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Evolution of Commercial Aircraft: Airbus A320

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Evolution of Commercial Aircraft: Airbus A320

The program to build Airbus A320 was launched in 1984 by a joint collaboration between UK, France, and West Germany. The design of this aircraft was influenced by the 1960s Airbus A300, which was a European aircraft. However, the first A320 aircraft was completed and launched in 1987. This first design of A320 had been named A320-200 or A320ceo. The engine for the first version of the A320 airbus was CFM 56-5-A1 turbofans of 25,000 lb thrust. For more than 28 years, this engine was used in Airbus A320 aircraft with some modifications. However, the current design is considered to be the most advanced and highly effective engine of A320 aircraft (Hardiman, 2020). This is the Airbus A320neo, with the engine named PW1100G-JM. The engine performance of these two aircraft has varied over the years as explained below.

A320neo (new engine option) is characterized by various upgrades and advancements that have seen the A320 aircraft become one of the world's most renowned single-aisle aircraft with the most fuel-efficient engines. Unlike the first version, the 320neo engine is equipped with two new-generation engines, which include Purepower PW1100G-JM and LEAP-1A (Hardiman, 2020). The first version of this aircraft had a wingspan of about 35.80m/117ft 5inch (Mraes, 1993). This has since changed with the advancements in the engine. The new and current version has remained to be the top-performing and the most advanced in the A320 Airbus family. The new version has a reduced wingspan of about 34.10m/111ft 10inch (Hardiman, 2020). However, the most advanced tech that makes it more fuel-efficient includes the sharklets on the wingtip. The new engine that was launched in 2010 started flying in 2016 after several improvements that have made the aircraft better than most of its previous versions. The large wingtip designed with the sharklets enhanced the aircraft's fuel-saving capabilities compared to its previous versions. With more fuel consumption efficiency, A320neo provided less emission than its previous

versions. With the large sharklets of about 2.4meters, the new version enhanced fuel efficiency by about 15% and 4% reduced fuel burn, which minimizes emission (Hardiman, 2020).

The total thrust for the new version is 240kN/54,000lbf compared to 242kN/54,240lbf for the first version (Hardiman, 2020). Some of the thermodynamic design features that separate the new engine from the old one include the introduction of ceramic matrix composites (CMC) that can handle higher temperatures than the older version (Hensey&Magdalina, 2018). The old version used super-nickel alloys that were used in the old engines. The CMCs can withstand the high thermo-structural requirements of the new engine. Furthermore, these new additions lessen the demand for cooling than the older versions.

Several things have changed in the new design of the A320 engines including the introduction of lighter materials to make up the engine. For example, the use of Ti-AI blades in the first version was heavier because it used nickel alloy metal material. As Hensey and Magdalina (2018) explain, the new version has replaced the metal material with the LEAP-1A LPT, which is much lighter and can withstand high temperatures and adapt to low temperatures better than the previous engines. Furthermore, lighter materials mean that the turbine can function well and more efficiently, which reduces the rotation inertia (Hensey&Magdalina, 2018). The new LPT blades have been considered to be one of the successful alterations of the A320 engine over the years. Also, the turbines are made of blisks. Blisks, according to Hensey and Magdalina (2018), is the most efficient materials than those that have been used in the previous engines. As such, these new changes are expected to positively impact the cost of maintenance of the A320 aircraft.

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