

26th International Slovak-Polish Scientific Conference on Machine Modelling and Simulations (MMS 2021)

IOP Conference Series: Materials Science and Engineering
Volume 1199

Bardejov, Slovak Republic
13 - 15 September 2021

Part 1 of 2

Editors:

**Jozef Zajac
Michal Hatala**

**Lucia Knapcikova
Svetlana Radchenko**

ISBN: 978-1-7138-4658-1
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.

This work is licensed under a Creative Commons Attribution 3.0 International Licence.
Licence details: <http://creativecommons.org/licenses/by/3.0/>.

No changes have been made to the content of these proceedings. There may be changes to pagination and minor adjustments for aesthetics.

Printed with permission by Curran Associates, Inc. (2022)

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

PART 1

Preface to the 26th International Slovak-Polish Scientific Conference on Machine, Modelling and Simulations (MMS 2021)	
Peer review declaration	
Alternative methods of verifying the reconstructed outline of a non-standard spur gear 1 <i>K Konecki, R Pytliński, A Kołodziej, G Domek</i>	1
Structural analysis of non-standard geometric variants of a shifted spur gear..... 8 <i>K Konecki, D Wojtkowiak, K Talaška, A Kołodziej, G Domek</i>	8
Assessment of the suitability of a gate design modification compared to the change in pressing velocity considering the distribution of gases in the casting volume 23 <i>J Majerník, M Tupaj, A Trytek, M Podařil</i>	23
Experimental verification of high-strength composite materials using a simulation program 32 <i>L Knapčíková, J Husár, J Kaščák</i>	32
Virtual reality in Industry 44 <i>I Klačková, I Kuric, I Zajačko, V Tlach, D Wiecek</i>	44
Preliminary analysis of the sensitivity of the FEM model of the process of dry ice extrusion in the die with a circularly converging channel on the changing its geometrical parameters..... 57 <i>J Górecki</i>	57
Modeling of Mechanical Properties of the Polymeric Composite Reinforced with Braided Preform..... 66 <i>A Kondratiev, O Andrieiev, A Tsaritsynskyi, T Nabokina</i>	66
Research on influence of mesh parameters modification on solution accuracy of finite element analysis 74 <i>M Handrik, J Majko, M Vaško, F Dorčiak, P Kopas</i>	74
Thermal specification of 3D printed injection moulds made from PA12GB 83 <i>K Raz, Z Chval, M Habrman, A Milsimerova</i>	83
Design and FEM strength analysis of an innovative design of a front loader with an extension dedicated to the KUBOTA M5..... 91 <i>Łukasz Gierz, Tomasz Zwiachel, Mikolaj Spadlo, Zharkevich Olga, Aliya Kukesheva, Ainash Marx, Maciej Mataj</i>	91
Simulation model for evaluation of ergonomic load in the use of exoskeletons 98 <i>D Onofrejová, M Balážiková</i>	98
Study vibration of worm gear boxes..... 106 <i>A Šmeringaiová</i>	106
Optimization and fast prototyping of polymer parts exposed to cyclic loading 116 <i>V Marek</i>	116
Modelling and Analysis of a Virtual Prototype of a Rotary Machine in MSC.ADAMS 124 <i>A Sapietová, V Dekýš, M Sapieta, A Jastraban, M Pástor</i>	124

