Elenco libri e capitoli a invito

1. C. Meola, G.M. Carlomagno, G. Giorleo Crosslinked Polyethylene, Encyclopedia of Chemical Processing (ECHP) pp. 577-588, Marcel Dekker, New York 2006.
2. C. Meola Editor Recent Advances in Non Destructive Inspection (C. Meola Editor) 2010 Nova Science Publisher Inc. ISBN 978-1-61668-550-8.
3. C. Meola, G.M. Carlomagno, Infrared Thermography in Non-Destructive Inspection: Theory and Practice, Chap. 4 in: Recent Advances in Non Destructive Inspection (C. Meola Editor) 2010 Nova Science Publisher Inc. ISBN 978-1-61668-550-8.
4. C. Meola Editor Infrared Thermography: Recent Advances and Future Trends Bentham Science Publishers, 2012, eISBN 978-1-60805-143-4.
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9. C. Meola, B. Raj, Non-destructive Testing and Evaluation: Overview. (Saleem Hashmi editor-in-chief), Reference Module in Materials Science and Materials Engineering. Oxford: Elsevier; 2016. pp. 1-10.
10. C. Meola, S. Boccardi, G.M. Carlomagno, Composite Material Overview and its testing for aerospace components (invited chapter) Chap 5 in Sustainable Composites for Aerospace Applications Mohammad Jawaid and Mohamed Thariq Editors, Woodhead Publishing Elsevier, 2018, ISBN: 978-0-08-102131-6 (print), ISBN: 978-0-08-102138-5 (online).
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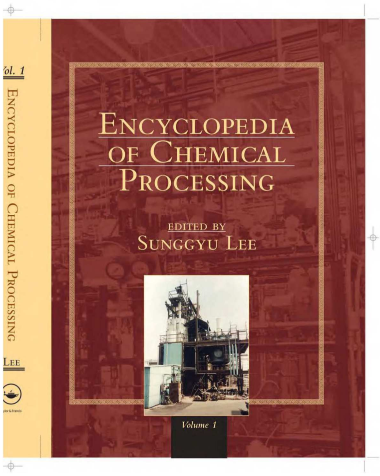
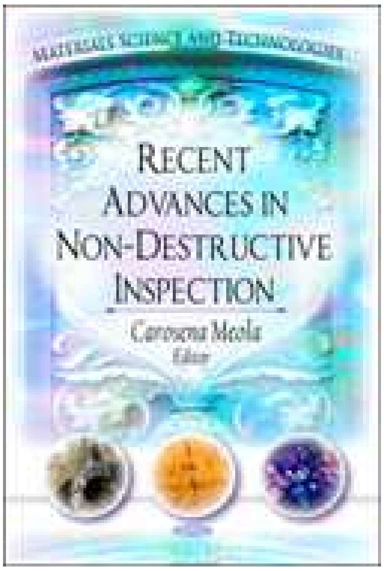


Encyclopedia of Chemical Processing
volume 1
Edited by: Sunggyu Lee Department of Chemical Engineering University of Missouri - Columbia Columbia, Missouri U.S.A. New York
Published in 2006 by Taylor & Francis Group 270 Madison Avenue New York, NY 10016

Cross-Linked Polyethylene by C. Meola, G.M. Carlomagno, G. Giorleo pp. 577-588

INTRODUCTION

In people's opinion, plastic is a light and weak substance that easily melts when warmed. And yet, cross-linking the carbon atoms suffices to transform such material into a superior material that may be resistant to temperature, pressure, corrosion, and that can be used in a variety of applications. In fact, polyethylene (PE) once crosslinked is advantageously employed in the fabrication of blanket insulation for electrical and telephone wires, pipes for the transport of cold and hot liquids, prostheses for the human body, and so forth. Since the late 1960s, when the European scientist Engel first succeeded in cross-linking PE, there has been a proliferation of cross-linking methods with the intention of fabricating a type of PE suitable for a specific need. There are many cross-linking methods; each method has advantages and disadvantages and no one method works well for every product. In fact, a cross-linked polymer obtained with one method may be excellent for one application, but it may be very inadequate for another application. It is important to choose the most effective method for the specific need and to comply with quality standards. Otherwise, a fixed sequence of operations alone does not ensure the product quality, but it is also important to characterize the products through appropriate testing and non-destructive evaluation. Another important point is with regard to the hazards and risks related to the substances, or devices, employed; manufacturers must comply with safety regulations and eco-sustainability. The intended purpose of this article is to expose the reader to an overview of the existing methods and to give indications and suggestions about the most appropriate method for a specific application with the existing legislation involving both quality and safety aspects.



