

॥ नमस्ते ॥

Prepared By
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Design

Construction of Wings

Parts of the Aircraft Wings

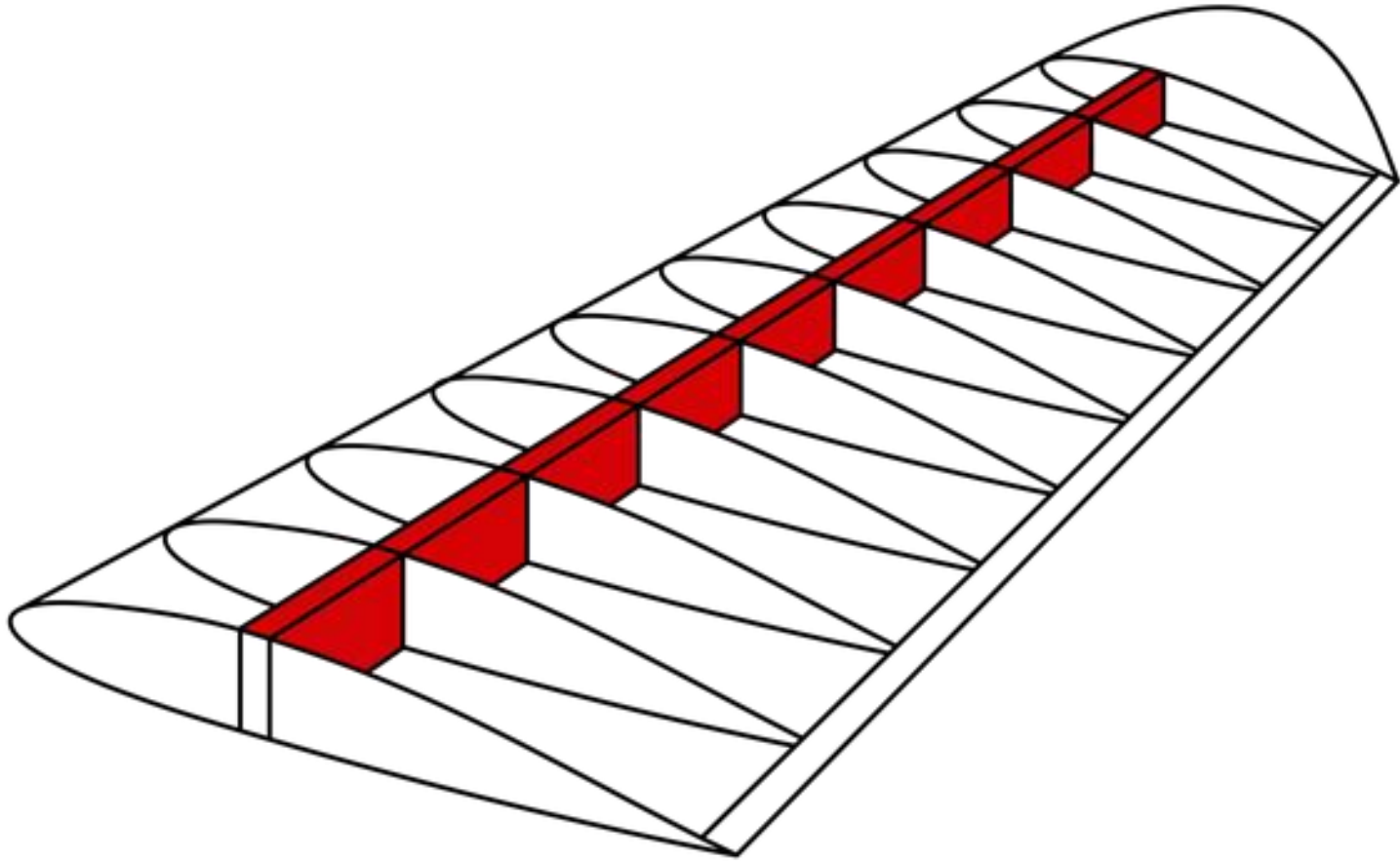
1. Spars
2. Ribs
3. Stinger
4. Skin

1.Wing Spars

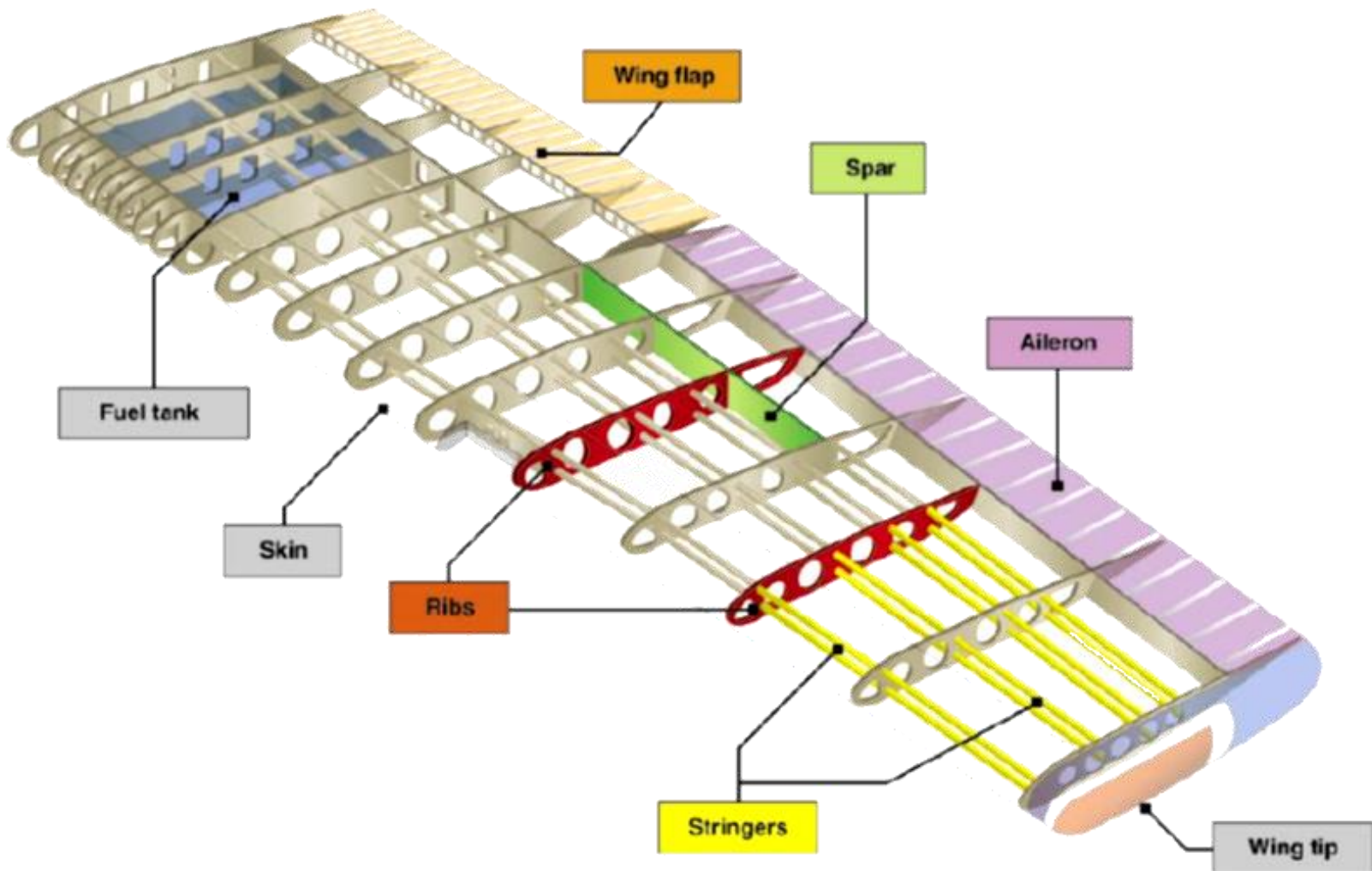
- **Spars are the principal structural members of the wing.**
- **They correspond to the longerons of the fuselage.**
- **They run parallel to the lateral axis of the aircraft, from the fuselage toward the tip of the wing, and are usually attached to the fuselage by wing fittings, plain beams, or a truss.**
- **Spars may be made of metal, wood, or Composite Material**

