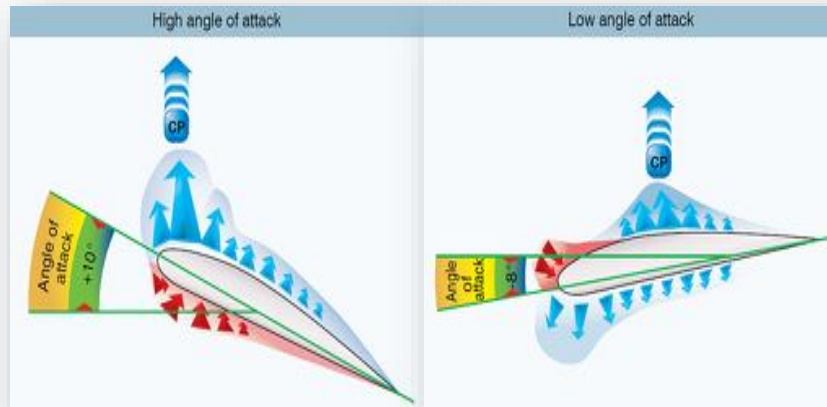


- ▶ The airplane must fly **safely and stably**. It is not just simply fly. A flap is needed to give stability to the flight.
We decide on the flap as a key-element.
Because the flap gives stability to the plane.

TECHNICAL CONTENT

✓ Why is this a key element?

Using **flaps** gives airplane **three distinct advantages**



[Landing&Takeoff]

[Descent]

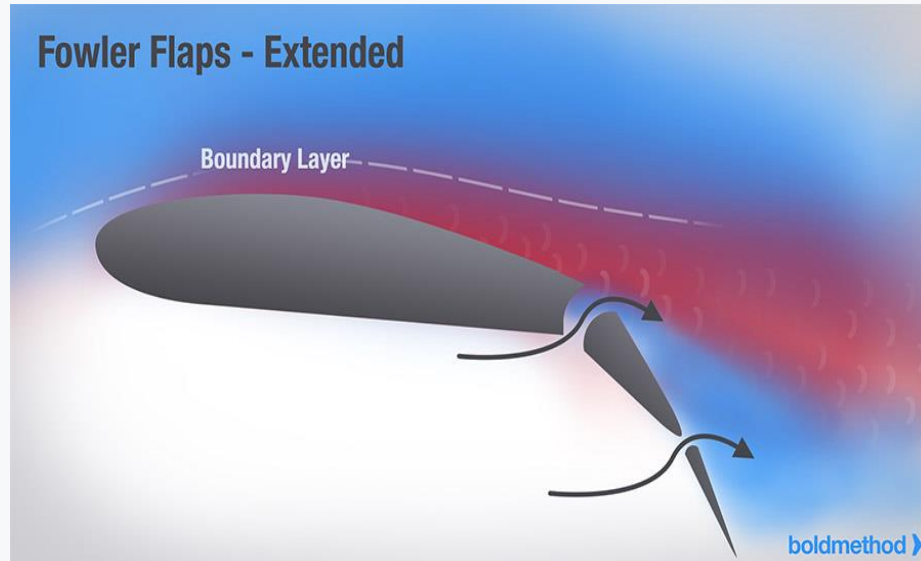
- ▶ Flaps can **produce more lift**, giving airplane lower takeoff and landing speeds
- ▶ Flaps can **produce more drag**, allowing a steeper descent angle without increasing your airspeed on landing
- ▶ Flaps can **reduce the length** of your takeoff and **landing roll**

→ **Flap provides stability and safety.**

TECHNICAL CONTENT

✓ How to improve flap's stability?

Using **Fowler flaps** gives airplane **stability and safety**



- ▶ When the Fowler Flap is extended, a small wing comes out of the back wing, and **increases the maximum lift coefficient** by increasing the wing area and camber.
- ▶ It performed very well **in controlling the speed and lift** of the plane.
- ▶ The **effect of lift generation is very large** compared to drag generation.
- ▶ Fowler flaps are **the most efficient and have few disadvantage** in aerodynamic effects.

TECHNICAL CONTENT

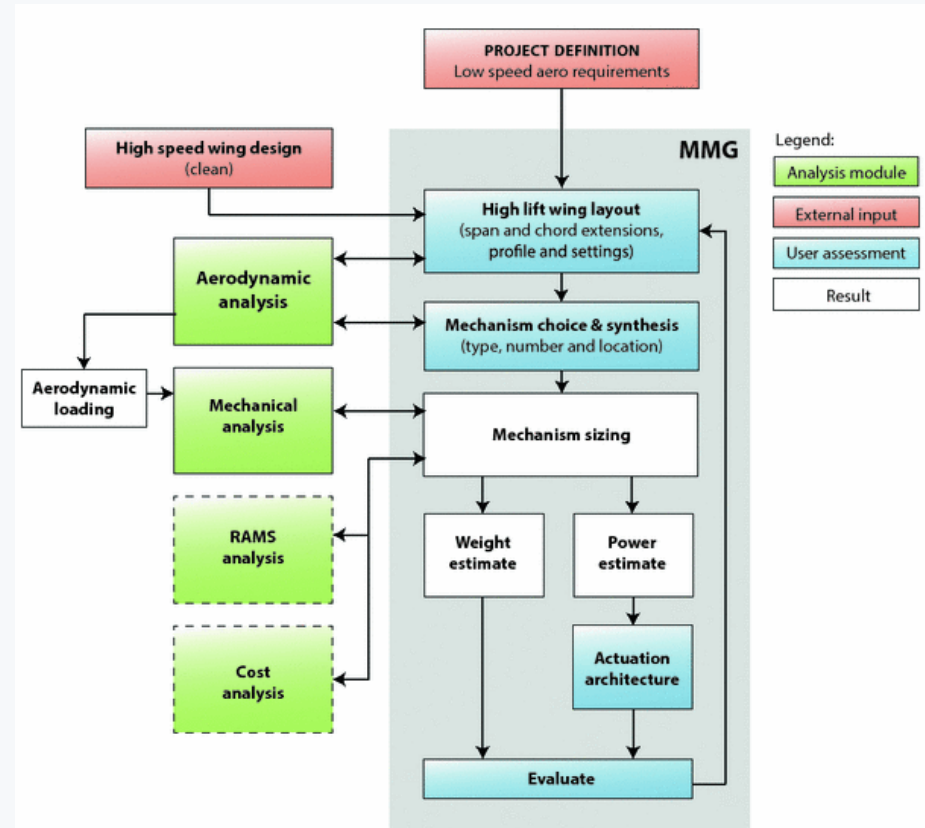
✓ How to design fowler flap?

01 Things to know to design

▶ To design a fowler flap, we must have knowledge of **geometry, fluid mechanics, and kinematics**. Based on this, **RAMS analysis** is performed.

02 Design Considerations

▶ The design considerations of the Fowler flap are **various**, such as the area of the wing, the AOA, the mounting position, the lift coefficient, stiffness, aeroelasticity, inertia, and the type of actuator.



CONCLUSIONS

We are able to **look inside** the advanced mechanical system.



Core component parts perform their respective functions, and core technologies perform well.
So the plane is an advanced system.



By Identifying the sub-components, we can notice these sub-components are the high technology entities.
We need to know this.

Without key element parts, **There is no** advanced mechanical system.

THE ROAD AHEAD



We realized that our **major knowledge** is important, and **insights to look into things** is important.

We will be **insightful engineers** through this Group Assignment.

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