



SNS College of Technology

[An Autonomous Institution]

Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai

Accredited by NAAC-UGC with 'A++' Grade (Cycle III) &

Accredited by NBA (B.E CSE, EEE, ECE, IT & Mech)

COIMBATORE-641 035, TAMIL NADU



Department of Aerospace Engineering

19AST202 AIRCRAFT PRODUCTION TECHNOLOGY

UNIT V HEAT TREATMENT – SURFACE ENGINEERING – INSPECTION

Case studies on surface treatments for aerospace bodies

Thermal Barrier Coatings (TBCs) for Jet Engine Components:

Application: TBCs are often applied to turbine blades and other hot-section components in jet engines.

Case Study: General Electric's GEnx engines, used in Boeing 787 Dreamliners, incorporate advanced TBCs. These coatings help protect components from high temperatures, improve efficiency, and extend the lifespan of critical parts.

Hard Chrome Replacement in Landing Gear Components:

Application: Traditional hard chrome plating has been widely used in landing gear components for corrosion resistance and wear protection.

Case Study: Airbus and other aerospace manufacturers have been exploring alternative coatings due to environmental concerns associated with hexavalent chromium. Electroless nickel-phosphorus, HVOF (High-Velocity Oxygen Fuel) coatings, and other advanced coatings are being investigated as potential replacements for hard chrome in landing gear applications.

Anodization for Aluminum Structures:

Application: Aluminum is a common material in aerospace structures, and anodization is often applied for corrosion resistance and improved surface hardness.

Case Study: Boeing's 787 Dreamliner extensively uses anodized aluminum components. The anodization process enhances the aluminum's resistance to corrosion, ensuring the structural integrity and longevity of the aircraft.

Plasma Spray Coatings on Spacecraft Thermal Protection Systems:

Application: Thermal protection is crucial for spacecraft re-entering the Earth's atmosphere. Plasma spray coatings are applied to protect against extreme temperatures.

Case Study: The Space Shuttle's Thermal Protection System (TPS) used a combination of ablative materials and ceramic tiles with plasma spray coatings. These coatings helped dissipate the intense heat generated during re-entry, ensuring the safety of the spacecraft and its crew.

Anti-Icing Coatings on Aircraft Wings:

Application: Preventing ice buildup on aircraft wings is essential for safety and aerodynamic performance.

Case Study: De-icing and anti-icing coatings, such as electro-thermal or hydrophobic coatings, are applied to wing surfaces. Various aerospace manufacturers use proprietary solutions to minimize the impact of ice accumulation on flight operations.