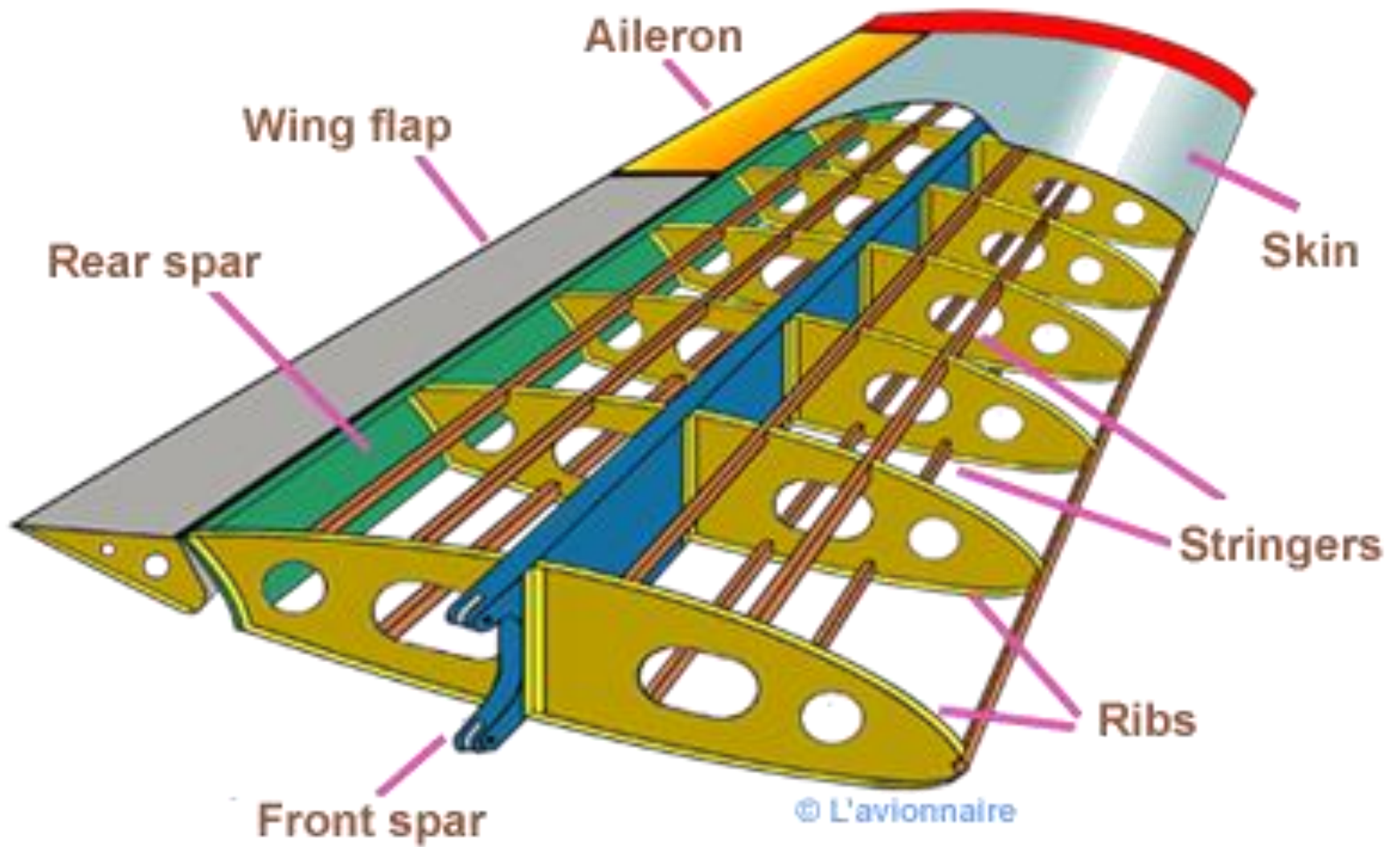
- **Most wing spars are basically rectangular in shape with the long dimension of the cross-section oriented up and down in the wing.**
- **In an I-beam spar, the top and bottom of the I-beam are called the caps and the vertical section is called the web.**
- **these members carry the loads caused by wing bending, with the caps providing a foundation for attaching the skin.**
- **As a rule, a wing has two spars.**

