



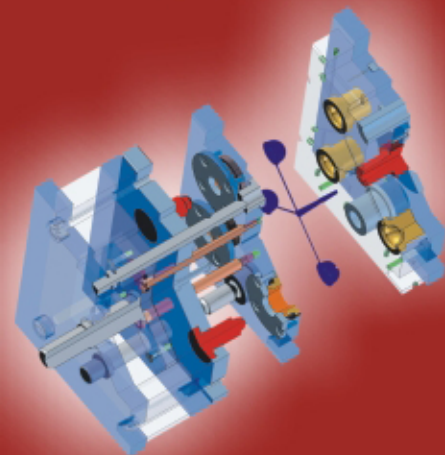
ISSN 2066 - 9984

Proceeding of The 2<sup>nd</sup> International Conference on Polymers Processing in Engineering PPE 2009



DUNAREA DE JOS UNIVERSITY OF GALATI

Proceeding of  
The 2<sup>nd</sup> International Conference on Polymers  
Processing in Engineering  
PPE 2009



Galati, Romania, 22 – 23 October 2009

**Dunarea de Jos University of Galati**



**Proceeding of**

**The 2<sup>nd</sup> International Conference on Polymers  
Processing in Engineering  
PPE 2009**

**Galati, Romania, 22 – 23 October 2009**

**Edited by**

**Felicia Stan**

Dunarea de Jos University of Galati  
Str. Domneasca, 47, 800008, Galati  
www.ugal.ro

**Edited by**

Stan Felicia  
Dunarea de Jos University of Galati

**The 2<sup>nd</sup> International Conference on Polymers Processing in  
Engineering, PPE 2009**

Colectiv Autori

Bibliogr.

**ISSN 2066-9984**

**Typesetting**

Munteanu Ana Veronica  
Dunarea de Jos University of Galati

**Cover design**

Graphotek Expres Tecuci

**Printed**

Galati University Press

### **Conference Chairmen:**

Santo Loredana, University of Tor Vergata, Rome  
Jinescu V. Valeriu, University Politehnica of Bucharest, Romania

### **International Scientific Committee:**

Amza Gheorghe (Romania)	Iovu Horia (Romania)
Andrei Laurentia (Romania)	Jiga Gabriel (Romania)
Andrei Tudor (Romania)	Melnig Viorel (Romania)
Axinte Dragos (UK)	Mourão António (Portugal)
Balc Nicolae (Romania)	Nagit Gheorghe (Romania)
Banu Mihaela (Romania)	Nedelcu Dumitru (Romania)
Berce Petre (Romania)	Opran Constantin (Romania)
Bologa Octavian (Romania)	Paun Puiu Viorel (Romania)
Cardon Ludwig (Belgium)	Papanicolaou George (Grecia)
Chinesta Francisco (France)	Pegoretti Alessandro (Italy)
Chirica Ionel (Romania)	Quadrini Fabrizio (Italy)
Coelho A.M. Gonçalves (Portugal)	Santo Loredana (Italy)
Davim Paulo (Portugal)	San Juan Manuel (Spain)
Dehelean Dorin (Romania)	Shenoi R Ajit (UK)
Dorohoi Dana-Ortansa (Romania)	Francisco Javier Santos Martín (Spain)
Draghici George (Romania)	Slatineanu Laurentiu (Romania)
Fetecau Catalin (Romania)	Stan Felicia (Romania)
Gavrus Adinel (France)	Stefanescu Mariana (Romania)
Hadar Anton (Romania)	Seres Ion (Romania)
Iclanzan Tudor (Romania)	Teodorescu Nicoleta (Romania)

### **Conference Organising Committee**

Stan Felicia	Dunarea de Jos University of Galati
Fetecau Catalin	Dunarea de Jos University of Galati
Munteanu Ana	Dunarea de Jos University of Galati
Postolache Ion	Dunarea de Jos University of Galati
Andrei Laurentia	Dunarea de Jos University of Galati

## ACKNOWLEDGEMENTS

The editor and the conference organizers acknowledge the support towards the publication of the PPE 2009 Proceedings, and the organization of the PPE 2009 Conference to the following organizations:

- Meusburger Georg GmbH & Co KG, Austria



- BRD Société Général – Galati, Romania



- Galati City Hall



- S.C. PLASTOR S.A. Oradea, Romania

- S.C. Vega 93 SRL Galati

- GAMACRIS SRL Galati



- Sol Maritime SRL Galati

- S.C. Solinvest SRL Galati

- D&D International Galati

## PREFACE

The book contains the papers presented at

**The 2<sup>nd</sup> International Conference on Polymers Processing in Engineering,  
PPE 2009, held in Galati, Romania, 22-23 October, 2009.**

Started in 2007, the International Conference on Polymers Processing in Engineering, PPE, takes place every two years. The aim of the PPE is to provide a forum to researchers, both engineers and scientists, from the academic world and industry to present and record the results on various aspects of polymers and polymer composites.

Specifically, PPE 2009 covers all of the important areas in the field, from state-of-the-art research and development to characterization, fabrication, technology development, numerical modeling and many new and emerging applications of polymeric materials.

The topics fall into, but are not limited to, the following categories:

- Polymer processing, rheology & rheometry
- Biopolymers & biotechnologies,
- Nanopolymers & nanotechnologies
- Green polymers, reprocessing & recycling
- Mechanical behavior of polymers and polymer composites
- Fracture mechanics of polymers & polymer composites
- Reliability & testing methods
- Product, mould design, & manufacturing processes
- Computational polymers & polymer composites

The Editor can not accept responsibility for any inaccuracies, comments and opinions contained in the paper.

The Editor and the Organizing Committee would like to thank all authors for submitting their contributions, and the International Scientific Committee for their help and support.