NovaScience Publisher   Series: Materials Science and Technologies, 234 pp
2010 ebook ISBN: 978-1-61728-082-5, Hardcover 2011 ISBN: 978-1-61668-550-8

The main idea of this book is to supply a tool to be used by peoples working in different fields, from building restoration to aerospace maintenance. This is achieved by bringing together the expertise of peoples who come from universities, research centers, and industries and who are involved in development and/or application of Non Destructive Inspection techniques in different fields from aerospace to civil engineering, and to Cultural Heritage. The book reports also some cases of interdisciplinary studies as well integration of techniques.

Table of Contents:

Book Content

The first chapter deals with the use of *3D laser scanning* applied to the modelling of cultural heritage and collects some of the work by the research group at the University of Padua. High resolution laser scanning methodology is analysed, together with classical topographic measurements and digital photogrammetric techniques, for 3D surveys. The purpose of this technique is to construct digital three dimensional models of objects. More specifically, the object is first laser scanned to create a point cloud from which the shape is extrapolated. It is helpful in different domains:

- in industrial engineering better known as reverse engineering and mainly exploited for design purposes;
- in civil engineering and in architecture for structural analysis and monitoring of small modifications for documentation and restoration of buildings;
- in territory survey for monitoring of volcanoes, glaciers and landslides areas, shoreline, etc.;
- in archaeological and cultural heritage fields for virtual reconstruction of buildings and work of art;

- in medicine for metric survey of prosthesis and changing evaluation pre- and post- surgical interventions.

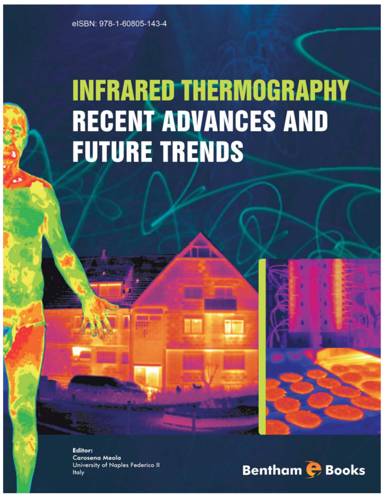
Thus, this methodology may be regarded with a twofold meaning: reproduce metrically correct models of also complex geometry and control variation of geometry resulting from degradation of materials and structures. Of course, this technique may be incorporated inside NDE techniques, but it is restricted to the object surface.

The successive chapters supply information through theoretical basics and practical applications for choosing the most adequate device and procedure to go more in depth inside the object and to check the material conditions. In this context, the second chapter reports on applications of the *ultrasound* methodology at the Italian Aerospace Research Centre (CIRA). Indeed, ultrasound has been for years the leading technique for control of materials in the aerospace industry; and perhaps, it is still the most popular non-destructive technique. In fact, it can be also used in architecture and in civil engineering as the third chapter proves.

In particular, chapter three joins expertise on the same subject coming from two different working entities which are the ENEA research Centre in south Italy and an University Department in north of Italy. Going back to the method principle, it is based on the propagation of high-frequency sound waves inside solid materials. A local variation of material characteristics (acoustical impedance) affects the energy transmission; thus, the amount of energy that arrives at the receiver probe gives information about the material characteristics (density, stiffness, porosity). Its main disadvantage is slowness for which it is now competing with emergent faster methodologies. However, it remains the most effective technique for thickness measurements.

A faster technique is certainly *infrared thermography* (IRT). It allows for generation of surface temperature maps starting from thermal energy radiated by object in the infrared band of the electromagnetic spectrum. It is a truly 2D non contact, non invasive methodology which can be used for a vast variety of applications and also for non destructive evaluation of materials and structures. For example, IRT may be used for diagnosis (in medicine, architecture, maintenance), or for understanding of complex fluid dynamics phenomena (flow instability, flow separation and reattachment), or for material characterization and procedures assessment which can help improving design and fabrication of products. As technology evolves, infrared systems offer new opportunities for application; indeed, any process which is temperature-dependent may benefit from the use of an infrared device. In this book, as for the other techniques, two chapters are devoted to applications of infrared thermography as non destructive technique. Chapter 4 by the Department of Aerospace Engineering at the University of Naples supplies basic theory and examples of applications to NDE of materials which are mainly used in the industrial field. In particular, the use of both pulse and lock-in techniques is illustrated. The attention is particularly devoted to the capability of lock-in thermography to detect several types of defects such as delamination, slag inclusions, and impact damage in different types of materials mainly glass and carbon reinforced composites, sandwiches and fibre metal laminates. Applications of IRT to the Cultural Heritage field are illustrated in chapter 5. This chapter focuses attention on the thermophysical parameters to be taken into account and on the processing algorithms for correct interpretation of thermal maps and in turn for effective investigation of the decay of artworks. The methodological approaches are discussed while presenting some of the work performed at the research centre CNR of Padua.

