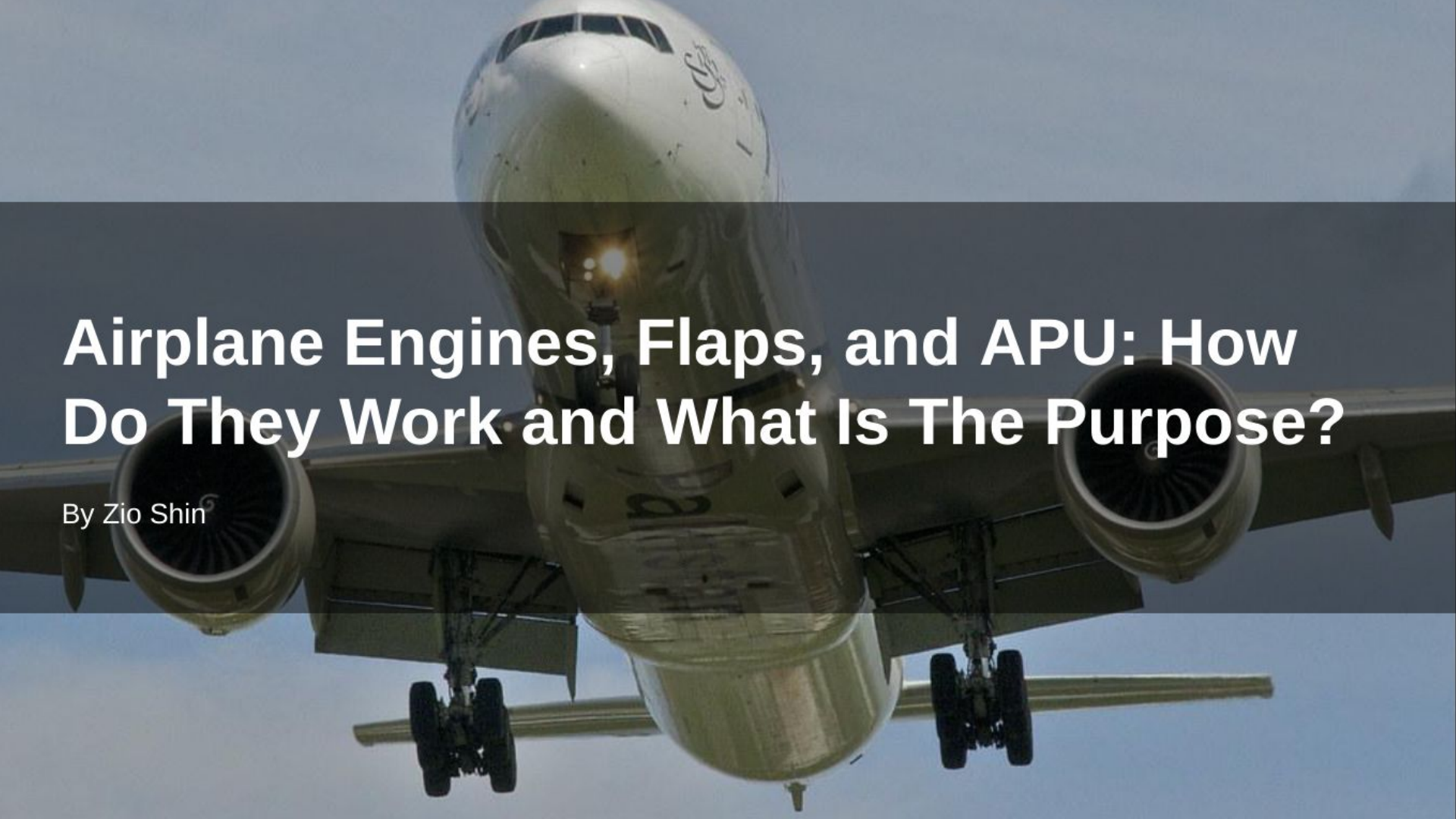

Airplane Engines, Flaps, and APU: How Do They Work and What Is The Purpose?

By Zio Shin

Intro And My Motivation

An airplane has many parts. Some aircraft types have 132,500 unique parts and in total about 3 million of them. But out of all those parts, I picked out the 3 I was the most interested in. They are the engines, the flaps, and the APU (Auxiliary Power Unit).

Motivation: I have flown on many planes in different sections of them, which have different parts. And since I am interested in them, I have lots of videos and pictures I took of the different parts. I have been interested in airplanes for a long time; I decided to learn more about them through this Science Fair project.

