

ABSTRACTS OF THE 3RD EJIL

LAETA Young Researchers Meeting



7/8 May 2015
Coimbra

ABSTRACTS OF THE 3RD EJIL

LAETA Young Researchers Meeting



**3^o Encontro de Jovens Investigadores do
LAETA**

BOOK OF ABSTRACTS

Edited by
LAETA



IDMEC– Instituto de Engenharia Mecânica (Mechanical Engineering Institute);

Address: Av. Rovisco Pais, ; 1049-001 Lisboa – Portugal

Phone: +351 218417351

Fax: +351 218419634

Email: idmec@dem.ist.utl.pt

Website: <http://www.idmec.ist.utl.pt>



INEGI– Instituto de Ciência e Inovação em Engenharia Mecânica e Engenharia Industrial (Institute of Science and Innovation in Mechanical Engineering and Industrial Engineering);

Address: Rua Dr. Roberto Frias, 400; 4200-465 Porto – Portugal

Phone: +351 229578710

Fax: +351 229537352

Email: inegi@inegi.up.pt

Website: <http://www.inegi.pt>



ADAI– Associação para o desenvolvimento da Aerodinâmica Industrial (Association for the Development of Industrial Aerodynamics);

Address: Rua Pedro Hispano, 12; 3031-289 Coimbra – Portugal

Phone: +351 239708580

Fax: +351 239708589

Email: info@adai.pt

Website: <http://www.adai.pt>



AeroG– Aeronautics and Astronautics Research Center;

Address: Calçada Ft. do Lameiro, 6200-358 Covilhã – Portugal

Phone: +351 275329732

Fax: +351 275329768

Email: jbarata@ubi.pt

Website: <http://aeronautics.ubi.pt/>

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Printed in: Sersilito – Empresa Gráfica, Lda.

Dep. Legal: 391392/15

ISBN 978-989-99080-1-7

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PREFACE

This book of abstracts contains the several works submitted to the 3rd LAETA Young Researchers Meeting (3EJIL – 3º Encontro de Jovens Investigadores do LAETA). LAETA is the acronym for “*Laboratório Associado para a Energia, Transportes e Aeronáutica*” (Associated Laboratory for Energy, Transports and Aeronautics). This meeting, held in Coimbra, is at the moment in the third edition. The first edition was held in Lisbon in 2010 and the second edition was organized in Oporto in 2012. The main objectives of these meetings are the dissemination of the work developed within LAETA and the promotion and encouragement of interdisciplinary discussions among the young researchers of the different units of LAETA, namely: IDMEC, INEGI, ADAI and AeroG.

This book is divided in five chapters according to the topics of the abstracts submitted: Energy, Transports Technology, Aeronautics and Aerospace, Advanced Materials and Advanced Manufacturing, Forest Fires, and Technology Design and Technology Systems. The title of the chapters are based in the research structure and the research lines of LAETA.

The diversity and multidisciplinary of the work developed in LAETA reflected in this book gives a comprehensive, even if not complete, view of the mechanical Engineering fields of activity. Some of the resumes hereby presented result from projects involving all the units of LAETA, gathering several areas of knowledge. The success of these integrative projects can be an inspiration for new ideas and for the development of new projects combining different research areas.

This book of abstracts is complemented by the full papers of the respective abstracts which are available online at <https://app.box.com/3EJIL>. On behalf of the Organizing Committee, I would like to thank all the authors of the resumes which are the reason of being of 3EJIL and consequently of this book.

The spirit of LAETA of merging many fields of expertise and several research units is also manifested in the Organizing Committee of 3EJIL involving elements of all the partners of LAETA. On behalf of the Organizing Committee I manifest our gratefully acknowledge to LAETA and to all the research units by the assistance and the honourable opportunity given. We greatly appreciate the Advisory Committee for the support and advices afforded.

Personally I would like to manifest my sincere gratitude to my colleagues of the Organizing Committee not only for the efficient work performed but especially for the friendly and helpfulness environment lived during the time of preparation of the meeting.

Coimbra, May 07th, 2015

Miguel Almeida

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ADDITIONAL INFORMATION

To open the full papers available online at <https://app.box.com/3EJIL> use the password “coimbra3ejil”.

The correct citation for the full papers is:

[Authors], [Year], [Title of the paper] *in* “Abstracts of the 3rd EJIL - LAETA Young Researchers Meeting”. Coimbra 2015. Edited by LAETA. ISBN 978-989-99080-1-7. Available at <https://app.box.com/3EJIL>.

Maria Goreti Antunes Fernandes^{a*}, Elza Fonseca^a, Renato Natal^a,
Maria Isabel Dias^b

a) INEGI - LAETA, Rua Dr. Roberto Frias 400, 4200-465 Porto

b) UTAD, Quinta de Prados, 5001-801 Vila Real

* e-mail: mgfernandes@inegi.up.pt

Keywords: Bone Cutting, Experimental methods, Temperatures

Abstract.

The bone cutting is a procedure widely used in medicine, including orthopaedic, dental and neuro surgeries. The success of this surgeries is dependent of many factors and also in temperature generation during the drilling bone. When an excessive heat is produced during the drilling bone the thermal necrosis can occur, and the bone suffers injuries. Eriksson and Albrektsson indicated that thermal necrosis in cortical bone from living rabbits occurred when this one reached a temperature of 47 °C for 1 minute. Other authors showed that temperature values above 55 °C for a period longer than 30 seconds can cause great irreversible lesions in bone tissue. The main goal of many researchers has been finding one way for reducing the heat generated in drilling processes. Studies have shown that the increased temperature is directly related with the cutting parameters, particularly, the drill speed, feed-rate, applied force, the depth of cut, the geometry of the drill bit, the use or not of a cooling system and also the type of bone.

This study presents different experimental methodologies for analysis and temperature evaluation during the drilling process of cortical composite materials and ex-vivo porcine bones. In the experimental methodologies were evaluated the influence of different parameters on the bone temperature rise. Different drill speed were used in the experimental tests: 600, 800 and 1200 rpm; feed-rates of 25, 50 and 75mm/min and a drill bit with 4mm of diameter. The combinations of different parameters produced temperatures far below the critical values. It was concluded when the feed-rate is higher the bone temperature increase is lower. The values of temperature in the drilling process of composite material or ex-vivo porcine bones were similar. Therefore the composite materials can supply a good accuracy in predicting the temperature rise during the drilling bone.