

4th International Conference Recent Trends in Structural Materials (COMAT 2016)

IOP Conference Series: Materials Science and Engineering
Volume 179

Pilsen, Czech Republic
9 – 11 November 2016

Editors:

**Jan Dzugan
Zbysek Novy**

ISBN: 978-1-5108-3717-1
ISSN: 1757-8981

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2016) by the Institute of Physics
All rights reserved. The material featured in this book is subject to
IOP copyright protection, unless otherwise indicated.

Printed by Curran Associates, Inc. (2017)

For permission requests, please contact the Institute of Physics
at the address below.

Institute of Physics
Dirac House, Temple Back
Bristol BS1 6BE UK

Phone: 44 1 17 929 7481
Fax: 44 1 17 920 0979

techtracking@iop.org

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2633
Email: curran@proceedings.com
Web: www.proceedings.com

Table of contents

Volume 179

**4th International Conference Recent Trends in Structural Materials
9–11 November 2016, Pilsen, Czech Republic**

**Accepted papers received: 14 February 2017
Published online: 1 March 2017**

Preface

011001

OPEN ACCESS

[4th International Conference Recent Trends in Structural Materials](#)

011002

OPEN ACCESS

[Peer review statement](#)

Papers

012001

OPEN ACCESS

[Features of the physico-mechanical behavior of UFG low-alloyed bronze Cu-1Cr-0.08Zr produced by severe plastic deformation](#)

D A Aksenov, R Asfandiyarov, G I Raab and G B Isyandavletova.....1

012002

OPEN ACCESS

[Investigations of influence of vibration smoothing conditions of geometrical structure on machined surfaces](#)

D Bańkowski and S Spadło.....6

012003

OPEN ACCESS

[Increase of chromium yield by slag reduction during production of chromium steels](#)

J Bažan, L Socha, V Kurka, P Jonšta and M Sušovský.....12

012004

OPEN ACCESS

[Finite element analysis regarding the forming behaviour of symmetric hybrid structures consisting of two sheet metal outer layers and a thermoplastic core](#)

B-A Behrens, A Bouguecha, C Bonk and H Schulze.....19

012005

OPEN ACCESS

[Numerical and experimental investigations on an extrusion process for a newly developed ultra-high-carbon lightweight steel for the automotive industry](#)

B-A Behrens, A Bouguecha, C Bonk, D Yarcu and M Kazhai.....26

012006

OPEN ACCESS

[Numerical analysis of a deep drawing process with additional force transmission for an extension of the process limits](#)

B-A Behrens, C Bonk, N Grbic and M Vucetic.....33

012007

OPEN ACCESS

[Simulation model of Al-Ti dissimilar laser welding-brazing and its experimental verification](#)

M Behúlová, E Babalová and M Nagy.....39

012008

OPEN ACCESS

[Numerical simulation of multi-ripled tube drawing – finding proper feedstock dimensions and tool geometry](#)

P Bella, P Buček, M Ridzoň, M Mojžiš and L' Parilák.....46

012009

OPEN ACCESS

[New heat treatment process for advanced high-strength steels](#)

D Publíková, Š Jeníček, I Vorel and B Mašek.....54

012010

OPEN ACCESS

[Magnetic properties of 42CrMo4 steel](#)

T Bulin, E Svabenska, M Hapla, P Roupčova, C Ondrusek and O Schneeweiss.....62

012011

OPEN ACCESS

[Automated microstructural analysis of titanium alloys using digital image processing](#)

A Campbell, P Murray, E Yakushina, S Marshall and W Ion.....68

012012

OPEN ACCESS

[Properties and microstructure of twin-roll cast Al-Mg alloy containing Sc and Zr](#)

M Cieslar, J Bajer, M Zimina, M. Šlapáková and O Grydin.....74

012013

OPEN ACCESS

[Heat treatment of nitrated layer formed on X37CrMoV5-1 hot working tool steel](#)

A Ciski, P Wach, J Tacikowski, T Babul and P Šuchmann.....81

012014

OPEN ACCESS

[Elements for the modeling of the thermal process in heating furnaces for steel forming](#)

D Constantinescu and A B Carlan.....89

012015

OPEN ACCESS

[Experimental comparison between upsetting characteristics of porous components prepared by Fe-based sintering technology](#)

W Depczyński, T Miłek and Ł Nowakowski.....95

012016

OPEN ACCESS

[Bainite austenitization in 51CrV4 spring steel: accelerated cementite spheroidisation](#)

J Dlouhy, D Hauserova and P Motycka.....102

012017

OPEN ACCESS

[Improvement of wear resistance for C45 steel using plasma nitriding, nitrocarburizing and nitriding/ manganese phosphating duplex treatment](#)

T V Doan, D Kusmič, M Pospíchal and D Dobrocký.....108

012018

OPEN ACCESS

[Structure and mechanical characterization of Mg-Nd-Zn alloys prepared by different processes](#)

D Dvorský, J Kubásek, D Vojtěch, I Voňavková, M Veselý and M Čavojský.....116

012019

OPEN ACCESS

[Mechanical properties determination of AM components](#)