October 2009

Editor  
F. Stan

## Table of Contents

Committee.....	iii
Preface .....	v
1. Viscoelasticity and viscoplasticity of polypropylene/clay hybrid nanocomposites <i>A. D. Drozdov and A.-L. Høg Lejre</i> .....	1
2. An inverse method applied to a rheological analysis of solid polymers using finite element simulation of the torsion and tensile tests <i>A Gavrus</i> .....	9
3. Mechanical and rheological properties of polypropylene/wood composites <i>M. Özcan, A. Durmus and I. Aydin</i> .....	17
4. Rheological properties of poly(butylene terephthalate) (PBT)/thermoplastic polyurethane (TPU) blends <i>A. Durmus, N. Ercan and A. Kasgöz</i> .....	25
5. Rheological and barrier properties of polyethylene/clay nanocomposites compatibilized by an oxidized polyethylene blend <i>A. Durmus, N. Ercan, G. Soyubol, A. Kasgöz and I. Aydin</i> .....	33
6. Influence of alkaline treatment of alfa fiber on the machanical, viscoelastic, thermal and morphological properties of PVC/Alfa composites <i>A. Boukerrou, M.A. Rahmoune and M. Kaci</i> .....	40
7. Improvement of performances of hand laminated composites by fiber pre-heating <i>L. Santo, F. Quadrini, F. Stan and C. Fetecau</i> .....	48
8. Forming of long glass fiber reinforced polypropylene <i>E. A. Squeo, C. Prosperi and F. Quadrini</i> .....	56
9. Some properties of a special type of reinforced composites with filled epoxy <i>A. Circiumaru, I. G. Birsan, G. Andrei, V. Bria and I. Postolache</i> .....	64
10. Characterization of Zn filled epoxy composites <i>I. G. Birsan, A. Circiumaru, I. Postolache and V. Bria</i> .....	70
11. Research on the properties of polymeric composite materials with particles using comparative tests <i>D. Dima, M. Murarescu and G. Andrei</i> .....	78
12. Evolution of 3D amplitude parameters characterising the composite surface after pin-on-disc tests in dry regim <i>L. Deleanu, L. Maftai, G. Andrei, S. Ciortan, G. Trufasu and G. Podaru</i> .....	86

13. Ecological use of the solid polymeric wastes - Case study plastics properties modifications in the recycling process <i>M. F. I. Stefanescu, N. Teodorescu and M. R. Juganaru</i> .....	94
14. Processes characterising tribological behavior of polymeric composites with micro glass spheres <i>L. Deleanu, L. Maftai, G. Andrei, A. Cantaragiu and A. Besnea</i> .....	102
15. Charpy impact tests on the molded polymeric parts <i>A. Nita, C. Opran, D. Murar and C. Bivolaru</i> .....	110
16. The tensile residual stress evaluation of two different composite materials ballistic impacted <i>H.A. Petrescu, D. Vlasceanu, G. Jiga and A. Hadar</i> .....	118
17. Researches concerning the behaviour at impact of the polymeric composite sandwich structures with the simulation of finite element analysis <i>C. Opran, C. Bivolaru, D. Murar and A. Vlase</i> .....	125
18. Buckling studies of the composite plates with delaminations <i>E. F. Beznea and I. Chirica</i> .....	136
19. Torsional analysis of ship hull model made of composite materials <i>R. Chirica, S. D. Musat, D. Boazu, I. Chirica and E. F. Beznea</i> .....	146
20. Methodology regarding numerical analysis of composite material junctions <i>M. A. Grozea, A. Hadar and D. Vlasceanu</i> .....	157
21. Calculation reinforced concrete structures with composite materials consolidated based fibers of carbon <i>G. N. Mares</i> .....	165
22. Biodegradable polymer blends based on polyvinyl alcohol and chitosan as drug delivery systems <i>E.M. Abdel Bary, B. Stoll, S. El-Taweel and N.S. Kessba</i> .....	173
23. Determining the mechanism of destruction of double emulsions with polymers <i>C. Stoian, S. Peretz and Gh. Zgherea</i> .....	181
24. Effect of surfactants on synthesis and properties of biopolymer microparticles <i>S. Peretz, D.F. Anghel, M. Florea Spiroiu, C. Stoian and Gh. Zgherea</i> .....	189
25. Formation of spider net-like morphology by electrospinning of Nylon 6 <i>M. Riahinezhad, S. Bazgir, Y. Aminotowlie and E. Behazin</i> .....	197
26. Effects of compatibilizer structure on the clay dispersion and barrier properties of polyethylene/clay nanocomposite films <i>A. Durmus, N. Ercan, G. Soyubol, A. Kaşgöz and I. Aydin</i> .....	205
27. Defect detection using pulse thermography method <i>A. Boritu, V. Anghel, N. Constantin, M. Gavan, D. Tanase and D. Codrut</i> .....	213
28. Effect of photooxidation on the structure and molecular weight of polystyrene/clay nanocomposites under accelerated UV exposure <i>M. Kaci, C. Remili, S. Bruzaud and Y. Grohens</i> .....	219



29. Acetaminophen entrapped in soft matter vesicles design based on nociceptive model in mice effects correlation <i>D. Bindar, A. Garlea, L. Tartau, A. Chiriac and V. Melnig</i> .....	225
30. Study of thermal properties of polypropylene/olive pomace composites by TG-DTG <i>H. Djidjelli, M. Kaci, A. Boukerrou and S. Krim</i> .....	233
31. Influence of cutting parameters on cutting force in turning of polytetrafluorethylene with regenerate graphite <i>A. Munteanu, C. Fetecau and F. Stan</i> .....	239
32. Studies regarding machinability during the turning process of PA 66 GF 30 polyamide with ceramics inserts <i>M. Motoi</i> .....	247
33. Study concerning the cutting forces obtained by milling of PA 6 SA polyamide <i>Gh. I. Vasile</i> .....	257
34. Study concerning the specific cutting pressure and the international dimensional accuracy during the milling process of PA 6 SA polyamide <i>Gh. I. Vasile</i> .....	263
35. Some aspects regarding the simulation of two-component injection process <i>D. Nedelcu, D. Mindru, L. Tabacaru and Gh. Cretu</i> .....	269
36. Optimization of the Injection Molding Process with 3D Simulation <i>N. Ivascu, C. Fetecau, I. Postolache and C. Voicu</i> .....	275
37. Determination of the residual stresses in the injection molded polymeric parts <i>A. Nita and P. Barsanescu</i> .....	283
38. Study regarding the influence of the mould temperature optimizing of large mold on piece quality of material thermoplastics <i>S. Mihaila, F. Ardelean, S. Ilie and D. Chira</i> .....	291
39. Study of the mould cavity manufacturing using CAM soft <i>F. Ardelean, S. Ilie, Ș. Mihăilă and D. Chira</i> .....	299
40. Discontinuous cooling in injection molding process <i>D. Chira, S. Mihaila, F. Ardelean and S. Ilie</i> .....	307
41. Using CAE programmes for better adhesion at the contact surface in injection bi-components parts <i>S. Ilie, S. Mihaila, F. Ardelean and D. Chira</i> .....	313
42. Considerations regarding the variation of the pressure in corotating twin screw extruder <i>V. V. Jinescu and N.I. Sporea</i> .....	319
43. Impact of accelerated particles with plexiglas objects surfaces <i>L. Slatineanu, M. Coteata, N. Pop and F. Negoescu</i> .....	327
44. Identification of relevant indicators for preforming process selection <i>M. Mihaluta, P. Martin, H.-F. Perrin and A. D'Acunto</i> .....	335

