

Designs

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As the maximum length of wingspan which is internationally recognized and can accommodate in most international airports is limited, so aircraft need to gain maximum lift with a length limit of only a few meters. In order to overcome this limitation, the engineers observed the wings of an eagle for some time and they found out that the end of the wing is folded slightly upwards. Next, they made out a prototype with a winglet on the end of the wing and placed it in a wind tunnel.

They found out that the winglets of the wing can reduce the wing tip vortices which act as a drag that reduces the lift force. This winglet design successfully overcomes the limitation of short wingspan which cannot support such a heavy weight by reducing the drag and increasing the lift. As for the outer skin, the design must be as light as possible in order to reduce the weight and then gradually increase the lift. But then, the material used must not be too fragile as it has to withstand high pressure and impact from foreign objects such as birds. The main material used is a type of stainless steel metal, which is aluminum.

But then, in order to withstand a high pressure the aluminum layer must be very thick and thus the weight is increased. So, the engineers got their idea from the short bow invented by Genesis Khan which wrapped the inner part with a layer of elastic fiber. Then, they tried to make a composite material by combining a layer of super light and super strong glass fiber. The glass fiber is made by burning glass with extremely high temperature which is about 15000 degrees Celsius. This layer of glass fiber provides elasticity and strength on the other hand the aluminum layer provides stiffness.

This type of specifically made composite material is 25 percent lighter than pure aluminum and thus the weight force is reduced. After that it comes the evacuation problem, as we know that AWAY is a double Decker Jumbo aircraft which has a capacity of about 850 plus passengers, when emergency occurs and evacuation is needed to carry out. It is a big challenge for the engineers to design an evacuation slides which is big enough to let all the passengers to evacuate in time and the inflation time for the slides must be within the international regulated limit which is 6 seconds.

Now, as we know that the fuselage of the aircraft is about mm in length so the slides must be very long, so another problem came up. How can the gigantic slides inflate in such a short time? After some time, they decided to use the gas released by the rocket to inflate it. Besides that, the connection of the opening of the tubes with a venturi tube creates pressure difference and hence suck the air from the atmosphere into the tube with a higher rate. They successfully designed the evacuation slides to inflate in just 4 seconds, which is 2 seconds shorter than the regulated limit.

Lastly, it comes to the landing gear problem. The landing gear will suffer from very high pressure as the Jumbo aircraft is 560 tons in weight. So, the engineers decided to use the principle of the bicycle pump. They filled the pump with oil which is incompressible and can easily distinguish when leakage occurs. The oil acts as a shock absorber, where all the friction of the wheel and the runway. In conclusion, the engineers successfully modified AWAY in order to overcome the limitation in the aspect of wingspan, outward skin, evacuation problem and the heavy touchdown which produced a high pressure.

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