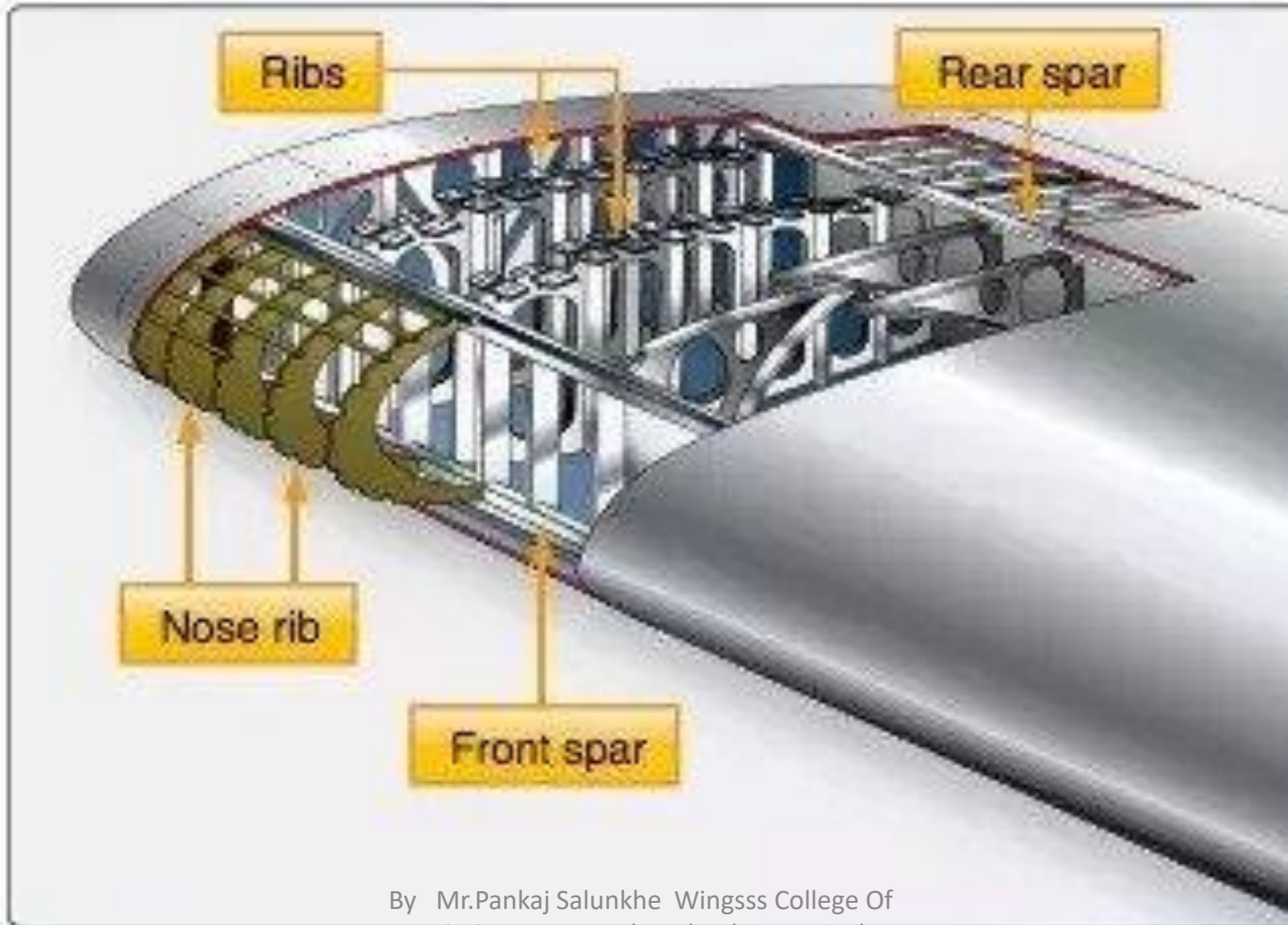
- **As a rule, a wing has two spars**
- **One spar is usually located near the front of the wing, and the other about two thirds of the distance toward the wing's trailing edge.**
- **False spars are commonly used in wing design.**
- **They are longitudinal members like spars but do not extend the entire span-wise length of the wing.**
- **Often, they are used as hinge attach points for control surfaces, such as an aileron spar.**