45. Impact of plastics, their specific technologies and their performance, in the RENAULT cars industry <i>V. Perianu</i> .....	343
46. New adaptive wing concept using smart materials <i>N. Camelia, B. Andrei, C. Ioan, M. Mihalcica, A. Boritu and D. Tanase</i> .....	351
47. Ecological use of the solid polymeric wastes – quality and economic limitations <i>N. I. Teodorescu and M.F.I. Stefanescu</i> .....	359
48. Establishing the optimum welding procedure for thermoplastic lining membrane using the response surface design <i>M. Cocard, I. Grozav, A. Murariu, M. Iacob and A. Caneparu</i> .....	367
49. Determination of the Cross-WLF viscosity model for polyethylene <i>I. Postolache, E.A. Squeo, C. Fetecau and F. Stan</i> .....	375
<i>Authors index</i> .....	383

## VISCOELASTICITY AND VISCOPLASTICITY OF POLYPROPYLENE/CLAY HYBRID NANOCOMPOSITES

Aleksey D. Drozdov\* and Anne-Lise Høg Lejre\*

\*Danish Technological Institute

E-mail: [Aleksey.Drozdov@teknologisk.dk](mailto:Aleksey.Drozdov@teknologisk.dk), Web page: <http://www.teknologisk.dk>

**Key words:** Nanocomposites, Viscoelasticity, Viscoplasticity

**Abstract.** *Observations are reported on polypropylene/clay nanocomposites with various concentrations of filler (ranging from 0 to 5 wt.-%) and various clay/compatibilizer proportions. Characteristic features are revealed of the viscoelastic and viscoplastic responses of nanocomposites in tensile tests with constant strain rates, creep and relaxation tests, and cyclic tests with complicated deformation programs. Constitutive equations for the time- and rate-dependent behavior of nanocomposites are developed and applied to predict their damage and lifetime under creep fracture.*

## AN INVERSE METHOD APPLIED to A RHEOLOGICAL ANALYSIS OF SOLID POLYMERS USING FINITE ELEMENT SIMULATION OF THE TORSION AND TENSILE TESTS

A. Gavras\*

\*National Institut of Applied Sciences, INSA de Rennes

European University of Brittany (UEB)

E-mail: [adinel.gavras@insa-rennes.fr](mailto:adinel.gavras@insa-rennes.fr), Web page: <http://www.insa-rennes.fr>

**Key words:** Rheology of Solid Polymers, Torsion, Traction, Inverse Analysis

**Abstract.** *In order to analyses the rheology of a solid polymer, torsion and traction mechanical tests are generally used. This paper deals with a rheological constitutive equation identification for a polycarbonate and a polyethylene materials. To take into account strain localization, caused by increasing values of the plastic strain and important temperature gradients, a finite element simulation of the experimental tests are used. Thus, the values of the constitutive parameters are computed from an Inverse Analysis method and the results are compared to the classical analytical methods. Accuracy of the material behavior identification from an Inverse Finite Element Method is then demonstrated.*

## MECHANICAL AND RHEOLOGICAL PROPERTIES OF POLYPROPYLENE/WOOD COMPOSITES

M. Özcan, A. Durmus and İ. Aydin

Istanbul University, Department of Chemical Engineering

E-mail: [durmus@istanbul.edu.tr](mailto:durmus@istanbul.edu.tr)

**Key words:** Polypropylene, Wood fiber, Extrusion, Rheology

**Abstract.** *In this study, solid-state mechanical properties and melt-state rheological behavior of polypropylene (PP)/wood fiber composites were investigated in detail. Composite samples were prepared in a co-rotating twin screw extruder using a maleic anhydride grafted polypropylene as adhesion promoter (compatibilizer). Wood fiber content (20-60%), fiber size (from <250  $\mu\text{m}$  to 425  $\mu\text{m}$ ), compatibilizer/filler ratio (4-16%) and processing method were varied. Mechanical properties and viscoelastic behavior of the samples were analyzed by a universal tensile test and a dynamic oscillatory rheometer. Changes in the Young's and shear modulus, shear viscosity and sample morphology were examined depending on the sample composition. Interfacial adhesion between wood fibers and polypropylene are quantified based on the mechanical properties and viscoelastic behavior of the samples. Morphology of the composite samples was also examined by scanning electron microscopy (SEM) method.*

## RHEOLOGICAL PROPERTIES OF POLY(BUTYLENE TEREPHTHALATE) (PBT)/THERMOPLASTIC POLYURETHANE (TPU) BLENDS

A. Durmus, N. Ercan and A. Kaşgöz

Istanbul University, Department of Chemical Engineering

E-mail: [n.ercan@isnet.net.tr](mailto:n.ercan@isnet.net.tr)

**Key words:** PBT, TPU, Extrusion, Rheology

**Abstract.** *In this study, rheological behavior of immiscible poly(butylene terephthalate)/thermoplastic polyurethane (PBT/TPU) blends prepared in a twin screw extruder were investigated. Structure of blend samples and immiscibility were quantified by scanning electron microscopy (SEM) analysis and dynamic oscillatory rheometer tests based on different rheological models. Effects of small amount of organo-clay addition on the sample morphology and interfacial tension were also studied.*