At last, *magnetic and electric* methodologies are discussed in chapters 6 and 7. Indeed, this family includes many techniques such as magnetic particle, eddy current, geoelectrics, etc., which exploit electric and magnetic properties of materials studying their behaviour under magnetic and/or electric field. Depending on the type of technique and on the measurement procedure, it is possible to detect shallow anomalies at depth of millimetres (e.g., with eddy current), or to discover ancient remnant at high deepness of 5-10 metres (e.g., with geoelectric, georadar). Again, the aim is to exploit electric/magnetic sensors in completely different application fields. And then, the attention of chapter 6 is mainly focused on the magnetic-based sensors for eddy current measuring devices; efforts are made to investigate the capability of such sensors to match the requirements of the aeronautical field. In particular, this chapter collects the expertise on the use of different types of sensors (i.e., flux-gate, GMR, HTc-SQUID) by researchers at the Coherentia section of the CNR-INFM in Naples. Electric/magnetic based techniques also belong to geophysical methodologies which are mainly used for underground exploration (mineral and oil, archaeology, etc.) and for mapping areas at natural risks (landslides, earthquakes, volcanic eruptions, etc.) for prevention and mitigation purposes. In chapter 7 some electrical geophysical methods are described and examples of application to architectural structures are shown. More specifically, the results shown, by the Department of Earth Science of the University of Naples Federico II, relate to micro-geophysics applied to the control of the state of conservation of buildings.



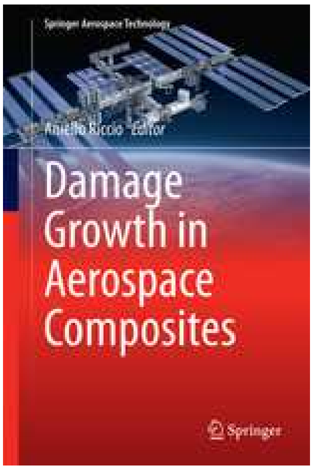
Bentham Science Publishers 2012, pp. 253, eISBN 978-1-60805-143-4.

The eBook is organised in two main parts: Part I and Part II and further into several chapters.