Simulation modelling of material handling using AGV	132
<i>M Dobrzanska, P Dobrzanski</i>	
The use of digital filtration methods in AGV laser navigation systems	141
<i>P Dobrzanski, M Dobrzanska</i>	
Modeling the damages of belt gears	150
<i>Gawrońska Elżbieta, Domek Grzegorz, Krawiec Piotr, Kołodziej Andrzej</i>	
Gear shape optimization for non-circular gearing	158
<i>S Maláková, S Sivák</i>	
Constructional design of the body shape of large gear wheels	166
<i>S Sivák, S Maláková</i>	
Possibility of using Matlab application to propose fuzzy computer model	177
<i>S Hrehova, J Husár, V Hladký</i>	
Elastic modulus of defected graphene sheets	186
<i>J Bocko, P Lengvarský</i>	
Mechanical properties of ductile cast iron relation to the charge elements	194
<i>H Pacha-Golębiowska, W Piekarska</i>	
Technic solutions analysis and development of the innovation design protective elements of railway tank wagons	200
<i>K Kravchenko, P Šťastniak, J Harušinec, J Gerlici, M Moravčík</i>	
SMART Identification by Vision System.....	213
<i>J Demčák, J Husár, V Hladký</i>	
Contribution to the analysis of grinder vibrations using condition monitoring procedures based on vibration measurements	224
<i>V Dekýš, M Čilíková, M Gavlas, P Novák, A Sapietová, M Pástor</i>	
Modeling of complex construction problems for randomly changing technological processes	231
<i>P. Knast, A. Kołodziej, K. Konecki</i>	
Multibody system simulation as a predictive tool for possible estimation of negative effects caused by vibrations of FDM device.....	242
<i>J Kaščák, M Kočiško, L Knapčíková, T Coranič, J Tôrök</i>	
Virtual reality and its possible integration into the process of distance learning focused on technically oriented subjects.....	251
<i>E Franas, M Kočiško, J Kaščák, S Hlavatá, A Vodilka</i>	
Thermal and Mechanical Characterization of Drawn Polypropylene Fibres.....	261
<i>V Krmelová, M Gavendová, J Krmela, P Skalková, E Loksik</i>	
Composite Materials with Epoxy Matrix and Their Properties	270
<i>P Skalková, V Krmelová, J Krmela, D Ondrušová, A Crkoň, E Benčíková</i>	
Technical solution of the modern conveyor system	285
<i>L Jakubovičová, P Kopas, M Vaško, M Handrik</i>	
Improving measuring line parameters of the UIC test bench	295
<i>F Pribilinec, L Čajkovič</i>	

Analysis of selected properties of powdered compacts	303
<i>D Olekšáková</i>	
Influence of asymmetric airflow on the cooling performance of brake disc of railway vehicle.....	312
<i>V Pavelčík, Y Fomina</i>	
The use of illite in function of filler applied in rubber blend.....	321
<i>M Pajtášová, B Pecušová, S Ďurišová, D Ondrušová, Z Mičicová, A Feriancová, S Brigantová</i>	
Study of new elastomeric composite systems containing wood ash based alternative filler	332
<i>D Ondrušová, S Božeková, M Pajtášová, I Labaj, M Božek, J Vršková, P Skalková</i>	
Curing characteristics and rheological properties of bentonite- filled rubber blends	340
<i>Z Mičicová, S Božeková, M Pajtášová, D Ondrušová</i>	
The influence of liquid rubber on selected properties of rubber compound and its vulcanizates	348
<i>S Brigantová, M Pajtášová, R Janík, D Ondrušová, S Ďurišová</i>	
Component assembly for determination of elastomeric vulcanizate frictions	357
<i>I. Labaj, D. Ondrušová, J. Vršková, M. Pajtášová, A. Feriancová</i>	
The influence of silane on the physico-mechanical properties of vulcanizates using bentonite fillers	369
<i>A Feriancová, A Dubec, J Pagáčová, I Labaj, M Pajtášová</i>	
Application of biowaste in rubber blend	377
<i>S Božeková, Z Mičicová, D Ondrušová, M Pajtášová, M Božek</i>	
Design and selection of a belt drive for an electric generator.....	386
<i>M Dudziak, G Domek</i>	
Modern trends in the development of electrical discharge machining	394
<i>P Kuchta, E Straka, J Žajac, S Radchenko</i>	
Failure analysis of flexible couplings by self-heating	404
<i>R Grega, M Kacir, J Krajnák</i>	
Destructive and non-destructive testing of samples from PLA and PETG materials	412
<i>T Balint, J Živčák, R Hudák, T Tóth, M Kohan, S Lancoš</i>	
Modelling and optimization of energy intensity of an electrical discharge machine.....	423
<i>E Straka, T Krenický, P Kuchta</i>	
Kinematic and dynamic analysis and distribution of stress for six-item mechanism by means of the SolidWorks program	433
<i>J Vavro, J Vavro, L Marček, M Taraba, L Klimek</i>	
Modification of the glass surface by DCSBD plasma discharge to improve adhesion of decorative gold.....	443
<i>R Janík, V Vargová, J Šulcová, M Pajtášová</i>	
System of Water Vehicle Power Plant Remote Condition Monitoring	451
<i>A Golovan, I Honcharuk, O Deli, O Kostenko, Y Nykyforov</i>	
Experimental verification tests of isokinetic equipment used in sport and rehabilitation	462
<i>G Harčarik</i>	