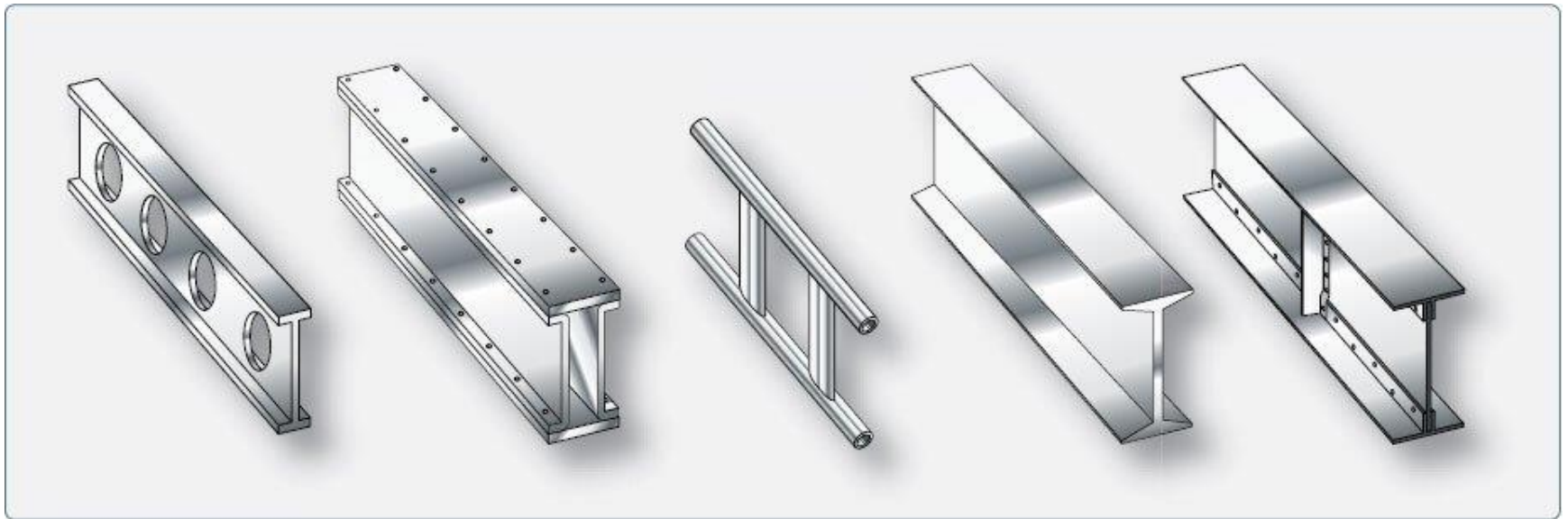
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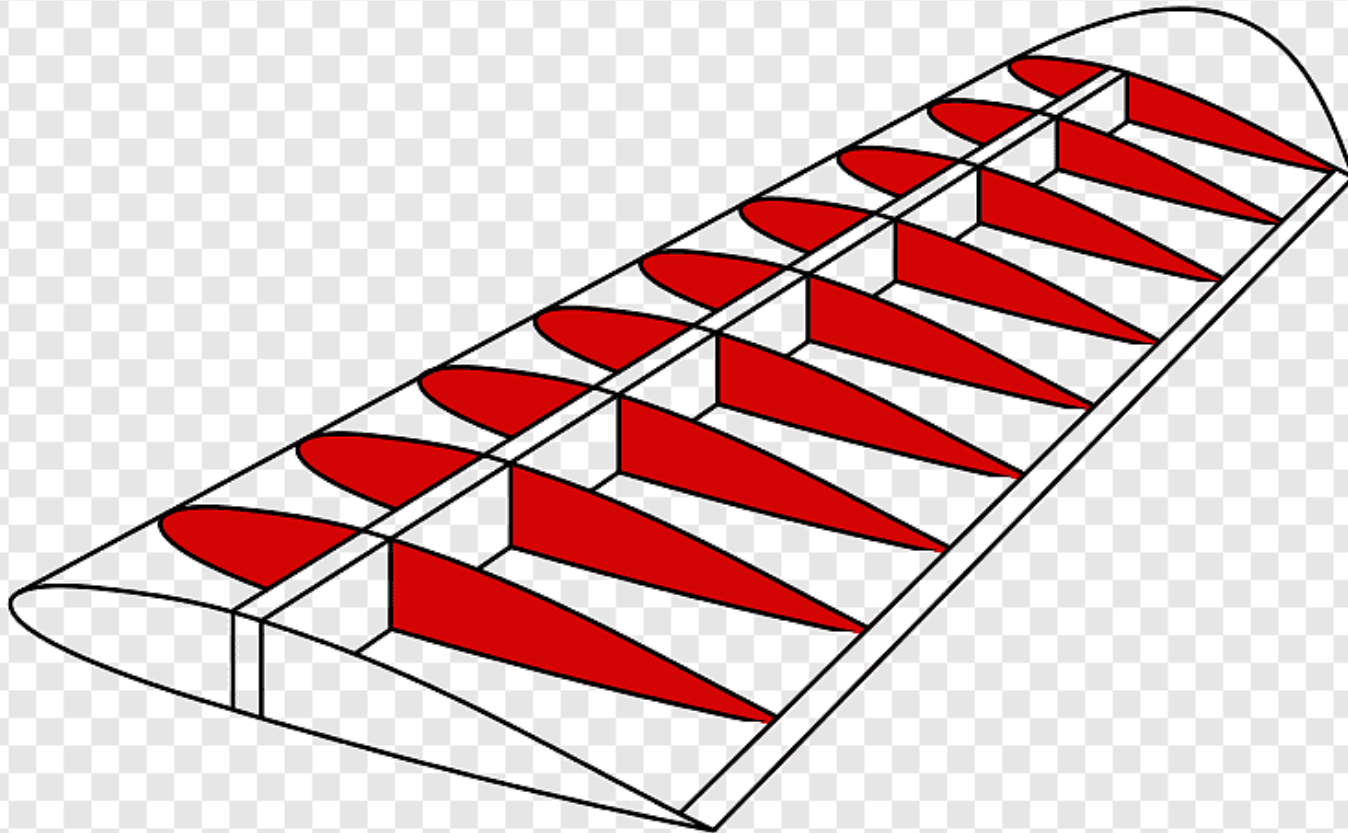