My Question

How Do The Engines, Flaps, And APU Work, And What Is Their Purpose?

About The Engines

Engines have an essential part in commercial aviation. There are different types of engines, such as turbo propellers, which have spinning propellers on the wing or in the front. Another type is turbofan engines. This is the type of engines I will use in this project. Turbofan engines, or jet engines, can be found on the wings or the back section of modern aircraft. They have blades spinning super fast inside them.

About The Flaps

Flaps are located on an airplane’s wing. They extend downwards during takeoff and landing. They help the plane gain lift. When an airplane is taking off, it needs a lot of speed, but also needs flaps to help stay airborne. During landing, the flaps are extremely important. When an airplane lands, the speed is very low. The plane might stall and fall, but the flaps create lift to prevent that from happening.

About The APU

The APU, or Auxiliary Power Unit, is located at the very, very back of an aircraft. It is there for providing electrical power to all aircraft systems when the engines are not in operation. For example, when the airplane is parked at the gate. The APU will be needed for pre-flight checks and starting the engines.

My Hypothesis

Out of my own knowledge, this is my hypothesis…

Engines: First, I think that the spinning blades suck in air. Then, it is hot inside the engines, because of the burning fuel, so I think the air gets heated and is turned into hot exhaust, blasting out the back of the engine with power.

Flaps: When they extend downwards, I think air pushes against them and moves downward itself, pushing up the aircraft and creating lift. The more flaps extend, the more lift gets created.

APU: I think the APU is connected to many parts of the aircraft by wires, and generates power to send through them. I think fuel is used to make the power.

Doing The Research

I consulted books and other resources. I was able to come to an accurate conclusion for the engines, flaps, and APU. I had many pieces of information from my own pictures I took of airplanes. For example, I took this picture of an engine taken apart. It allowed me to take a detailed look at the different parts and layers of the engine.

Incheon International Airport,
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The Results for the Engines

For the engines, this is what I came to: The spinning blades suck in air into the engine. Some of the air gets compressed before it flows into the combustion chamber. Then, it mixes with fuel and burns, creating hot exhaust gases that come out of the engine at high velocity, which moves the plane forward. Most of the air bypasses the engine at a lower velocity, but still it supports the thrust with a higher velocity.

The Results for the Flaps

A ‘camber’ is the measure of the curvature of an airplane’s airfoil. The more the flaps are extended, the larger the camber will be. The larger the camber is, which means the flaps are longer and lower, the more air pushes against them. That results in increased lift and also, drag, which is the air resistance pulling backward. The more lift there is, it’s less likely the plane reaches its stall speed.

The Results for the APU

The APU, or Auxiliary Power Unit, is equipped with an extra electrical generator. It is needed to power the onboard lights, pilot avionics, and galley electrics. It works by drawing fuel from the aircraft's fuel system. It utilizes combinations of air and fuel to generate power. But, the APU doesn't move the aircraft forward, like the engines do.

Reference

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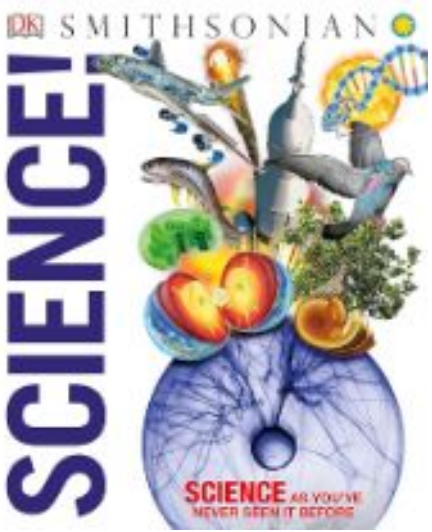
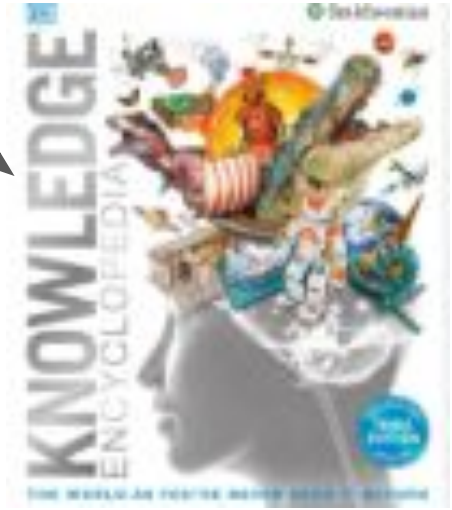


Knowledge Encyclopedia



Newsela: Four Forces On An Airplane

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The End