## RHEOLOGICAL AND BARRIER PROPERTIES OF POLYETHYLENE/CLAY NANOCOMPOSITES COMPATIBILIZED BY AN OXIDIZED POLYETHYLENE BLEND

A. Durmus, N. Ercan, G. Soyubol, A. Kaşgöz and İ. Aydın

Istanbul University, Department of Chemical Engineering

E-mail: [n.ercan@isnet.net.tr](mailto:n.ercan@isnet.net.tr)

**Key words:** Polyethylene, Nanocomposite, Oxidized Polyethylene, Rheology

**Abstract.** *In this work, high density polyethylene (HDPE)/organo-clay (Cloisite® 15A) nanocomposites were prepared by melt processing using a commercially available oxidized polyethylene/oxidized (ethylene-co-vinyl acetate) copolymer blend (30:70 wt%) (AC® 645 supplied from Honeywell) as compatibilizer. Clay and compatibilizer amounts were varied to optimize clay dispersion and property enhancement. Clay dispersion was investigated by X-Ray diffraction (XRD) and Transmission Electron Microscopy (TEM) methods. Viscoelastic behavior of the nanocomposites was analyzed by a dynamic oscillatory rheometer in melt state. Oxygen permeability properties of the film samples prepared by a hot compression were tested with a gas permeability tester working by the constant volume/variable pressure method.*

## INFLUENCE OF ALKALINE TREATMENT OF ALFA FIBER ON THE MECHANICAL, VISCOELASTIC, THERMAL AND MORPHOLOGICAL PROPERTIES OF PVC/ALFA COMPOSITES

A. Boukerrou\*, M.A. Rahmoune and M. Kaci

Laboratoire des Matériaux Organiques, University A. Mira of Bejaia, 06000 Algeria

E-mail: [\\*aboukerrou@yahoo.fr](mailto:*aboukerrou@yahoo.fr), [mdamezianer@yahoo.fr](mailto:mdamezianer@yahoo.fr), [kacimu@yahoo.fr](mailto:kacimu@yahoo.fr)

**Key words:** Wood Plastic Composites, Alfa Fibers, Sodium Hydroxide Treatment, PVC, Thermal and Mechanical Properties

**Abstract.** *This paper deals with plastic-wood composites based on poly(vinylchloride) (PVC) and alfa fiber (strippa tenacissima) prepared by melt blending in a high-speed twin steel-wall mixer at various loadings, i.e. 5 and 15 wt. %. In order to improve adhesion between alfa fiber (strippa tenacissima) and matrix, alkaline treatment was used. The effect of the incorporation of virgin and treated fiber in the poly(vinyl chloride) matrix on mechanical, thermal stability, viscoelastic properties and morphology of composites was followed by various techniques, especially tensile testing, thermogravimetric analysis (TGA), Dynamic mechanical thermal analysis (DMTA) and scanning electron microscopy (SEM). The experimental results indicated that the chemical treatment of alfa fiber flour with NaOH improved the thermal stability of fiber*

*alfa. The mechanical properties of the treated composites were improved; expect young modulus (for PVC filled with 5 % w/w, 15 %w/w of alfa treated). Also the sodium hydroxide improves the interactions between the two composites components and promoted better dispersion of the filler (at a content of 15 % w/w) in the matrix. The thermal characterization of PVC filled with 15 %w/w of alfa revealed an decrease in the onset temperatures of decomposition for the treated composites. Further, SEM revealed that the surfaces of modified fiber composites are smoother and better dispersion than virgin fiber composites.*

### **IMPROVEMENT OF PERFORMANCES OF HAND LAMINATED COMPOSITES BY FIBER PRE-HEATING**

L. Santo\*, F. Quadrini\*, F. Stan† and C. Fetecau†

\* University of Rome Tor Vergata

E-mail: [loredana.santo@uniroma2.it](mailto:loredana.santo@uniroma2.it), Web page: <http://www.mec.uniroma2.it>

**Key words:** Hand lamination, Composite, Glass Fiber Reinforced Plastics

**Abstract.** *Fiber pre-heating was used to improve the performances of hand laminated glass fiber reinforced composites. Several glass reinforced laminates were produced by changing the number of plies and the pre-heating temperature. Thermal analysis (dynamic mechanical analysis and differential scanning calorimetry) and mechanical testing (tensile and flexure tests) were used to evaluate the effect of the proposed innovation. Best results were observed in terms of composite strength with moderate fiber pre-heating.*

### **FORMING OF LONG GLASS FIBER REINFORCED POLYPROPYLENE**

E. A. Squeo\*, C. Prospero\* and F. Quadrini\*

\* University of Rome Tor Vergata

E-mail: [squeo@ing.uniroma2.it](mailto:squeo@ing.uniroma2.it), Web page: <http://www.mec.uniroma2.it>

**Key words:** Thermoplastic Matrix Composite, Prepreg, Polypropylene, Long Glass Fiber, Forming

**Abstract.** *Unidirectional thermoplastic prepregs were used to produce thin glass fiber reinforced laminates with 3 and 4 plies. The laminate performances were evaluated by means of tensile tests and dynamic mechanical analyses (DMA). Subsequently, flat laminates were used in a second forming step to obtain glass fiber reinforced tubes which were tested by means of transverse compression. The two-stage production process allows to form complex shape structures without affecting the adhesion between adjacent glass reinforced laminae.*

### **SOME PROPERTIES OF A SPECIAL TYPE OF REINFORCED COMPOSITES WITH FILLED EPOXY**

A. Circiumaru\*, I.-G. Birsan\*, G. Andrei\*, V. Bria\* and I. Postolache\*

\* Dunarea de Jos University of Galati

E-mail: [acirciumaru@ugal.ro](mailto:acirciumaru@ugal.ro), Web page: <http://www.ugal.ro>

**Key words:** epoxy, clay, fiber fabric, pseudo-laminates

**Abstract.** *Textile composites present several advantages towards the design of effective lightweight structures. The undulation of the woven or braided structure provides inherent out of plane reinforcement. Textile structures also provide inherent reinforcement in multiple directions. Both of these properties can be quite useful, especially in impact energy absorption applications. However, the increased micro-structural complexity, as compared to traditional unidirectional composites, also presents the challenge of increased complexity of characterization and analysis.*