Cross section of the spars



2.Wing Ribs

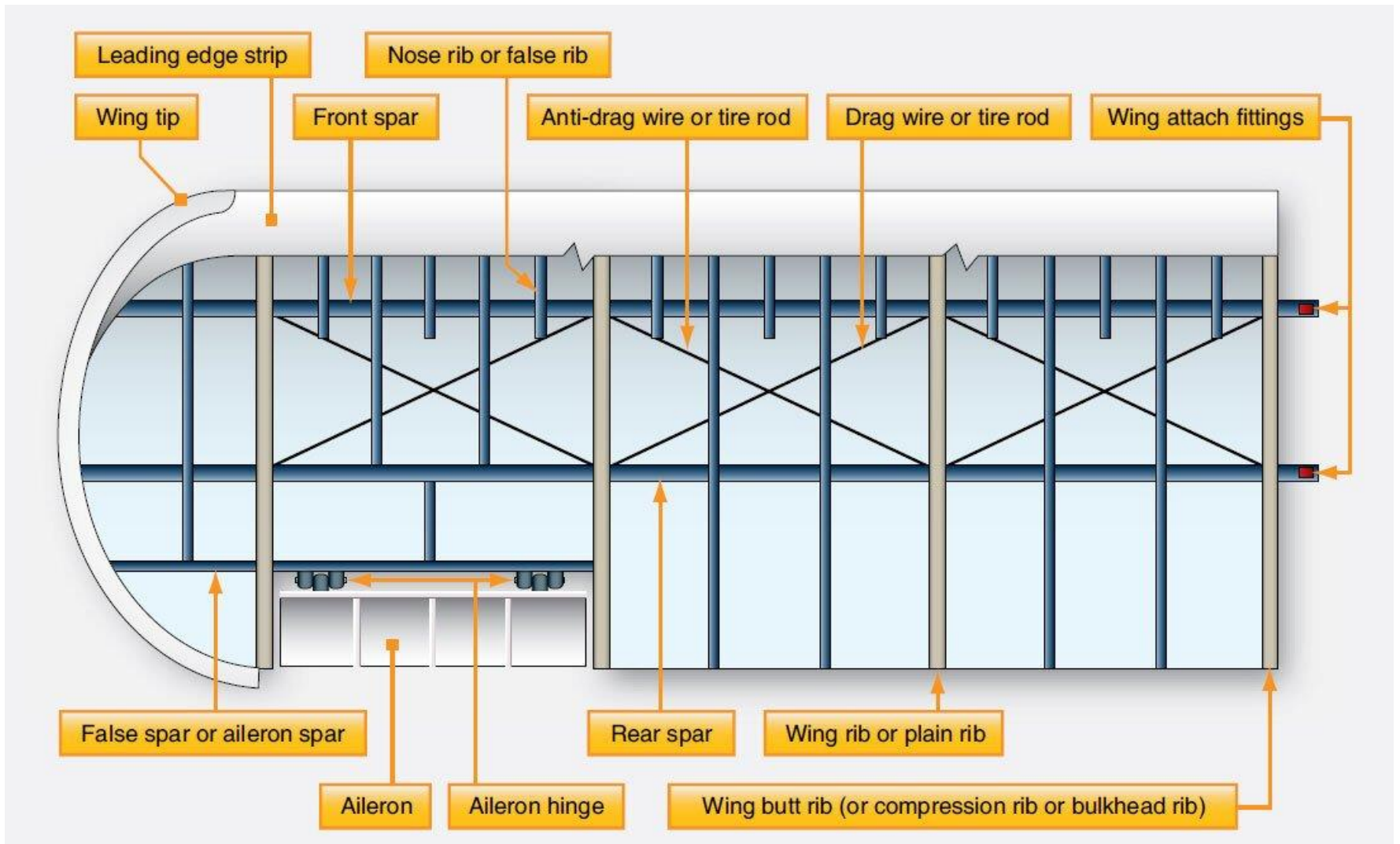
- **Wing ribs are the structural crosspieces that combine with spars and stringers to make up the framework of the wing.**
- **They usually extend from the wing leading edge to the rear spar or to the trailing edge of the wing.**
- **The ribs give the wing its cambered shape and transmit the load from the skin and stringers to the spars.**
- **Similar ribs are also used in ailerons, elevators, rudders, and stabilizers**



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Types of the Ribs

- **A wing rib** may also be referred to as a plain rib or a main rib. Wing ribs with specialized locations or functions are given names that reflect their uniqueness.
- For example, ribs that are located entirely forward of the front spar that are used to shape and strengthen the wing leading edge are called **nose ribs or false ribs**.
- **False ribs** are ribs that do not span the entire wing chord, which is the distance from the leading edge to the trailing edge of the wing.