Increase of Technical Condition Control Efficiency of Marine Railways.....	473
<i>I Honcharuk, A Golovan, A Voloshyn, O Kostenko, O Deli</i>	
The Concept of Implementation of Multifrequency RFID System Industrial Involvement in Laboratory Conditions.....	484
<i>J Husár, L Knapčíková, S Hrehová</i>	
Influence of design features of a multi-edge shredder on the operational characteristics of the process of comminution corn stalks	496
<i>D Łączny, M Macko, K Moraczewski, J Lewandowski</i>	

PART 2

Modeling and analysis of motion with wheel slip of the mobile platform with four wheel drive	503
<i>A Jaskot, B Posiadala</i>	
Results verification of numerical simulation of the side impact of a vehicle in a three-point bending test	514
<i>E Evin, S Nemeth</i>	
Thermo-elastostatic analyzes of new dampers made of polymer springs with negative thermal expansion.....	522
<i>J Murin, V Goga, J Paulech, J Hrabovský, T Sedlár, V Kutiš, M Aminbaghai</i>	
Influence of the parameters of the extrusion process on the properties of PLA composites with the addition of graphite.....	538
<i>K Fiedurek, P Szroeder, M Macko, A Raszowska-Kaczor, N Puszczkowska</i>	
The method of obtaining polymer masterbatches based on polylactide with carbon filler.....	548
<i>D Kaczor, K Bajer, G Domek, A Raszowska-Kaczor, P Szroeder</i>	
Optimization of the Study Materials Design in the Conditions of the COVID-19 Pandemic	561
<i>D Knežo</i>	
Longitudinal critically refracted (LCR) ultrasonic wave for residual stress measurement.....	568
<i>M Gel'atko, M Hatala, R Vandžura, F Botko</i>	
Selection of parameters during shredding of corn stalks as an additive to the polymer	576
<i>M Macko, D Łączny, J Lewandowski</i>	
Effective shaping of a bisymmetrical cross section of beams under shear stresses constraints.....	583
<i>K Magnucki, D Witkowski</i>	
Analysis of the usability of rolling resistance measurement methods to study the mechanisms of some wheelchairs	589
<i>Ł Warguła, M Kukla, V Yurchenko, A Kukesheva</i>	
Method of Modelling a Tank with Ribbing using a Spatial Scanner for Optimized Control of Volume Characteristics	601
<i>T Krenicky, L Straka</i>	
Modeling the vehicle operational efficiency in the "Vehicle - Infrastructure" system.....	610
<i>V Mateichyk, M Smieszek, M Tsiuman, R Symonenko</i>	

Modeling the longitudinal dynamics of electric multiple units with Xcos/Scilab software	622
<i>J Jackiewicz</i>	
The amount of heat input to the weld per unit length and per unit volume	633
<i>J Winczek, M Gucwa, K Makles, M Mičian, A Yadav</i>	
Damping of layered porous composites and an application in machinery.....	641
<i>Z Murčínková, S Radchenko, G Kuchtová</i>	
Design and implementation of a diagnostic system for measuring high-precision reducers	650
<i>M Kočiško, M Pollák, A Vodilka, D Paulišin</i>	
Simulation of a vehicle movement on a roadway with stochastic irregularities prescribed by the power spectral density	658
<i>J Dižo, M Blatnický, O Kravchenko, V Mamrai, D Barta, P Gasper</i>	
Analysis of the influence of surface roughness of various types of wood on the results of their hardness measured by the Leeb method	669
<i>M Bembenek, L. Kowalski, J. Pawlik</i>	
Production injection moulds with additive technology by the HP MJF 4200 printer.....	677
<i>Z Chval, K Raz, M Stepanek</i>	
Determination of the coefficient of friction in a screw joint loaded with a controlled torque	685
<i>J Mascenik</i>	
The influence of suspension nonlinearities on fatigue assessment of vehicle structure	695
<i>Zbyszko Klockiewicz, Mikołaj Spadło, Grzegorz Ślaski</i>	
Computational Simulation of the Shear Test of a Multi-layered Long-Fibre Composite with a Polymer Matrix.....	709
<i>J Krmela, V Krmelová, A Artyukhov, S Sadjiej, A Bakošová</i>	
Kinematic and dynamic analysis and distribution of stress for seven-item mechanism by means of the SolidWorks program.....	719
<i>J Vavro, J Vavro, L Marček, M Taraba, L Klimek</i>	
Modification of the structure and properties of hardfaced layers with TIG high frequency method.....	728
<i>M Gucwa, J Winczek, K Makles, M Mičian, A Yadav</i>	
Loading of thin composite plate by low-speed impact	737
<i>L Rychlíková, P Novák, J Skočilas, M Žmindák, B Skočilasová, J Soukup</i>	
Simulation of running a vehicle with a Y25 bogie on a theoretical track.....	753
<i>S Solčanský, S Knap</i>	
Determining the fuel consumption of a public city bus in urban traffic	763
<i>M Šmieszek, V Mateichyk</i>	
Information system for remote monitoring the vehicle operational efficiency.....	776
<i>M. Šmieszek, V. Mateichyk, M. Tsiuman, R. Symonenko, I. Gritsuk, M. Bulgakov</i>	
Experimental assessment of eigenfrequencies and stiffness of the elastically supported body	788
<i>J Soukup, A Sapietová, J Skočilas, B Skočilasová</i>	