## CHARACTERIZATION OF Zn FILLED EPOXY COMPOSITES

I.-G. Birsan\*, A. Circiumaru\*, I. Postolache\* and V. Bria\*

\* Dunarea de Jos University of Galati  
E-mail: [acirciumaru@ugal.ro](mailto:acirciumaru@ugal.ro), Web page: <http://www.ugal.ro>

**Key words:** epoxy, zinc powder, thermal analysis, abrasive behavior

**Abstract.** *Among thermosetting polymers the epoxy resins are most often used as composite's matrix due to their long life, stability and versatility. The use of epoxy resins is some how limited by their poor electromagnetic properties. A way to change this situation is to fill the polymer with various powders. For the present study the Zn powder was used as filler and its influence over properties of formed particulate epoxy composites was investigated.*

## RESEARCH ON THE PROPERTIES OF POLYMERIC COMPOSITE MATERIALS WITH PARTICLES USING COMPARATIVE TESTS

D. Dima\*, M. Murarescu\* and G. Andrei\*

\* Dunarea de Jos University of Galati  
E-mail: [monica.murarescu@ugal.ro](mailto:monica.murarescu@ugal.ro), Web page: <http://www.ugal.ro>

**Key words:** Dispersion, Nanoparticles, Nanocomposites

**Abstract.** *It is acknowledged that a composite material is anisotropic, considering its composition and the geometrical distribution of the main constituents: matrix and reinforcement. The aim of this paper is the improvement of matrix/reinforcement compatibility by an interface quality increasing. It was realized a step-up dispersion strategy starting with a dry granulation followed by its wet variant, a mechanical dispersion using Lewis acids, an ultrasonication dispersion and/or a magnetic field dispersion. It was used glass fibers as reinforcement due to their usability at the industrial level and also by reason of the provided technological design data. It was realized added matrix films using different dispersion strategies and the samples were investigated by SEM method. The film deposition support was made of steel and carbon fibers. The composite materials samples of polyester matrix/glass fiber reinforcement added with different concentration particles were realized. The SEM analysis on the surface, in cross-section and in fracture, the XRD analysis on the crystalline nature of the matrix and also the Iosipescu test of pure shearing were used to realize the profile of the composite material global quality. Finally, the conclusions about the efficiency of the optimum processing technology were relieved.*

## EVOLUTION OF 3D AMPLITUDE PARAMETERS CHARACTERISING THE COMPOSITE SURFACE AFTER PIN-ON-DISC TESTS IN DRY REGIM

L. Deleanu†, L. Maftai\*, G. Andrei†, S. Ciortan†, C. Trufașu† and G. Podaru†

† Dunarea de Jos University of Galati  
E-mail: [lorena.deleanu@ugal.ro](mailto:lorena.deleanu@ugal.ro), Web page: <http://www.ugal.ro>

**Key words:** 3D amplitude parameters, polymeric composites, micro glass spheres

**Abstract.** *This paper presents influence of sliding regime against steel on the 3D amplitude parameters for composite surfaces. The composites have a matrix of polyamide (PA), 1% of black carbon and different concentrations of micro glass spheres (MGS).*

## ECOLOGICAL USE OF THE SOLID POLYMERIC WASTES – CASE STUDY: PLASTICS PROPERTIES MODIFICATIONS IN THE RECYCLING PROCESS

M.-F. I. Ștefănescu \*, N. Teodorescu \* and M. R. Jugănar

University Politehnica of Bucharest

\* E-mail: [marianastefanescu2007@yahoo.com](mailto:marianastefanescu2007@yahoo.com)

**Key words:** Plastics properties, recycling, degradation, environment

**Abstract.** *The paper presents end-used plastics behavior tests from rheological point of view. Used parts made of polypropylene (material produced in Romania) were tested and compared with the processing behavior of the virgin material. On this basis practical information were suggested.*

## PROCESSES CHARACTERISING TRIBOLOGICAL BEHAVIOUR OF POLYMERIC COMPOSITES WITH MICRO GLASS SPHERES

L. Deleanu<sup>†</sup>, L. Maftai\*, G. Andrei<sup>†</sup>, A. Cantaragiu<sup>†</sup> and A. Besnea<sup>†</sup>

<sup>†</sup> Dunarea de Jos University of Galati

E-mail: [lorena.deleanu@ugal.ro](mailto:lorena.deleanu@ugal.ro), Web page: <http://www.ugal.ro>

**Key words:** Polymer matrix, glass micro spheres, wear, composite

**Abstract.** *This paper presents processes within the superficial layers of composites with PA matrix and different concentrations of micro glass spheres and a discussion about the influence of sliding speed in the range 0.5...1.5 m/s and average pressure in the range of 1...2 MPa, after pin-on-disc tests for a sliding distance of 10 km.*

## CHARPY IMPACT TESTS ON THE MOLDED POLYMERIC PARTS

A. Niță\*, C. Opran<sup>†</sup>, D. Murar<sup>†</sup> and C. Bivolaru<sup>†</sup>

\* Constanta Maritime University

E-mail: [alexandranita@imc.ro](mailto:alexandranita@imc.ro), Web page: <http://www.cmu-edu.eu>

<sup>†</sup> University Politehnica of Bucharest

Email: [constantin.opran@ltpc.pub.ro](mailto:constantin.opran@ltpc.pub.ro), Web page: <http://www.pub.ro>

**Key words:** Charpy test, Polymers, Impact behaviour, Injection Molding

**Abstract.** *This paper presents the evaluation of impact behaviour on different used polymeric materials. The Charpy impact test, also known as the Charpy V-notch test, is a standardized strain rate test which determines the amount of energy absorbed by a material during fracture. This absorbed energy is a measure of a given material's toughness and acts as a tool to study temperature-dependent brittle-ductile transition. For the plastics we used the typical method described in ASTM Standard D 6110. It is widely applied in industry, since it is easy to prepare and conduct. The results can be obtained quickly and cheaply. We observe that materials behave very differently at high rates of loading and for that we cannot use static strength tests to predict impact behaviour. The impulse system is a fully integrated hardware and software package that let us capture load information at very high speed from the impact tests.*