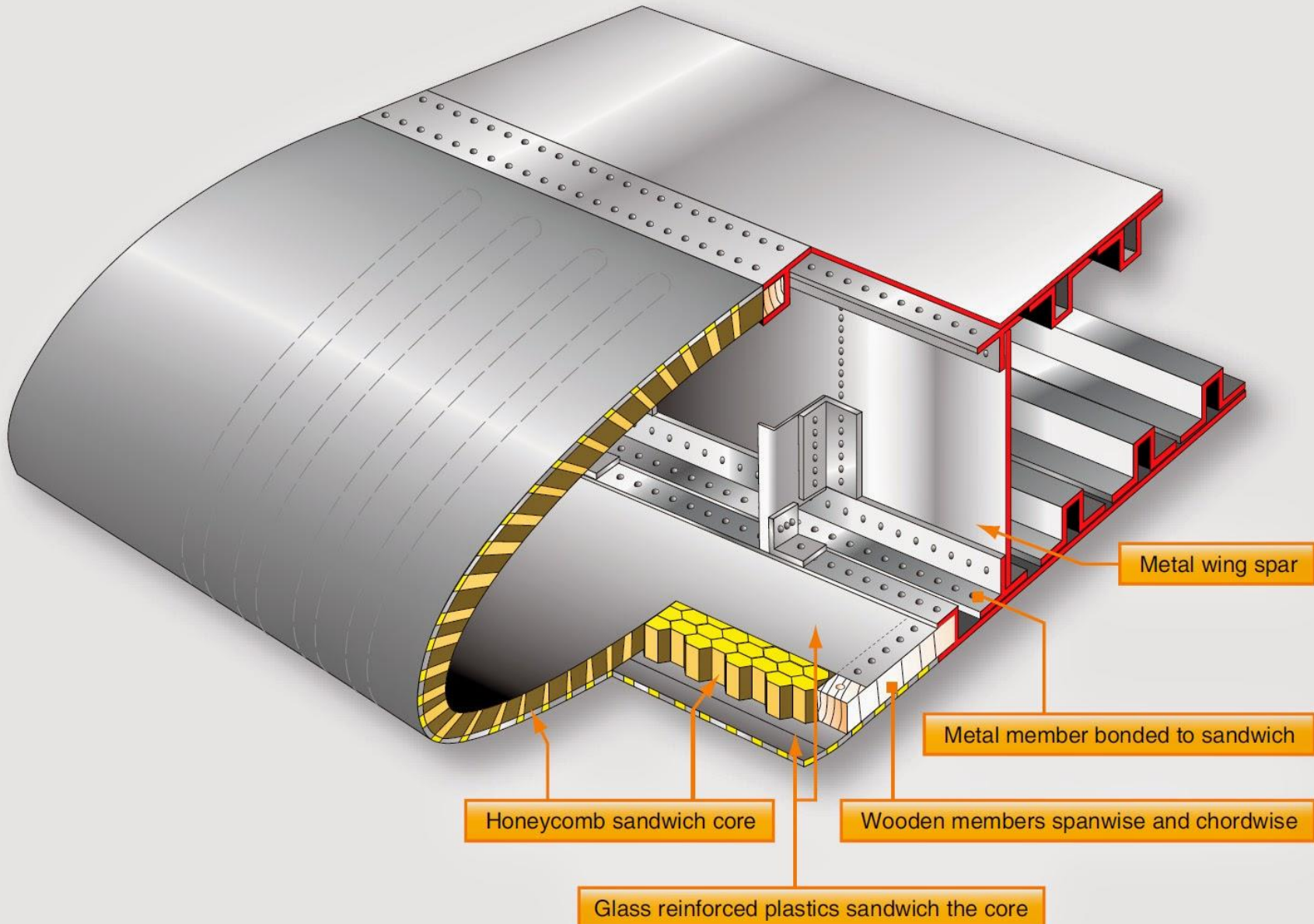


- **Wing butt** ribs may be found at the inboard edge of the wing where the wing attaches to the fuselage.
- Depending on its location and method of attachment, a butt rib may also be called a **bulkhead rib** or a **compression rib** if it is designed to receive compression loads that tend to force the wing spars together.

3.WING SKIN

- The skin on many wings is designed to carry part of the flight and ground loads in combination with the spars and ribs.
- This is known as a stressed-skin design.
- The wing skin on an aircraft may be made from a wide variety of materials such as **fabric, wood, or aluminum.**
- Most transport and high performance aircraft use aluminum and composites to skin the wings.