The method of kinematic excitation reconstruction based on measured suspension dynamic responses – experimental verification	797
<i>Zbyszko Klockiewicz, Grzegorz Ślaski, Hubert Pikosz</i>	
The method of measuring motion capture in wheelchairs during actual use – description of the method and model of measuring signal processing	810
<i>B Wieczorek, M Kukla</i>	
Overview of the possibilities of surface modification of materials using energy beam technologies	818
<i>R Balint Bali, J Zajac, F Botko, D Botková</i>	
Topology optimization of the tool holder produced with additive manufacturing	826
<i>M Stepanek, K Raz, Z Chval</i>	
Numerical study of the vertical vibration of a vehicle model with variable speed	838
<i>M Sága, M Vaško, Z Ságová, L Jakubovičová, M Handrik</i>	
The impact of stiffness increasing in construction of tire measuring device to measured results	847
<i>M Bartoš, V Bulej, T Gál, I Zajacko, D Wiecek</i>	
Capability measurement of non-standard parameters of manufacturing processes	861
<i>R Turisova, S Markulik</i>	
Sensorless Control of Asynchronous Motor at Low speed.....	870
<i>M Duhancik, S Gaspar, T Coranic</i>	
Simulation of manipulation task using iRVision aided robot control in Fanuc RoboGuide software	879
<i>V Bulej, M Bartoš, V Tlach, M Bohušík, D Wiecek</i>	
Application of continuous carbon fiber reinforced composites in a modular system	892
<i>J Svetlík, L Hrivniak, M Šašala, T Stejskal</i>	
Drying Machines with Combined Hydrodynamic Regimes	900
<i>N Artyukhova, J Krmela, V Krmelová, A Artyukhov</i>	
Research of creating mold for crayons with use of additive manufacturing technique	910
<i>M Šašala, L Hrivniak, J Svetlík, Š Ondočko</i>	
Measurement problems of miniature electrical machines	918
<i>M Bodnicki</i>	
Improving mechanical properties of the UIC test bench	926
<i>L Čajkovič, F Pribilinec</i>	
Airflow simulation when braking with a disc brake	937
<i>Y Fomina, V Pavelčík</i>	
Analysis of software solutions for creating models by a generative design approach.....	946
<i>M Pollák, M Kočiško, J Dobránsky</i>	
Model of the pressing and drying system of organic material	957
<i>G Domek, K Talaška</i>	
Stress and Deformation Analysis of Batch Plates using Finite Element Method	967
<i>P Lengvarský, J Bocko</i>	

Design Issues Related to the Construction of Automatic Devices for Conveyor Belt Perforation	976
<i>D Wojtkowiak, K Talaśka, D Wilczyński, J Górecki, G Domek</i>	
Testing and simulating the working conditions of an organic material shredders.....	985
<i>K Tyszczyk, G Śmigielski, G Domek</i>	
Optimization of the drive mechanism with lead screw using Isight software	993
<i>D Wojtkowiak, K Talaśka, K Konecki</i>	
Thermal analysis and experimental testing of clamping jaws for thermomechanical simulator	1006
<i>T Kalina, V Marek, S Jenicek, R Letak</i>	
Issues related to an attempt to recreate the geometry of a non-standard spur gear.....	1014
<i>K Konecki, D Wojtkowiak, K Talaśka, A Kołodziej, G Domek</i>	

Author Index