## THE TENSILE RESIDUAL STRESS EVALUATION OF TWO DIFFERENT COMPOSITE MATERIALS BALLISTIC IMPACTED

H. A. Petrescu\*, D. Vlasceanu, G. Jiga and A. Hadar

\* University Politehnica of Bucharest

Email: [petrescu\\_horia@yahoo.com](mailto:petrescu_horia@yahoo.com), Web page: <http://www.pub.ro>

**Key words:** fiber-glass, ballistic, composite materials, residual stress.

**Abstract.** *This paper evaluates the tensile residual stress in two different composite materials ballistic impacted. The two materials are made of fiber-glass reinforced resin one with its layers of fiber-glass displaced longitudinally and one made of fiber-glass threads. After the elasticity modulus determination they were impacted with a 4.5 gauge bullet shot from a compressed air gun. Following the impact the residual stress was determined. The purpose of this paper is to evaluate which one of the two materials withstands better an impact regarding the residual stress.*

## RESEARCHES CONCERNING THE BEHAVIOUR AT IMPACT OF THE POLYMERIC COMPOSITE SANDWICH STRUCTURES WITH THE SIMULATION OF FINITE ELEMENT ANALYSIS

C. Opran\*, C. Bivolaru\*, D. Murar\* and A. Vlase\*

\* POLITEHNICA University of Bucharest,

E-mail: [constantin.opran@ltpc.pub.ro](mailto:constantin.opran@ltpc.pub.ro), Web page: <http://www.ltpc.pub.ro>

**Key words:** polymeric composite sandwich structures, shaping and simulation, ABAQUS soft, impact.

**Abstract.** *The polymeric composite sandwich structures have a wide utilization of the domain activities in which the behaviors at impact represent the main parameter in using the capability. Such as is necessary to know and make the shaping and simulation for behavior at impact in structures. This paper contains the shaping and simulation at impact of polymeric composite sandwich structures, using the finite element analysis as part of ABAQUS soft. The research has the aim to determine the behavior at impact and the conditions of his complete determination and view the developing in performances of working for the polymeric composite sandwich structure.*

## BUCKLING STUDIES OF THE COMPOSITE PLATES WITH DELAMINATIONS

E.-F. Beznea\* and I. Chirica†

\* Dunarea de Jos University of Galati

E-mail: [elena.beznea@yahoo.com](mailto:elena.beznea@yahoo.com), Web page: <http://www.ugal.ro>

**Key words:** Polymers, Plate buckling, Delaminations

**Abstract.** *In the paper, a study of the influence of elliptical delamination on the changes in the buckling behaviour of ship deck plates made of composite materials. An orthotropic delamination model, describing mode delaminating, by using COSMOS/M soft package, was applied. So, the damaged part of the structures and the undamaged part have been represented by well-known finite elements (layered shell elements). The influence of the position and the ellipse's diameters ratio of delaminated zone on the critical buckling force was investigated.*



## TORSIONAL ANALYSIS OF SHIP HULL MODEL MADE OF COMPOSITE MATERIALS

R. Chirica\*, S.D. Musat<sup>†</sup>, D. Boazu<sup>†</sup>, I. Chirica<sup>†</sup> and E.F. Beznea<sup>†</sup>

\*<sup>†</sup> Dunarea de Jos University of Galati

\*E-mail: [ralucachirica@yahoo.com](mailto:ralucachirica@yahoo.com), Web page: <http://www.ugal.ro>

**Key words:** Polymers, Ship hull model, Torsion

**Abstract.** *In the paper, a new methodology (numerical and experimental) proposed to analyze the ship hull torsion is treated. The torsion analysis is performed on a scale model (1:50) of a container ship, made of composite material, with the main characteristics.*

## METHODOLOGY REGARDING NUMERICAL ANALYSIS OF COMPOSITE MATERIAL JUNCTIONS

M.-A. Grozea, A. Hadar and D. Vlasceanu

University Politehnica of Bucharest

Email: [abcgrozea@yahoo.com](mailto:abcgrozea@yahoo.com), Web page: <http://www.pub.ro>

**Key words:** FEM, junction, layered composites, tube, flange

**Abstract.** *In the paper, an original methodology for the numerical analysis of composite layered structures using the finite elements method is presented. The junction between a tube and a flange, which is often met in the engineering practice, is presented as example. The proposed methodology may be also used in the geometrical and constructive optimization of the junctions.*

## CALCULATION REINFORCED CONCRETE STRUCTURES WITH COMPOSITE MATERIALS CONSOLIDATED BASED FIBERS OF CARBON

G. N. Mares

Gendarme Inspectorate Braila

E-mail: [mrs\\_ultimate@yahoo.com](mailto:mrs_ultimate@yahoo.com)

**Key words:** reinforced concrete, composite materials, fiber blades of carbon, fiber fabric carbon shearing forces.

**Abstract.** *Walls resulted in strengthening the structure with composite materials based on carbon fibers should be designed to behave similarly to the structural walls made of reinforced concrete monolith. To this end, elements of the joints with the walls of consolidation will be so large as to be applied in the elastic, corresponding to the charges for last-stage structure as a whole. Values glissade forces and forces involved in sizing connectors (dorns, fixed with resin anchors or mechanical) will be at least equal to the associated structural mechanism plasticity. Calculation of structural elements of reinforced concrete buildings with walls made by strengthening with composite materials based on carbon fiber will be essential for groups and special boot. Weight walls and thus strengthen, where appropriate, the weight structure results items are added to the tasks of gravity of the original structure.*

## BIODEGRADABLE POLYMER BLENDS BASED ON POLYVINYL ALCOHOL AND CHITOSAN AS DRUG DELIVERY SYSTEMS

E.M. Abdel Bary\*, B. Stoll, S. El-Taweel and N.S. Kessba

\* German University Cairo, New Cairo, Egypt

E-mail: [elsayed.abdelbary@guc.edu.eg](mailto:elsayed.abdelbary@guc.edu.eg)

**Key words:** Polymers, Injection Molding

**Abstract.** Chitosan has been blended with different proportions of poly (vinyl-alcohol) PVA and subjected to cross linking using glutaraldehyde GD. The obtained samples either cross linked or in their initial state have been characterized using differential scanning calorimetry (DSC), dielectric and tensile measurements. It has been found that the presence of trapped water in PVA films prepared by casting technique lead to a decrease in  $T_g$ , which has higher value after complete drying. The glass transition temperature of PVA cross linked with Glutaraldehyde was slightly shifted to lower value compared with pure PVA. It has been also found that chitosan (CS) and PVA are incompatible at the molecular level in the blended membrane. The glutaraldehyde as cross linking agent increases the stiffness and decreases the elongation percentage of both polymers. Using Glutaraldehyde GD for cross-linking of chitosan and PVA leads to a decrease in the drug release extent. Moreover, increasing concentration of PVA in the blend decreases the drug release due to the possible hydrogen bonding formation between OH of PVA and NH<sub>2</sub> of CS. This conclusion holds true for cross-linked blends. The drug delivers kinetics of some selected blends was evaluated using Brilliant Blue dye as model of drugs.