Part I includes two chapters. The first one, by the Editor, deals with basic theory, which is described following the historical steps by eminent scientists, from Herschel, to Nobili, Melloni, Stefan, Boltzmann to Planck and others. The radiation mechanisms with the most important parameters, which play a key role in the acquisition and interpretation of thermal images, are recalled and discussed. A section is devoted to detectors used for infrared technology. The main steps in detectors' development following the technological progress are also drawn. The second chapter is by Roberto Rinaldi of the Infrared Training Centre (ITC) by Flir Systems in Milan (Italy). This chapter is concerned with an overview of infrared imaging devices from the first prototype developed in 1958 to the multitude of models, which are available today. The historical evolution of the infrared technology is traced within the key features of each model. In particular, some basic characteristics and performance are described, which may help the reader in the choice of the most appropriate device for the specific application.
Part II is subdivided into four sections and many chapters, which are numbered following part I.
The first section includes applications to medicine (Chapter 3) and veterinary (Chapter 4). The study of the temperature of the human body has been associated with health as far back as the 1st century BC, when Hypocrites (the father of medicine) used *the sense of touch* for skin surface temperature anomalies to determine the *health* of his patients. Even today, monitoring the body temperature variation aides in both diagnosis and treatment planning. Chapter three was prepared by Boris G. Vainer of the Institute of Semiconductor Physics of the Russian Academy of Sciences. This chapter reports on the IRT's state of the art in medicine with methodological approaches and a variety of applications such as in the diagnosis of breast cancer, in ophthalmologic surgery, in cardiovascular surgery, in the visualization of ischemic tissues and in many others. Chapter four presents the application and use of infrared thermography in farm animals and veterinary medicine. This chapter was supplied by Petr Kunc and Ivana Knizkova of the Institute of Animal Science-University of Prague (The Czech Republic). The addressed areas include reproduction, thermoregulation, animal welfare and the milking process. The application of IRT to veterinary medicine is particularly useful to predict inflammation since, contrary to human beings, animals cannot reveal any symptom before the illness has become important.
Section two includes a chapter (5) on the use of Infrared thermography in foodstuff conservation by Klaus Gottschalk of the Leibniz-Institut für Agrartechnik Potsdam (Germany). It shows the usefulness of IRT to control the conservation conditions of fruits and vegetables. The main advantage of using an infrared device lies in the possibility to control and improve the climate, which is essential in prolonging the shelf life of crops.
Section three explains the applications of IRT to industrial engineering. The chapter six, prepared by Giovanni M. Carlomagno of the Department of Aerospace Engineering-University of Naples Federico II (Italy), is an overview on IRT to thermo-fluid-dynamics. After recalling the first historical attempts in measuring heat transfer coefficients, this chapter describes the most useful heat flux sensors, supplies information about thermal restoration of data and shows several examples of convective heat transfer measurements in complex fluid flows, ranging from natural convection to hypersonic regime. The attention of chapter seven is focused on the application of IRT to combustion. This contribution is by Christophe Allouis and Rocco Pagliara of the Combustion Institute CNR in Naples (Italy). It demonstrates the usefulness of an infrared imaging system for understanding the fluid-dynamics phenomena associated with the combustion processes in turbine burners. The chapter eight by Ralph A. Rotolante of Vicon Infrared in Boxborough,

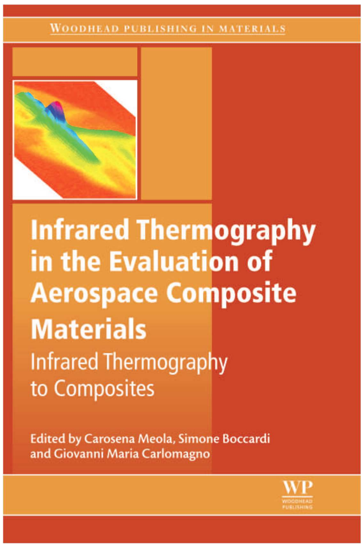
MA (USA) explains the use of IRT for non-destructive inspection purposes. The main pulse and lock-in techniques are described with some application examples, including the inspection of real aircraft parts. Indeed, a remote imaging system offers many advantages over other methodologies since it is fast and two-dimensional and guarantees the safety of the part integrity.

Section four is concerned with the application of IRT in architecture and civil engineering. This is a relevant topic for infrared thermography applications after Building Regulation (2007) for Conservation of Fuel and Energy. Chapter nine by Ermanno Grinzato of CNR-ITC in Padua (Italy) reports some examples of structural analysis aided by IR thermography. In particular, it stresses the impressive help, which is given to the comfort monitoring by the distributed temperature map measured by an infrared device. The attention also goes to the possibility, using a novel method, to "see" the main environmental quantities, such as air temperature, relative humidity and velocity, obtained from thermographic readings. Besides those herein described, an infrared imaging system can be advantageously used for many other applications. Infrared thermography is an excellent condition monitoring tool to assist in the reduction of maintenance costs on mechanical equipment. One of the biggest problems in mechanical systems is the heat generated by friction, cooling degradation, material loss or blockages. The infrared technique allows for the monitoring of temperatures and thermal patterns, on a wide variety of equipment including pumps, motors, bearings, pulleys, fans, drives, conveyors *etc*., and also while the equipment is online and running under full load. Information acquired from thermographic images enable a company to predict equipment failure and to plan corrective actions before a costly shutdown, equipment damage, or personal injury occurs. What is more, the inspection can also be performed far away from any dangerous condition without additional costs in terms of workers' health care. However, it has to be pointed out that infrared thermography is still not completely exploited. It could be employed in a lot of other novel applications; it is only a matter of fantasy and skill!



