



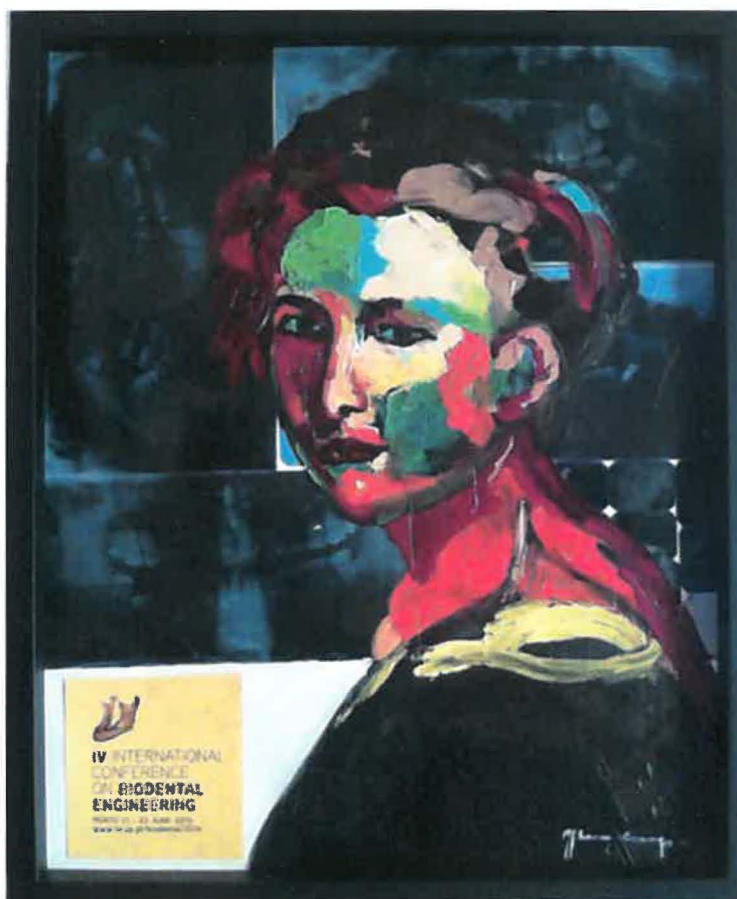
IV INTERNATIONAL CONFERENCE ON **BIODENTAL ENGINEERING**

PORTO - PORTUGAL
21 - 23 JUNE 2016

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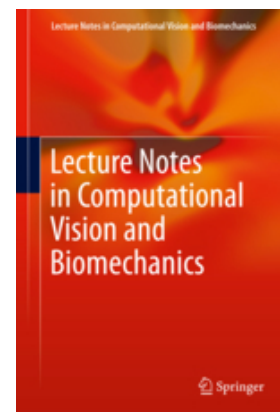
CONFERENCE PROGRAM and ABSTRACTS



**Vila Nova de Famalicão
Portugal**



CONFERENCE PROGRAM and ABSTRACTS



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Reis Campos

Mário Vaz

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Casa das Artes: integrated in Biodental a painting exposition is presented



Centros auditivos Widex



Biodental 2016 was organized in the scope of Project NORTE-01-0145-FEDER-000022 - SciTech - Science and Technology for Competitive and Sustainable Industries, cofinanced by Programa Operacional Regional do Norte (NORTE2020), through Fundo Europeu de Desenvolvimento Regional (FEDER).





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VENUE

Casa das Artes
Av. Carlos Bacelar
Parque de Sinções
4760-103 Vila Nova de Famalicão

<http://www.casadasartes.org/>

GPS Coordinates:

N: 41° 24' 50"

W: 8° 31' 03"

Tel.: +351 252 371 304 / +351 252 371 297

e-mail: casadasartes@vilanovadefamalicao.org





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Tuesday Room: 'Pequeno Auditório'	
10:30	Registration
11:30	Opening Session
12:00	Oral presentations – Session I Chairpersons: Mário Vaz / Fernanda Gentil
	MANDIBLE ANOMALIES – HOW CAN TWO-DIMENSIONAL ULTRASOUND HELP? Inês Côrte-Real, Rosete Nogueira, Ana Cristina Braga, António Felino, Vicente Campos, Francisco Valente, Paula Vaz
	TRIDIMENSIONAL SCAFFOLDS IN BONE REGENERATION Mariane Beatriz Sordi, Isis Carvalho Encarnação, Águedo Aragonês, Mabel Mariela Rodriguez Cordeiro, Ricardo de Souza Magini
	DEGRADATION OF DENTAL IMPLANT SYSTEMS AFTER IMMERSION IN THERAPEUTIC GELS Gabiella M. P. Juanito, Maithe S. Araujo, Filipe S. Silva, Ricardo S. Magini, Júlio C. M. Souza
	PALATAL OBTURATORS FOR CLEFT PALATE PATIENTS Marco António Silva, André Correia, Vicente Campos, Teresa Pereira Leite, Reis Campos
13:00	Lunch (<i>Massimo Restaurante</i>)



