DE GRUYTER

Special Issue in High Temperature Materials and Processes:

ROLE OF ADVANCED COMPOSITE MATERIALS IN ENHANCING AEROSPACE VEHICLE PERFORMANCE

GUEST EDITORS

Dr. Rahul Kumar
Department of Aerospace Engineering,
School of Mechanical Engineering
Lovely Professional University, Punjab, India
rahul.28708@lpu.co.in

Dr. Anuj Jain
School of Electronics and Electrical Engineering,
Lovely Professional University, Punjab, India
anuj.22631@lpu.co.in

Dr. Abhishek Sharma
Department of Mechanical Engineering,
B I T Sindri, Dhanbad, Jharkhand, India
asharma.me@bitsindri.ac.in

Dr. Olusegun D. Samuel
Department of Mechanical Engineering,
Federal University of Petroleum Resources,
Effurun, Delta State, Nigeria
samuel.david@fupre.edu.ng

Prof. Sujit Kr. Verma
Dept. Mechanical Engineering, GLA University
Mathura-281406
ORCID ID: 0000-0002-7927-7365
Scopus id:57578613900
sujit.verma@gla.ac.in

DESCRIPTION

High specific strength and stiffness advanced composite materials, when paired with automated production techniques, enable the creation of composite structures that are both lightweight and economical. Additionally, composites have a high fatigue and weather resistance, which makes them perfect for use in aeroplane building. One significant benefit is their resistance to extremely high temperatures, which is especially useful for use in spaceflight and re-entry vehicles. Several more advanced composite materials are being utilised in automotive and aerospace applications in addition to CFRP. These consist of hybrid composites, aramid fibre reinforced polymer (AFRP), and fibreglass reinforced polymer (FRP). In the aerospace industry, composite materials have become a game-changer, transforming the design and production of aeroplanes. Their outstanding strength-to-weight ratio, adaptability in design, and resilience to weather conditions make them the perfect material for use in contemporary aircraft construction.

Carbon, glass, and aramid fibres are the three most prevalent types of fibres used in aerospace applications. These fibre varieties differ in their molecular chemical compositions, which translate into distinct macroscopic fibre qualities in terms of mechanical and physical attributes. Metal, wood, and other conventional materials are frequently swapped out for advanced composite materials. The product gains strength and rigidity from a polymer composite, along with additional advantages including corrosion and moisture resistance. Advanced polymer composites are lightweight, robust, and engineered materials that form a ply or lamina by embedding high-performance reinforcing fibres into a toughened polymeric matrix. There are many well-established uses for advanced composite materials in the sports equipment, aerospace, and aviation industries. More precisely, ACMs are highly desirable for structural parts used in aircraft and aerospace. In aerospace, fibre-reinforced polymer composite materials have found widespread application. Polymer composites are notable for their high strength-to-weight ratio, longevity, resistance to corrosion, thermal stability, and numerous other attributes.

The main justification for employing composite materials in aircraft structure is their ability to reduce weight, which is by far their largest benefit. Fibre-reinforced matrix technologies offer a smoother surface, improve fuel efficiency, and are stronger than the conventional aluminium used in the majority of aeroplanes. This method is extensively employed and gradually replacing traditional metal materials, particularly in the aerospace sector. Plastics and composites, being among the most important components in aviation, help reduce weight and are more lightweight than conventional materials like metal. The overall weight of an aircraft can be decreased to increase fuel efficiency. Aerospace engineers can build aeroplanes and spacecraft to match performance criteria while minimising weight by using composite materials. The most popular composite materials for aerospace applications consist of a polymer matrix reinforced with carbon fibre oriented in a precisely regulated manner. These materials have many benefits, such as lighter weight, better fuel economy, longer durability, and lower maintenance costs.

Topics of interest include but are not limited to:

- Advanced composite substances for application in automotive.
- A cutting-edge material for aeronautical purposes is polymer composites.
- Resin transfers moulding produces advanced material composites for use in aircraft.
- Aerospace composite building creation and manufacture, and cutting-edge evaluation.
- The automotive and aerospace industries utilise biodegradable composite polymers.
- Recent developments in the field of aeronautical development of materials.
- Sophisticated mechanics of composite constructions and materials.
- Technical requirements for composite supplies used in aircraft.
- An overview of current studies on the applications of multifunctional composite materials and structures.
- A synopsis of current studies on the mechanics of composite structures and materials with many functions.
- Procedures utilised during the production of aeronautical components and composite materials.
- Future of Automotive and aeronautical engineering for Advanced Composite Materials

HOW TO SUBMIT

Before submission authors should carefully read the Instruction for Authors. In order to make the preparation of manuscript easier, you are advised to use the Manuscript Template.

All submissions to the Special Issue must be made electronically via the Editorial Manager submission and tracking review system.

All manuscripts will undergo the standard peer-review process (single-blind, at least two independent reviewers). When entering your submission via online submission system please choose “SpecialIssue_Role of Advanced Composite Materials in Enhancing Aerospace Vehicle Performance”.

The deadline for submissions is 5th August, 2025, but individual papers will be reviewed and published online on an ongoing basis.

APC: 1050 EUR

In case of any question please contact Ms. Joanna Kosińska, Managing Editor of High Temperature Materials and Processes, Joanna.Kosinska@degruyterbrill.com