J Dzugan, M Sibr, P Konopík, R Procházka and M. Rund.....122

012020

OPEN ACCESS

[Mini-tensile specimen application for sheets characterization](#)

J Džugan, M Rund, A Prantl and P Konopík.....128

012021

OPEN ACCESS

[A study of carbide dissolution in bearing steels using computational thermodynamics and kinetics](#)

E Erişir, O G Bilir and A E Gezmişoğlu.....135

012022

OPEN ACCESS

[Study of martensitic-ferritic dual phase steels produced by hot stamping](#)

E Erişir and O G Bilir.....141

012023

OPEN ACCESS

[Sheet necking prediction in forming limit diagrams with the anisotropy influence incorporation](#)

P Farahnak, A Prantl, J Dzugan, P Konopik and R Prochazka.....147

012024

OPEN ACCESS

[Prediction of thinning of the sheet metal in the program AutoForm and its experimental verification](#)

M Fedorko, M Urbánek and M Rund.....153

012025

OPEN ACCESS

[3D printed porous stainless steel for potential use in medicine](#)

M Fousová, J Kubásek, D Vojtěch, J Fojt and J Čapek.....160

012026

OPEN ACCESS

[Strain-amplitude dependent cyclic hardening of 08Ch18N10T austenitic stainless steel](#)

J Fumfera, J Dzugan, J Kuželka, R Procházka and M Španiel.....166

012027

OPEN ACCESS

[Sintering and heat treatment of \$Al_{15}Ti_5Co_{35}Ni_{25}Fe_{20}\$ high-entropy alloy](#)

K Górecki, J Zýka, J Malek, J Horvát, J Čapek and P Bała.....172

012028

OPEN ACCESS

[Mechanical properties and structure of AZ61 magnesium alloy processed by equal channel angular pressing](#)

O Hilšer, S Ruzs, T Tański, P Snopiński, J Džugan and M Kraus.....179

012029

OPEN ACCESS

[The effect of the material surface oxidation on laser light absorption](#)

M Hruška, J Tesař, M Vostřák and E Smazalová.....186

012030

OPEN ACCESS

[Testing of T91 steel in heavy liquid metals](#)

M Chocholoušek, Z Fulín, J Janoušek and Z Špirit.....192

012031

OPEN ACCESS

[Reinforcement of the bulk crowns excavator technology by dispersion hardening of titanium carbide to increase wear resistance](#)

I Chumanov, A Anikeev and V Chumanov.....197

012032

OPEN ACCESS

[Creep test with use of miniaturized specimens](#)

E Chvostová and J Džugan.....203

012033

OPEN ACCESS

[Using of material-technological modelling for designing production of closed die forgings](#)

K Ibrahim, I Vorel, Š Jeníček, J Káňa, D Aišman and V Kotěšovec.....209

012034

OPEN ACCESS

[Fatigue performance of blade steel T552 in a corrosive environment](#)

J Janoušek, S Hřeben, Z Špirit, J Strejcius and J Kasl.....215

012035

OPEN ACCESS

[Effect of silicon on stability of austenite during isothermal annealing of low-alloy steel with medium carbon content in the transition region between pearlitic and bainitic transformation](#)

Š Jeníček, I Vorel, J Káňa, K Ibrahim and V Kotěšovec.....221

012036

OPEN ACCESS

[Semi-solid processing of high-chromium tool steel to obtain microstructures without carbide network](#)

H Jirková, D Aišman, K Rubešová, K Opatová and B Mašek.....227

012037

OPEN ACCESS

[High-strength state of ultrafine-grained martensitic steel produced by high pressure torsion](#)

M V Karavaeva, M A Nikitina, A V Ganeev and R K Islamgaliev.....233

012038

OPEN ACCESS

[Characterization of TiAl based alloys with various content of carbon](#)

A Klimová, J Lapin and T Pelachová.....242

012039

OPEN ACCESS

[Correlation between standard Charpy and sub-size Charpy test results of selected steels in upper shelf region](#)

P Konopík, J Džugan, T Bucki, S Rzepa, M Rund and R Procházka.....248

012040

OPEN ACCESS

[Comparison of irradiated 15Kh2MFA material mechanical properties using conventional testing methods and innovative approach of small punch testing \(SPT\) and automated ball indentation \(ABIT\)](#)

R Kopriva, P Petelova, I Eliasova, M Kytka and M Culek.....254

012041

OPEN ACCESS

[Impact of quenching temperature and isothermal holding time during austempering on bainite content in high-silicon steel](#)

V Kotěšovec, I Vorel, Š Jeníček, J Káňa and K Ibrahim.....260

012042

OPEN ACCESS

[Influence of the input parameters on the efficiency of plaster sanding with alundum abrasive discs](#)

D Krajcarz, S Spadło and P Młynarczyk.....265

012043

OPEN ACCESS

[Aluminium alloys with transition metals prepared by powder metallurgy](#)

V Kucera, F Prusa and D Vojtech.....270

012044

OPEN ACCESS

[High ductility of bainite-based microstructure of middle carbon steel 42SiMn](#)

