

# Preface

It is a great pleasure and honor for us to present this scientific papers collection and to thank all contributing authors to this special edition "Advanced Materials in Aerospace Engineering" for their effort, collaboration and confidence. This special edition is being published in the journal Advanced Materials Research, AMR, edited by Trans Tech Publishing/ Switzerland.

Universities and Institutes, through the realization of this special edition, accomplishes its relevant role of presenting and transferring to the Brazilian society and international scientific communities recent research results in the field of Material Technologies in Aerospace Engineering and the related areas of Mechanical and Materials Engineering.

The call for papers this year 2015 had an excellent response in participation from academic, scholars and engineering professionals due to the subject and AMR site, <http://www.scientific.net/>, and the easy procedure to submit and review papers via Internet, economizing many sheet of papers, time, post services and human resources. A total of 50 participants attended the call for submitting papers. The Editors received and approved 19 papers, originate mainly from the Brazilian scientific community, academia and industry. The submitted papers have been selected and reviewed to be published in this special issue. We have received also some research papers from Europe such as Germany and Holland.

Although this is solely the first edition, the collection of articles already shows its impact potential and represents a Brazilian Forum for presentation and critical discussion of new results of basic and applied research in materials and manufacturing technologies in the Aerospace industry, the diffusion of scientific and technical knowledge among the academia and industry. The mix of different issues and professionals worked very well and this should be preserved in future issues. Future discussions among participants is also very important and to encourage new partnerships and development of new researches and projects.

The call for papers of this special issue "Advanced Materials in Aerospace Engineering" focused on high performance materials, smart materials, composite material, structural integrity, high entropy alloys and design of lightweight structures.

Papers presented in this special edition covered many of these aspects of science and technology of materials in aerospace engineering. However, the majority of works were mainly in the areas of: composites, metallurgy, surface engineering, cutting, welding and manufacture. Therefore, other areas need a greater stimulus and invitation to increase the participation in a next issue.

I would like to thank my colleagues and reviewers that dedicated themselves to the realization of this enterprise during five month of intense work. The success of this issue is due to the enthusiasm and energy of authors and the fellow reviewers. To build this special issue, the collaboration and attention of all authors and reviewers that respected the schedule was very important, thus, we thank you all.

We would like also to thank the invited international contributors Prof. Stan Veprek, Prof. Marcias Martinez and Prof. Shoichi Hirosawa for participating and submitting their work.

The goal of this special issue was to present the latest findings and promote further research in the areas of advanced materials in aerospace engineering. Engineers, Researchers, Scholars from all relevant industrial and academic fields were invited to submit high-quality manuscripts that describe the latest research results, state-of-the-art research or innovations.

Nowadays, two related imperatives are influencing the design of aeronautical structures:

1. requirements for more efficient aircraft (use of advanced lightweight materials, reduction of life cycle costs and particularly operating costs),
2. Requirements to reduce the environmental footprints, including gas pollution emissions and noise, of aircraft.

The aerospace industry should meet these imperatives by reducing its manufacturing and operating costs while at the same time, introduce new technologies, new material applications and new design and certification processes. This includes issues such as a greater use of advanced lightweight materials in primary structure, introduction of techniques and concepts for increased utilization of environmentally sustainable materials, elimination of toxic materials and reduction of waste in manufacturing and maintenance processes. It also includes life extension processes, and advanced systems design, increase the use of modeling and simulations instead of tests and change from hydraulic to all electric aircraft system design to reduce weight.

Therefore, industrial challenges, environmental requirements for sustainable development and competitions due to market dynamics have been increased and forced the reengineering of all activities at factories and academy in order to increase productivity, reduce production costs, part weight, part energy content, energetic efficiency, efficient and rational use of natural resources and design for recyclability of materials. Hence, this concerns and requirements have faced the industries, academy and governments with new materials and manufacturing challenges.

To cope with this challenges, it is necessary the formation of work teams inside the industries, academy and mixed teams to study and improve technological processes with the aim at advancing the product quality, durability, sustainability and equipment productivity, as well as to reduce production and maintenance costs.

In particular, the aerospace industries should continue to attain these objectives in addition to introduce or increase the use of lightweight aluminium alloys, magnesium alloys and composites. Furthermore, to produce precision parts with zero-defects, to advance the use of near net shape processes, manufacturing of large parts by sheet metal forming, advance the use of additive manufacturing and design for recycling, durability or sustainability.

It is not enough to wish that research and development have a place of prominence in the Brazilian's economic, educational and politic scenario, it is necessary that we work together to win the merited space.

Finally, I would like to thank Trans Tech Publishing Ltd team and particularly Ms. Anne Wohlbier for trusting and helping us to publish this special issue of the Advanced Materials Research Journal.

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