## DETERMINING THE MECHANISM OF DESTRUCTION OF DOUBLE EMULSIONS WITH POLYMERS

C. Stoian\*, S. Peretz† and Gh. Zgherea\*

\* Dunarea de Jos University of Galati

E-mail: [cstoian@ugal.ro](mailto:cstoian@ugal.ro), Web page: <http://www.ugal.ro>

**Key words:** Polymers, double emulsion, destruction, diffusion

**Abstract.** Were prepared diluted direct double emulsions, the contents of internal aqueous phase was less than 30%. The double emulsions were stabilized with lipophilic and hydrophilic polymers. The internal aqueous phase was a solution of sodium chloride and the external aqueous phase was a solution of glucose, isotonic with the internal aqueous phase, so that the passage of the salt through oily membrane is not determined by the difference of osmotic pressure. The passage of sodium chloride from the external aqueous phase in the internal aqueous phase was followed by potentiometry method. It was concluded that the electrolytic migration respect a first order kinetics and were calculated the rate constant and the half-life time. It was found that the rate of salt release from the internal aqueous phase increase with the growth of hydrophilic surfactant concentration. As a result of the determinations by optical microscopy and granulometry methods was worded conclusion that electrolytic release from internal aqueous phase is achieved by diffusion, without having held coalescence.

## EFFECT OF SURFACTANTS ON SYNTHESIS AND PROPERTIES OF BIOPOLYMER MICROPARTICLES

S. Peretz\*, D.F. Anghel\*, M. Florea Spiroiu\*\*, C. Stoian\*\*\*  
and Gh. Zgherea\*\*\*

\* Institute of Physical Chemistry "I. Murgulescu", Department of Colloids, 202 Spl. Independentei, 060021,  
Bucharest, Romania, E-mail: [peretz@icf.ro](mailto:peretz@icf.ro),

**Key words:** Biopolymer, Microparticle, Surfactant

**Abstract.** *The synthesis of microparticles made by two natural polymers, alginate and chitosan was studied in the presence of surfactants. The solubility behavior of chitosan complexes with two anionic surfactants: sodium dodecyl sulfate (SDS) and sodium bis (2-ethyl hexyl) sulfosuccinate (AOT) have been investigated. The study included the formation of gel-like membranes capable of separating two aqueous polymer and respectively surfactant solutions. The conditions for new stable chitosan-AOT microcapsules formation were mainly observed and compared with those of chitosan-SDS. The interactions between sodium alginate and salts of divalent metal ions (calcium or barium), in the absence or the presence of two cationic surfactants, tetradecyltrimethylammonium bromide (TTAB) and didodecyldimethylammonium bromide (DDAB) have been also investigated. The formation of the alginate microparticles takes place following a cross-linking process, by the diffusion of the barium or calcium ions. One obtained complexes of alginate cross-linked complexes can exist either as homogeneous clear solutions, precipitates or as microparticles. The formation of microcapsules takes place under specific conditions, following the interaction between alginate and salts. The thickening of the walls of the gel capsules is accelerated by the presence of surfactants. The areas in the phase diagram which corresponds to formation of spherical microparticles and the non spherical capsules of alginate move towards lower concentrations in the case of TTAB than in the case of DDAB.*

## FORMATION OF SPIDER NET-LIKE MORPHOLOGY BY ELECTROSPINNING OF NYLON6

M. Riahinezhad\*, S. Bazgir<sup>†</sup>, Y. Aminotowlie<sup>†</sup> and E. Behazin<sup>†</sup>

\* Iran Polymer and Petrochemical Institute (IPPI), Tehran, Iran  
Email: [m.riahi@ippi.ac.ir](mailto:m.riahi@ippi.ac.ir)

<sup>†</sup>Polymer Engineering Group, Chemical Engineering Department, Tarbiat Modares University, Tehran, Iran  
E-mail: [behazin@modares.ac.ir](mailto:behazin@modares.ac.ir)

**Key words:** Electrospinning, Nano-fiber, Morphology, Nano-web, Polyamide 6

**Abstract.** *The present study aims at producing nano-fibers from Nylon6/formic acid solution. Three solutions with concentrations of 17.5wt%, 20wt% and 22.5 wt% have been prepared at 180°C. Series of experiments were conducted to choose the optimum processing variables such as needle/collector distance, feed rate, and voltage. Resulted nano-fiber morphologies were checked using Scanning Electron Microscopy (SEM) and the test's temperature and relative humidity were controlled by means of a heater and an evaporation system. The results showed that the test's humidity and temperature are the two most important ambient variables which produce a novel morphology called spider net-like in nano-fibers. Development of Nylon6/formic acid/water ternary system in high relative humidity and subsequent solution fast phase inversion proposed as a possible mechanisms involved in spider net-like morphology formation.*

## EFFECTS OF COMPATIBILIZER STRUCTURE ON THE CLAY DISPERSION AND BARRIER PROPERTIES OF POLYETHYLENE/CLAY NANOCOMPOSITE FILMS

A. Durmus, N. Ercan, G. Soyubol, A. Kaşgöz and İ. Aydın

Istanbul University, Department of Chemical Engineering  
E-mail: [durmus@istanbul.edu.tr](mailto:durmus@istanbul.edu.tr)

