

# FUTURISTIC AERO-ENGINE - VISION OF AN ELECTRIC AERO-ENGINE

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## Abstract

The present generation turbofan aero-engines essentially consists of a modular engine comprising of the fan, compressor, combustion chamber, high and low pressure turbine, after burner and jet pipe with convergent-divergent nozzle having thrust vectoring features. There has been a significant advancement in the design and operation of the conventional aero-engine with thrust towards high thrust to weight ratio, reduced life cycle cost and enhanced reliability and maintainability features. However, the ongoing effort is looking to be getting saturated in the conventional design and new concepts are being explored to take it further. The futuristic turbofan aero-engine concept, be it for military or civil application, is that of an "**Electric Aero-engine**". The all-electric concept offers a huge scope for engine operational improvements with benefits of overall weight reduction (higher thrust to weight ratio), increased reliability, easier maintainability, reduced costs of operation and enhanced safety. The present generation turbofan aero-engine architecture uses ball and roller bearings for its rotor support system, gear box for power transmission to the various engine driven accessories and a lubrication system for the lubrication of the various bearings of the engine and the power transmission system. The vision of all "**Electric Aero-engine**" is meant to replace current generation of aero-engines by driving all accessories electrically via a distribution network from motor/generators embedded in the engine spools. Inclusion of active magnetic bearings in such engines would facilitate deletion of the oil system as well as the engine gear box. The all "**Electric Aero-engine**" apart from delivering the required thrust in a near conventional manner will also produce enough electric power for powering the aircraft equipments, accessories, control system and engine accessories. All ongoing advancements in the design of present day aero-engine for the flow path components will also be encompassed in the so called "**Electric Aero-engine**". The paper brings out vision of various key features of an "**Electric Aero-engine**" which makes it different from the present day conventional turbofan aero-engines.