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Tuesday Room: 'Pequeno Auditório'	
14:30	<p>Oral presentations – Session II Chairpersons: João Tavares / Paula Vaz</p> <p>CONVERGENCE ANGLE OF PREPARED TEETH FOR FULL CROWNS Inês Meireles Silva, Alexandra Matos Oliveira, Paulo Rocha-Almeida, Paula Vaz, César Silva, João Sampaio-Fernandes</p> <p>VIRTUAL DIE-SPACING - EVEREST® (KAVO®) SYSTEM EVALUATION Paulo Rocha-Almeida, JC Reis Campos, Tiago Coutinho Almeida, Paula Vaz, César Silva, João Sampaio-Fernandes</p> <p>SURFACE FINISHING IN TOOTH PREPARATION FOR FIXED PROSTHODONTICS – COMPARATIVE STUDY Estevão Correia, Paulo Rocha-Almeida, Manuel A Sampaio-Fernandes, Paula Vaz, César Silva, João Sampaio-Fernandes</p> <p>DERMAL ZIGOMATIC PERI-IMPLANT REACTION – GENE EXPRESSION? Margarida Sampaio-Fernandes, Luís Tovim, Levi Rau, César Silva, João Sampaio-Fernandes, Paula Vaz</p> <p>KAVO PREPASSISTANT® SYSTEM: RELIABILITY Francisco Maligno, Kevin Oliveira, Paulo Rocha-Almeida, João Carlos Pinho, João Sampaio-Fernandes</p> <p>IMPLANT STABILITY QUOTIENT (ISQ) – FROM SURGERY TO PROSTHETIC REHABILITATION MA Sampaio-Fernandes, Luís Guilherme Pimentel, Nuno Mesquita Marques, JC Sampaio-Fernandes, Paulo Júlio Almeida</p>
16:30	<p><i>Welcome Reception and Social Program</i></p>



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Wednesday Room: 'Pequeno Auditório'	
09:30	<p>Invited Lecture</p> <p>Beyond the Smile: Psychological Readings of the Teeth in Painting Sofia Torres, Faculdade de Belas Artes da Universidade do Porto</p> <p>Chairperson: Reis Campos</p>
10:30	<p>Coffee break</p>
11:00	<p>Oral presentations – Session III Chairpersons: JC Sampaio-Fernandes / Marco Parente</p> <p>DETERMINATION OF OPTIMAL PARAMETERS IN DRILLING COMPOSITE MATERIALS TO MINIMIZE THE MACHINING TEMPERATURE USING THE TAGUCHI METHOD Ana C. Lopes, Maria G. A. Fernandes, João E. Ribeiro, Elza M.M. Fonseca</p> <p>CYCLIC TORSIONAL TESTING OF TITANIUM AND ZIRCONIA DENTAL IMPLANTS Marco Martins, José Reis, M. Fátima Vaz, Luís G. Reis</p> <p>TRIDIMENSIONAL SCAFFOLDS IN BONE REGENERATION Mariane Beatriz Sordi, Isis Carvalho Encarnação, Águedo Aragonês, Mabel Mariela Rodriguez Cordeiro, Ricardo de Souza Magini</p> <p>NEW STRATEGIES TO ZIRCONIA IMPLANT APPLICATIONS Rafael S. F. Pereira, Filipe S. P. Silva, Bruno Henrique, Márcio C. Fredel</p> <p>INFLUENCE OF SELECTIVE ETCHING ON MARGINAL FILTRATION OF SELF-ETCHING ADHESIVES Sebastiana Arroyo Bote, X. Martinez Arroyo, M^a C. Manzanares Céspedes</p> <p>MECHANICAL PROPERTIES OF ORTHODONTIC ARCHWIRES: INFLUENCE OF TYPE OF ALLOY AND SURFACE COATING Spalj S, Musa Trolic I, Katic V, Turco G, Contardo L.</p> <p>EFFECT OF DRILL SPEED ON BONE DAMAGE DURING DRILLING Maria G Fernandes, Lucas Azevedo, Renato Natal Jorge, Elza M M Fonseca, João E P C Ribeiro</p> <p>EFFECT OF THE CHANGE IN THE PH VALUE OF ARTIFICIAL SALIVA ON MECHANICAL PROPERTIES OF ORTHODONTIC ARCHWIRES Katic V, Kamenar E, Zelenika S, Marković K, Spalj S</p>
13:00	<p>Lunch (<i>Massimo Restaurante</i>)</p>