Springer 2015 ISBN 978-3-319-04004-2
http://www.springer.com/978-3-319-04003-5

This book presents novel methods for the simulation of damage evolution in aerospace composites that will assist in predicting damage onset and growth and thus foster less conservative designs which realize the promised economic benefits of composite materials. The presented integrated numerical/experimental methodologies are capable of taking into account the presence of damage and its evolution in composite structures from the early phases of the design (conceptual design) through to the detailed finite element method analysis and verification phase. The book is based on the GARTEUR Research Project AG-32, which ran from 2007 to 2012, and documents the main results of that project. In addition, the state of the art in European projects on damage evolution in composites is reviewed. While the high specific strength and stiffness of composite materials make them suitable for aerospace structures, their sensitivity to damage means that designing with composites is a challenging task. The new approaches described here will prove invaluable in meeting that challenge.



Woodhead Publishing is an imprint of Elsevier
The Officers' Mess Business Centre, Royston Road, Duxford, CB22 4QH, UK 50 Hampshire Street, 5th Floor, Cambridge, MA 02139, USA The Boulevard, Langford Lane, Kidlington, OX5 1GB, UK

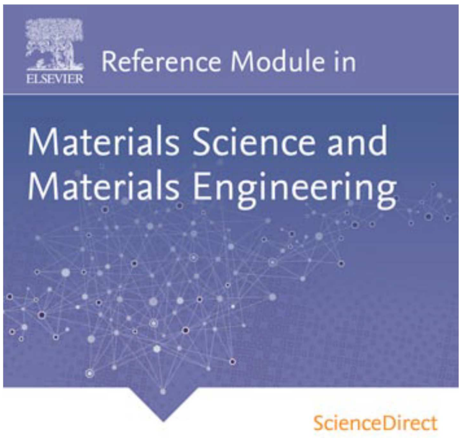
ISBN: 978-1-78242-171-9 (print), ISBN: 978-1-78242-172-6 (online)

This book was written with the intent to provide the reader with indications on the usefulness of infrared thermography within composite materials during development and in-service. Efforts have been made to make the matter easy to read and understand, even for non-experts. Therefore, the theoretical part was minimized, trying to be essential without boring the reader with unnecessary digressions. Some notions on composite materials have been inserted with the purpose being not to teach anything on these materials, but to facilitate the understanding of the utility of infrared thermography in their investigation. Also a general description of the mostly in use non-destructive testing techniques has been made while infrared thermography has been treated more deeply.

The attention was driven towards the use of infrared thermography with a twofold function of non-destructive technique and monitoring device. In fact, as shown in chapter four, infrared thermography can be used to detect either manufacturing defects, like fibres misalignment, voids, slag inclusions, or impact damage and/or degradation occurred in service. In chapter five it has been demonstrated that infrared thermography may be a valuable means for on-line control of the behaviour of materials subjected to mechanical stress.

The obtained results prove that, through visualization of impact-induced thermal signatures, it is possible to getting information useful for the material characterization, specifically for identifying initiation and propagation of the impact damage. In particular, it is possible to circumscribe the whole area affected by the impact and to identify the bands of increasing damage. It has also been stressed, as already done in previous work, the valuable and cost-effective use of an infrared imaging device to assess the extension of the impact damaged area for design purposes. In fact, the use of an infrared imaging device allows for a rapid on-line appraisal avoiding the waste of time in back and forth testing attempts, which is common practice in industrial enterprise to assess the performance under impact of new materials.

A lot has been done, since the appearance of the first infrared imaging device on the market, but much remains to be done. However, the technological progress with the continue release of new devices even more sophisticated, more ergonomic, more light, etc., makes possible new applications, which also requires continue upgrading of procedures, data analysis methods, etc. without end. And perhaps, an infrared imaging device, if used in the most appropriate way, can help make the world more safe!



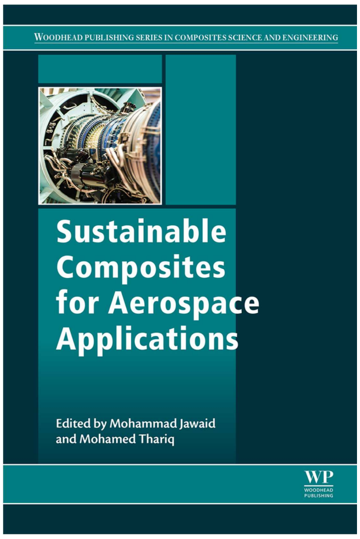
Reference Module in Materials Science and Materials Engineering. Oxford: Elsevier; 2016.
ISBN: 978-0-12-803581-8

Saleem Hashmi (editor-in-chief),
Preface
One of the most important parts of the research process is separating trustworthy, current information from everything else efficiently, this has been too difficult for far too long. Until now.
This interdisciplinary and broad Reference Module covers both the fundamental scientific principles of materials and the technologies which are used to modify, adapt, and improve the characteristics of materials from their primary state to the state suitable for practical application in terms of stock material and components in various shapes, sizes and compositions. This comprehensive online resource forms the definitive source for those entering, researching or teaching in any of the many disciplines making up Materials Science and Materials Engineering.

