Material Selection

Student name

[Institutional Affiliation(s)]

Author Note

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Before finalizing the material, to be used in the aircraft structure material needs to be evaluated i.e. flame resistance, etc. certain standards have been set by Federal Aviation Association which are published under Federal Aviation Regulation documents FAR 25.853. Depending upon its location and its use, various tests are applied. Incorporating steel metal in wings during aircraft construction could result in failure of meeting the aircraft needs. Though steel is strong and hard metal but depending upon its application (as it is used in the making the wings of the aircraft) it won’t work because of its weight. Because of its weights, using steel is not a good choice (Agney, et al, 2018). Thermal conductivity and expansion are the conditions under which steel usage goes wrong as it has poor resistance against heat. In the construction of aircraft wings, heat-shield material is expected to use with low thermal conductivity so that airframe structure could be protected from excessive heating. Steel may prove to be the ideal metal for making the skin and landing gear and it typically comprises around 11-13 percent of the materials used in an aircraft, but its weight restricts take off and flying off the aircraft.

An aircraft is built with several major components i.e. wings, undercarriage, and fuselage, etc. Different components of the aircraft are made with different material and depending upon the function the material is selected. For correcting the above mentioned structural failure, being a part of the team, I would recommend using titanium in place of steel for making the wings of the aircraft. Titanium is most widely used material for making aircraft and 15 percent of the aircraft is being made of titanium (Ngo, 2019). Titanium is a lightweight metal and has a high capacity to bear heat that prevents wings from expansion. Titanium also has low thermal conductivity due to which is proves to be the ideal material for the structure of the wings. I would recommend using titanium considering its application in the aircraft construction on basis on its characteristics. It is lightweight, strong, inexpensive, and a predictable metal. Though, steel is stronger than titanium but considering the location where it would be used, titanium seems to be the ideal choice.

Reinforcing and redesigning the problem areas would not work, as the main concern is a material choice as per the part of the aircraft where it would be used so choosing appropriate and different materials would be the main focus while aircraft construction. Material selection is the real challenge as aircraft being a metal object is prone to corrosion, though it (the aircraft) is painted but nature would prevail. Changing the material and replacing steel with titanium would serve best as far as wing construction is concerned. Titanium's good mechanical properties and good weldability make it a good choice for aircraft construction (Yerra, 2019). Titanium should be replaced with steel as it could bear bending, compression, torsion and all the other varying stresses. So considering the key properties of titanium, it won't be wrong to say that it is a lightweight, corrosion-resistant and strong metal. After analyzing all the factors and aspects, I would say that it is not the design but it is the location or the area for which a metal or material would be used in aircraft. Depending upon the application and the characteristics of the metal, material for aircraft would be selected. For example, if it's about constructing wings of the aircraft then titanium would be an appropriate choice because of its lights weight and thermal characteristics, but it's about constructing landing gear, then steel would prove better than titanium because of its high thermal conductivity and heavyweight.

References

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