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Wednesday

Room: 'Pequeno Auditório'

Oral presentations – Session IV

Chairpersons: Maria Helena Figueiral / Elza Fonseca

14:30

AN OVERVIEW OF DENTAL IMPLANT MATERIALS

S. Madeira, O. Carvalho, G. Miranda, J. Caramês, F.S. Silva

BENEFITS OF MULTI-LAYERED MATERIALS IN DENTISTRY

Júlio C. M. Souza, Bruno Henriques, Marcio C. Fredel, Filipe S. Silva

STRESS DISTRIBUTION AROUND ANGLED IMPLANTS WITH DIFFERENT LENGTHS: AN IN VITRO ANALYSIS

Joana Xavier, Tiago Borges, Marco Parente, Ricardo Faria-Almeida, João Manuel R.S. Tavares

SURFACE CHANGES (SCANNING ELECTRON MICROSCOPE) INDUCED BY ARTIFICIAL SALIVA IN STAINLESS STEEL ORTHODONTIC LOOPS

Saúl Castro, Eugénio Martins, Maria Ponces, Jorge Lopes; Maria Pollmann

EXPERIMENTAL STUDY OF A NEW BIOMEMBRANE (MES) FOR GUIDED BONE REGENERATION

Raquel Zita Gomes, Isabel Guerra, Américo Afonso, Maria Helena Fernandes, José Cavalheiro, Mário Vasconcelos, Antonio Felino

SURFACE ROUGHNESS OF STAINLESS STEEL ORTHODONTIC LOOPS IN ARTIFICIAL SALIVA

Saúl Castro, Ramiro Martins, Reis Campos, Paulo Teles, Maria Pollmann

FLEXIBLE PROSTHESIS IN POLYAMIDE – LITERATURE REVISION

Rui Costa, Maria Helena Figueiral, José Reis Campos

DENTURE ADHESIVES – A REVIEW

Carlos Almeida, Margarida Sampaio-Fernandes, José Reis Campos, José Mário Rocha, Maria Helena Figueiral, João Sampaio-Fernandes

FIXED PROSTHODONTICS - CLINICAL VERSUS PRE-CLINICAL PRACTICE

Carlos Almeida, Rui Machado, Orlando Lino, César Silva, João Carlos Sampaio-Fernandes

17:00

Coffee break



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Wednesday Room: 'Pequeno Auditório'	
	<p>Thematic Session on Numerical Remodelling Analysis of Bone Tissue – Session I</p> <p>Organizers: Jorge Belinha (INEGI-FEUP), M^a Cristina Manzanares Céspedes (U Barcelona), António Completo (U Aveiro), Susana Vinga (IDMEC-IST)</p>
17:30	<p>THE ANALYSIS OF BAR IMPLANTS: A NUMERICAL STUDY J. Belinha, L.M.J.S. Dinis, R.M.Natal Jorge</p> <p>STRESS ANALYSIS OF 3D TRABECULAR PATCHES: A COMPARISON STUDY C.I.R.A Maia dos Santos, M.C. Marques, J.Belinha, M.C. Manzanares Céspedes, Catherine Chaussain, R.M. Natal Jorge</p> <p>BIPARTITE MEDIAL CUNEIFORM X-ray MICROTOMOGRAPHIC (μCT) IMAGE ANALYSIS Alicia Baltasar-Sánchez, Ángel González-Sistal, Miquel Dalmau-Pastor, Betlem Fargues-Polo, Maria-Cristina Manzanares-Céspedes</p> <p>A 2D STRESS ANALYSIS OF ZIRCONIA DENTAL IMPLANTS: A COMPARISON STUDY L.G.Piqueiro, J.Belinha, A.M.R.Correia, L.M.J.S.Dinis, R.M.Natal Jorge</p> <p>MICROSCOPIC AND ULTRAMICROSCOPIC ANALYSIS of "IN VIVO" TREPHINE PATIENT'S BIOPSIES I. Valdivia-Gandur, E. Sánchez-García, V. Beltrán-Varas, R. Fuentes-Fernández, W. Engelke, C. Bucchi-Morales, MC. Manzanares-Céspedes</p> <p>THE NUMERICAL ANALYSIS OF ANGLED ABUTMENTS USING ADVANCED DISCRETIZATION TECHNIQUES R.O.S.S. Costa, J. Belinha, L.M.J.S. Dinis, R.M. Natal Jorge</p>
19:30	<i>Departure for conference dinner</i>