Meola C., Raj B., Nondestructive Testing and Evaluation: Overview. pp. 1-10.

Premise

Variations in heat treatment, as in the heat-affected zone of a weld, or in a quenched aluminium alloy plate, can lead to significant changes in mechanical properties and hence material performance. The knowledge of micro-structural variations in a component is very important to ensure the desired quality and in-service performance. Similarly, knowledge of residual stresses in a component is essential for reliable assessment of structural integrity. Residual stresses are the system of stresses which exist in a material or component when it is free from external loads. Manufacturing processes are the most common causes of residual stresses. In some instances, residual stress may also be induced later in the life of the structure during installation, assembly, or operation. While tensile residual stresses are generally detrimental, increasing the susceptibility of a component to failures due to fatigue and stress corrosion, the compressive residual stresses are usually beneficial, tending to reduce the above susceptibilities. Traditionally, microstructures are investigated by microscopy methods, which are destructive in nature. With the recent developments in non-destructive technology, investigation of micro-structural adequacy or degradation is possible. Today many requirements such as: damage assessment, life estimation, changes in chemical composition, grain size, texture, phases or other in-homogeneities can be addressed in non-destructive way.



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ISBN: 978-0-08-102131-6 (print), ISBN: 978-0-08-102138-5 (online)

From Preface to the BOOK

The central aim of this book is to present the development, characterization, and applications of composite materials developed from natural fibre/biomass as fillers and reinforcements to enhance material performance for utilization in aerospace components. This book has been written by leading experts in the field of composite materials, and covers composite materials developed from different natural fibres and their hybridization with synthetic fibres. The book chapters will provide cutting-edge, up-to-date research on the use of composite materials in aerospace components from eminent researchers worldwide.

This book covers topics such as materials selection for aerospace components, the role of advanced polymer materials in aerospace, eco-friendly polymer composites for interior parts of aerospace applications, manufacturing techniques of composites for aerospace applications, composite materials overview and testing for aerospace components, sustainable biocomposites for aircraft components, impact damage modeling in laminated composite aircraft structures, natural lightweight hybrid composites for aircraft structural applications, composite patch repair using natural fibre for aerospace applications, sustainable composites for aerospace applications high performance machining of carbon fibre-reinforced plastics, ultrasonic inspection of natural fibre-reinforced composites, the potential of natural fibre/biomass filler-reinforced polymer composites, the potential of natural composite materials in structural design, the low velocity impact properties of natural fibre reinforced composite materials for aeronautical applications, and the potential of natural/synthetic hybrid composites for aerospace applications.

The book will fill the gap in the published literature (published books on composites do not pay much attention to natural fibre-based composites in aerospace components), and provide reference material for future research in natural fibre and hybrid composite materials, which is much in demand due to sustainable, recyclable, and eco-friendly composites needed for different applications. This book is written by renowned experts from India, Malaysia, Italy, Serbia, Japan, and the USA.

Chap 5 Composite Material Overview and its testing for aerospace components

Carosena Meola, Simone Boccardi, Giovanni Maria Carlomagno

This chapter is concerned with the application of infrared thermography to investigate composite materials, which are used for fabrication of aerospace components, and is organized in several sections. In particular, it starts with a brief introduction to composite materials, discussing also their main weaknesses. Then, an overview on the mostly used methods of non-destructive evaluation is given, highlighting some crucial aspects. The core of the chapter regards the description of basics of infrared thermography and the advantages of introducing it in the industrial enterprise; some key examples concerning on-line monitoring of loading tests and non-destructive evaluation of either final parts, or impact damaged parts, are also illustrated. In addition, some critical features, such as noise effects, are addressed with a proposed likely solution. The most important emphasized result regards the possibility to monitor impact tests with an infrared imaging device to get information about initiation and damage propagation directly on-line during the impact event as well as damage extension evaluation through subsequent post-processing of the acquired thermal images.