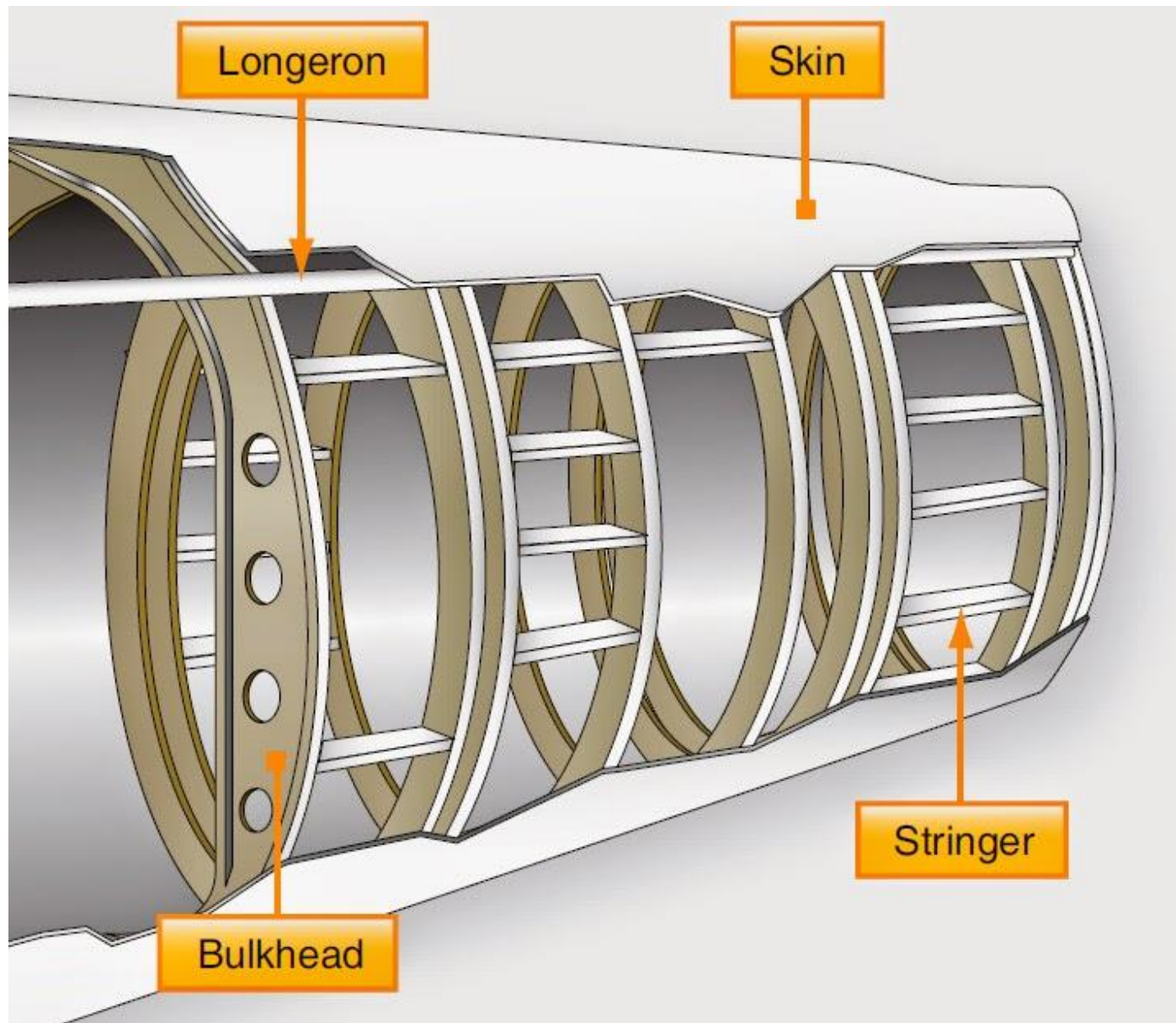
- **The wing skin is stronger and carries more of the loads where it is milled thicker, usually near the wing root.**
- **On aircraft with stressed-skin wing design, honeycomb structured wing panels are often used as skin.**
- **A honeycomb structure is built up from a core material resembling a bee hive's honeycomb which is laminated or sandwiched between thin outer skin sheets.**
- **A honeycomb panel can be made from a wide variety of materials. Aluminum core honeycomb with an outer skin of aluminum is common. But honeycomb in which the core is an Arimid[®] fiber and the outer sheets are coated Phenolic[®] is common as well.**
- **In fact, a myriad of other material combinations such as those using fiberglass, plastic, Nomex[®], Kevlar[®], and carbon fiber all exist.**



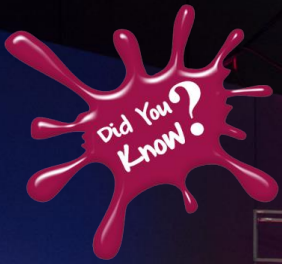
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Aircraft Stringers

- **Stringers, sometimes confused with, or referred to interchangeably as longerons, run lengthwise (longitudinally) along an airplane's fuselage or span wise of a wing.**
- **Their purpose is to serve as structural components that transfer loads and stresses from the aircraft's skin to the formers.**
- **Generally, they are attached between formers and bulkheads and are more numerous than longerons and space more closely together.**
- **Individual strings are not strong enough to handle large stresses and forces encountered by an airframe.**
- **For this reason, they are directly attached to formers and bulkheads and spaced much more closely than their counterpart, the longeron.**



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Today's Amazing Fact??????



36% NASA scientists are Indian



*HAVE ANY
QUESTIONS?*

धन्यवाद

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