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CONFERENCE DINNER

Conference dinner	
20:00	<p>Restaurante</p> <p>Pátio das Figueiras</p> <p>Rua do Além 257 4760-075 Vila Nova de Famalicão</p>
	



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Thursday Room: 'Pequeno Auditório'	
09:15	<p>Thematic Session on Numerical Remodelling Analysis of Bone Tissue – Session II</p> <p>Organizers: Jorge Belinha (INEGI-FEUP), M^a Cristina Manzanares Céspedes (U Barcelona), António Completo (U Aveiro), Susana Vinga (IDMEC-IST)</p> <p>DEVELOPMENT OF A STAND-ALONE SOFTWARE IN MATLAB TO RECOGNIZE MULTI-SCALE BONE STRUCTURES BONE M. Marques, J. Belinha, M.C. Manzanares Céspedes, Catherine Chaussain, R.M. Natal Jorge</p> <p>EFFECTS OF DYNAMIC COMPRESSION ON CELLS IN TISSUE ENGINEERING OF MANDIBULAR CONDYLAR CARTILAGE S. Cortez, A. Completo, J.L. Alves</p> <p>A NEW BONE TISSUE REMODELLING ALGORITHM COMBINING THE MECHANICAL STIMULI WITH CELLULAR DYNAMICS M. Peyroteo, J. Belinha, S. Vinga, L.M.J.S. Dinis, R.M. Natal Jorge</p> <p>INFLUENCE OF POROSITY AND CELL DENSITY ON TISSUE ENGINEERING OF MANDIBULAR CONDYLAR CARTILAGE S. Cortez, A. Completo, J.L. Alves</p> <p>ENDODONTIC-PERIODONTAL LESIONS: A 2D COMPUTATIONAL STUDY P.F.O. Lopes, J. Belinha, L.M.J.S. Dinis, R.M. Natal Jorge</p>
10:30	Coffee break



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Thursday Room: 'Pequeno Auditório'	
	Oral presentations – Session V Chairpersons: Margarida Sampaio-Fernandes / Renato Natal Jorge
11:00	<p>DEVELOPMENT, LABORATORY AND CLINICAL EVALUATION OF A TMJ DISTRACTION DEVICE FOR PATIENTS WITH ARTICULAR DISORDERS DIAGNOSIS – THE PROJECT. Júlio Fonseca, Luís Roseiro, Pedro Nicolau</p> <p>IMAGE PROCESSING TECHNIQUES AND ORTHODONTIC RELATED APICAL ROOT RESORPTION PREDICTION MODELS Sónia Alves, Henriqueta Silva, Luís Mesquita, Nuno Lavado, Miguel Lopez</p> <p>IN VITRO ACCURACY AND SENSIBILITY OF A COMPUTERIZED OCCLUSAL ANALYSIS SYSTEM: T-SCAN III HD Júlio Fonseca, Mário Martins, Pedro Nicolau</p> <p>ARTICULATING PAPER MARKINGS INTERPRETATION CANNOT ACCURATELY DETERMINE OCCLUSAL FORCE Júlio Fonseca, Joana Pereira, Pedro Nicolau</p> <p>IN VITRO STUDY OF ANTIFUNGAL DRUG EFFECT IN A TISSUE CONDITIONER Bibiana M. Assunção, Mariana Henriques, Célia F. Rodrigues, Paula Vaz, Helena Figueiral, Ana Cristina Braga, Sampaio Fernandes</p> <p>RESIDUAL RIDGE RESORPTION IN PATIENTS WITH MANDIBULAR KENNEDY CLASS I REMOVABLE PARTIAL DENTURES Ana Messias, Fernando Guerra, Maria Augusta Neto, Pedro Nicolau</p> <p>PATIENT-SPECIFIC RECONSTRUCTION UTILIZING COMPUTER ASSISTED 3D MODELLING FOR PARTIAL BONE FLAP DEFECT IN CRANIOPLASTY Low Peh Hueh, Johari Yap, Abdul Manaf Abdullah, Suzana Yahya, Zamzuri Idris, Zainul Ahmad Rajion, Dasmawati Mohamad</p>
12:30	Closing Session
13:00	Lunch (<i>Massimo Restaurante</i>)