L Kučerová, M Bystrianský and Š Jeníček.....276

012045

OPEN ACCESS

[Modeling plasticity of materials with nanostructure](#)

N R Kudinova.....282

012046

OPEN ACCESS

[Tribological and corrosion properties of plasma nitrided and nitrocarburized 42CrMo4 steel](#)

D Kusmic and D Van Thanh.....289

012047

OPEN ACCESS

[Evaluation of the effectiveness of the use of horizontal and vertical rolls in the "Rolling-pressing" process on the basis of the stress-strain state studying](#)

S Lezhnev, A Naizabekov, E Panin, T Koinov, I Mazur and A Arbuz.....297

012048

OPEN ACCESS

[Hydrogen effect on compression mechanical properties of TiNb alloys at elevated temperatures](#)

M Losertová, O Štefek, I Schindler, L Szkandera and P Kudela.....303

012049

OPEN ACCESS

[Influence of rotary swaging and subsequent age hardening on properties of EN AW 6082 aluminium alloy](#)

L Maleček, J Palán, J Nacházel and J Dlouhý.....309

012050

OPEN ACCESS

[Processing of bulk Al7075 alloy by spark plasma sintering](#)

P Málek, O Molnárová, J Cinert, F Lukáč and T Chráska.....315

012051

OPEN ACCESS

[FEM model and experimental measurement of clinched joint](#)

P Malý, F Lopot and J Sojka.....321

012052

OPEN ACCESS

[A method for assessing the wear of sanding abrasive discs differing in the type of grains \(SiC, Al₂O₃\(95A\)\)](#)

P Młynarczyk, S Spadło and D Krajcarz.....327

012053

OPEN ACCESS

[Effects of the pouring temperature on the formation of the bonding zone between AZ91 and AlSi17 in the compound casting process](#)

R Mola, T Bucki and A Dziadoń.....332

012054

OPEN ACCESS

[Experimental and computational evaluation of rolling bearing steel durability](#)

L Nohál and M Vaculka.....338

012055

OPEN ACCESS

[The effect of annealing on mechanical and structural properties of UFG titanium grade 2](#)

J Palán, T Kubina and P Motyčka.....342

012056

OPEN ACCESS

[Implementation of American weld connection standards into finite element computations](#)

M Peč, P Vosynek, F Šebek and T Návrat.....349

012057

OPEN ACCESS

[Fe-Mn\(Al, Si\) TWIP steel – strengthening characteristics and weldability](#)

P Podany, M Koukolikova, T Kubina, R Prochazka and A Franc.....356

012058

OPEN ACCESS

[Prediction of fracture in the shearing process using DEFORM and MARC software](#)

I Poláková, M Urbánek, T Kubina and J Džugan.....363

012059

OPEN ACCESS

[Evaluation of in-situ deformation experiments of TRIP steel](#)

J Procházka, L Kučerová and M Bystrianský.....369

012060

OPEN ACCESS

[Strain controlled cyclic tests on miniaturized specimens](#)

R Procházka and J Džugan.....376

012061

OPEN ACCESS

[Development of geometry of forming tools for extrusion of strip sheet by SPD process](#)

S Rusz, M Salajka, J Džugan, O Hilšer, J Bořuta, M Pastrňák and J Švec.....382

012062

OPEN ACCESS

[Influence of relative rolling reduction and thickness layers bimetallic plate at the non-uniformity of the strain after rolling process](#)

D Rydz, G Stradomski and H Dyja.....393

012063

OPEN ACCESS

[Influence of specimen dimensions on ductile-to-brittle transition temperature in Charpy impact test](#)

S Rzepa, T Bucki, P Konopík, J Džugan, M Rund and R Procházka.....400

012064

OPEN ACCESS

[Effect of mechanical treatment on intergranular corrosion of 6064 alloy bars](#)

P Sláma and J Nacházel.....406

012065

OPEN ACCESS

[Mechanical testing of anisotropy in ODS steel tubes](#)

Z Špirit, M Chocholoušek and M Šíma.....413

012066

OPEN ACCESS

[Computer simulation of combination extrusion of ENAW1050A aluminum](#)

P Thomas.....417

012067

OPEN ACCESS

[Distribution of porosity and macrosegregation in slab steel ingot](#)

M Tkadleckova, P Jonsta, Z Carbol, M Susovsky, K Michalek, L Socha, J Sviželová and J Zwyrtek.....423

012068

OPEN ACCESS

[Effect of silicon content on microstructure of low-alloy Q&P-Processed steels](#)

I Vorel, Š Jeníček, J Káňa, K Ibrahim, V Kotěšovec and B Mašek.....429

012069

OPEN ACCESS

[Anticorrosion nitrated layers on unalloyed and alloyed steels](#)

P Wach, J Michalski, K Burdyński and A Ciski.....435

012070

OPEN ACCESS

[The influence of heat treatment on properties of cold rolled alloyed steel and nickel superalloys sheets used in aircraft industry](#)

K Zaba, I Dul and S Puchlerska.....444