19AST202 AIRCRAFT PRODUCTION TECHNOLOGY

ADDITIVE MANUFACTURING IN AEROSPACE

Additive manufacturing applications in aerospace

Case studies on AM applications in Aerospace Industry

Additive manufacturing (AM) has made significant inroads in the aerospace industry, offering various benefits such as lightweighting, complex geometries, and rapid prototyping. Here are a few case studies highlighting the applications of additive manufacturing in the aerospace sector:

GE Aviation's LEAP Engine Fuel Nozzle:

Application: Additive manufacturing was used to produce the fuel nozzle for the LEAP engine, a joint venture between GE Aviation and Safran Aircraft Engines.

Benefits: The 3D-printed fuel nozzle is 25% lighter and five times more durable than its conventionally manufactured counterpart. This weight reduction contributes to fuel efficiency in aircraft.

Airbus A350 XWB Aircraft:

Application: Airbus utilized additive manufacturing for various components in the A350 XWB, including cabin brackets and bleed pipes.

Benefits: The use of 3D-printed components contributed to a reduction in weight and improved fuel efficiency. The technology also enabled the creation of more intricate and optimized designs.

Boeing's 787 Dreamliner:

Application: Boeing applied additive manufacturing in the production of components for the 787 Dreamliner, including plastic ducts and titanium structures.

Benefits: The use of 3D printing helped reduce the weight of the aircraft, enhance fuel efficiency, and simplify the manufacturing process for complex parts.

NASA's Rocket Engine Components:

Application: NASA has extensively explored additive manufacturing for rocket engine components, including combustion chamber liners and injectors.

Benefits: Additive manufacturing allows for the creation of complex cooling channels and intricate geometries that improve engine performance and efficiency. It also reduces the number of components and simplifies assembly.

SpaceX SuperDraco Rocket Engine:

Application: SpaceX incorporated additive manufacturing into the production of the SuperDraco rocket engine, which is used in the Crew Dragon spacecraft for astronaut launches.

Benefits: 3D printing enabled the rapid prototyping and production of the engine components, contributing to quicker development timelines and cost-effectiveness.

Lockheed Martin's Satellite Components:

Application: Lockheed Martin has applied additive manufacturing to produce satellite components, such as brackets and antenna components.

Benefits: The use of 3D printing allows for the creation of lightweight and structurally optimized components, contributing to overall weight reduction in satellites.

Safran Power Units' Microturbo Auxiliary Power Unit (APU):

Application: Safran Power Units utilized additive manufacturing for the production of the combustion chamber in its Microturbo APU.

Benefits: Additive manufacturing enabled the creation of a more efficient and compact combustion chamber, contributing to the APU's overall performance and reducing fuel consumption.