DETERMINATION OF OPTIMAL PARAMETERS IN DRILLING COMPOSITE MATERIALS TO MINIMIZE THE MACHINING TEMPERATURE USING THE TAGUCHI METHOD

Ana C. Lopes (1), Maria G. A. Fernandes (2), João E. Ribeiro (3), Elza M.M. Fonseca (4)

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Introduction

Dental implant is used to replace the natural dental root. The process to fix the dental implant in the maxillary bone needs a previous drilling operation. This machining operation involves the increasing of temperature in the drilled region which can reach values higher than 47°C and for this temperature is possible to occur the osseous necrosis [1]. The main goal of this work is to implement an optimization method to define the optimal drilling parameters that could minimize the drilling temperature. The proposal optimization method is the Taguchi method. This method has been used with success in machining processes optimization of metallic materials [2]. However, the Taguchi method is also used in medical applications, namely in dental medicine [3].

Material and methods

For this study were used blocks of Sawbones in composite material (Figure1), a computer, a MGC data acquisition system, type K thermocouples and a CNC machine programmed to drill the blocks.

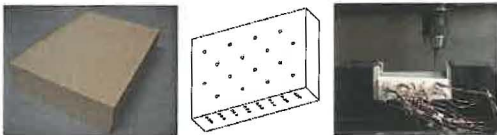


Figure1: Sawbones block (left), Solidworks drawing with marking holes and block drilling, thermocouples [4].

Several tests were performed and it was possible to record the temperature in the material for different depths as can be seen in Figure 2. The material used is a composite which has mechanical properties similar to cortical bone.

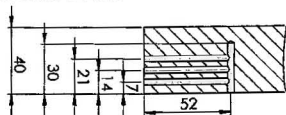


Figure2: Position of the thermocouples.

To implemented the experimental tests was used the Taguchi orthogonal array L₁₈ with three parameters. In table 1 is presented the parameters and their levels.

Table1: Parameters and their levels used in experimental tests.

Symbol	Cutting Parameters	Level 1	Level 2	Level 3
A	Irrigation	Yes	No	-
B	Spindle Speed [rpm]	600	800	1200
C	Position	7	14	21

For each combination of parameters and levels were measured the temperature with the thermocouples. Using the obtained results was implemented an ANOVA analysis which is represented in table 2.

Table 2: ANOVA analysis of results.

Source	DF	Adj SS	Adj MS	F-Value	P-Value	% Contribution
A	1	110.18	110.18	43.57	0.000	51.1
B	2	66.374	33.187	13.12	0.001	30.8
C	2	8.702	4.351	1.72	0.220	4.0
Error	12	30.346	2.529			14.1
Total	17	215.602				

Conclusions

The Taguchi method proved that can be used as optimization method to determine the best parameters combination to obtain the minimum temperatures in the drilling process. The combination of parameters and levels which provide the minimum average temperature is A1B3C1. By ANOVA analysis was possible to verify that the irrigation parameter is the most influent in the drilling temperature.

References

- [1] Eriksson RA, Albrektsson T. The effect of heat on bone regeneration: An experimental study in the rabbit using the bone growth chamber. *Journal of Oral and Maxillofacial Surgery*, 1984, 42: 705-711.
- [2] Kurt M, Bagci E, Kaynak Y. Application of Taguchi methods in the optimization of cutting parameters for surface finish and hole diameter accuracy in dry drilling processes. *Int J Adv Manuf Technol*, 2009, 40: 458-469.
- [3] Pandey RK, Panda SS. Evaluation of delamination in drilling of bone. *Medical Engineering and Physics*, 2015, 37: 657-664.
- [4] Sampaio C., *et al.* The assessment of the generated temperature by the drill bit in the bone tissue. In *Proceedings of III International Conference of Biomedical Engineering*, Porto, Portugal, 22-23 June, 2014