**Key words:** Polyethylene, Organoclay, Nanocomposite, Permeability, Rheology

**Abstract.** *In this work, high density polyethylene (HDPE)/organo-clay (Cloisite® 15A) nanocomposites with different types of compatibilizer and having various clay amount and compatibilizer/clay weight ratio were prepared by melt blending in a batch, internal mixer. Poly(ethylene-co-metacrylic acid) Na<sup>+</sup> salt, poly(ethylene-co-acrylic acid) and poly(ethylene-g-maleic anhydride) copolymers were used as compatibilizer. Film samples were prepared by hot compression. Clay dispersion was investigated by X-Ray diffraction (XRD) and Transmission Electron Microscopy (TEM) methods. Viscoelastic behavior of the nanocomposites was analyzed by a dynamic oscillatory rheometer in the melt state. Oxygen permeability properties of the samples were tested with a gas permeability tester. Degree of crystallinity was calculated by XRD and differential scanning calorimetry (DSC) methods.*

*It was found that compatibilizer structure and amount affect the oxygen permeability values of nanocomposite films. Consequently, enhancement in oxygen permeability of the nanocomposite films must be evaluated taking into account of the sample composition, compatibilizer structure, clay dispersion and crystallinity. High barrier, flexible and transparent polyethylene/clay nanocomposite packaging films could be considered as one of the novel innovations in barrier technologies.*

## DEFECT DETECTION USING PULSE THERMOGRAPHY METHOD

A. Borîtu\*, V. Anghel\*, N. Constantin\*, M. Găvan\*, D. Tănase\* and D. Codruț\*

\*University Politehnica of Bucharest  
Email: [andreea10delia@yahoo.com](mailto:andreea10delia@yahoo.com), Web page: <http://www.pub.ro>

**Key words:** GFRP, NDI, IRT, pulse method.

**Abstract.** *Among various non-destructive inspection (NDI) methods available for evaluating composite materials, infrared thermography (IRT) is currently used as a local inspection method, particularly in the active pulse variant. Thermal non-destructive testing uses the pattern of surface temperature to detect non-uniformities below the surface. These patterns can be used to estimate the characteristics of the non-uniformities and to predict the resultant behaviour or serviceability of the material. This paper describes some applications of non-destructive inspection with IRT, using the transient/long pulse technique, for GFRP type composite plates.*

## EFFECT OF PHOTOOXIDATION ON THE STRUCTURE AND MOLECULAR WEIGHT OF POLYSTYRENE / CLAY NANOCOMPOSITES UNDER ACCELERATED UV EXPOSURE

M. Kaci\*, C. Remili\*, S. Bruzard † and Y. Grohens †

\* University A. Mira, Bejaia 06000, Algeria

E-mail: [kacimu@yahoo.fr](mailto:kacimu@yahoo.fr), Web page: <http://www.univ-bejaia.dz>

† Université de Bretagne Sud, Rue de Saint Maudé, 56321 Lorient Cedex, France

Email: [yves.grohens@univ-ubs.fr](mailto:yves.grohens@univ-ubs.fr), Web page: <http://web.univ-ubs.fr>

**Key words:** Polystyrene, Cloisite 15A, Polymer Nanocomposites, Photooxidation

**Abstract.** *This paper reports an investigation on the effects of photooxidation under accelerated UV conditions on the structure and properties of polystyrene (PS)/Cloisite 15A (OMMT), at various loading rates: 2.5, 5 and 7 wt.%. Fourier transform infrared (FT-IR) spectroscopy and viscosimetry have been used to evaluate the degradation extent of nanocomposite samples compared with neat PS, up to 216h of exposure. The results indicated an increase in photooxidation rate with exposure time, being much higher for PS/OMMT nanocomposites. A large increase in the scission index was also observed for all the exposed samples, however less pronounced for neat PS. The photooxidation rate was more affected by the presence of clay acting as a catalyst, rather than by the clay loadings.*

## ACETAMINOPHEN ENTRAPPED IN SOFT MATTER VESICLES DESIGN BASED ON NOCICEPTIVE MODEL IN MICE EFFECTS CORRELATION

D. Bîndar\*, A. Gârlea\*, L. Tarțău†, A. Chiriac\* and V. Melnig\*

\* Faculty of Physics, COMB Laboratory, "Al. I. Cuza" University

E-mail: [danavered@yahoo.com](mailto:danavered@yahoo.com)

† Faculty of Medicine, "Gr.T. Popa" University of Medicine and Pharmacy

E-mail: [lylytartau@yahoo.com](mailto:lylytartau@yahoo.com)

**Key words:** acetaminophen, soft vesicles design, nociception, tail flick

**Abstract.** *The important technological advantages of vesicles used as drug carriers have high stability and carrier capacity, feasibility of incorporation of both hydrophilic and hydrophobic substances, and feasibility of variable routes of administration. The acetaminophen vesicles were physicochemical and structural analyzed. The soft matter vesicles made by lipid – acetaminophen – chitosan have medium size of 100 nm. The nociceptive cutaneous testing was performed using tail flick assay. In our experimental conditions acetaminophen entrapped in soft vesicles, determined a gradually increasing of the latency time response to thermal noxious stimulation comparing with non entrapped substance, more than 12 hours after substance administration. The use of soft matter vesicles as carrier for acetaminophen presented the advantage of a sustained release of drug comparing with non entrapped substance. Acetaminophen entrapped in soft vesicles exhibited significant and prolonged antinociceptive effects that can be correlated, by needing, with the design of vesicle carriers.*

## STUDY OF THERMAL PROPERTIES OF POLYPROPYLENE/OLIVE POMACE COMPOSITES BY TG-DTG

H. Djidjelli\*, M. Kaci, A. Boukerrou, and S. Krim

University of Bejaia, Algeria

\*E-mail: [hocdjidj@yahoo.fr](mailto:hocdjidj@yahoo.fr)

**Key words:** Polypropylene, fibers, cellulose, composite, thermal properties.

**Abstract.** Every year, during the season of transformation of olive to oil, thousands tons of olive residue are rejected to nature or incinerated causing environmental pollution. The recovery of this renewable waste may have a double positives impact, economic, and ecological. The great part of the publications deals with the use of cellulosic fibers treatment with chemical agents and the characterization of the properties performances of such composites. However, very few publications are devoted to olive residue. In this study the olive pomace was modified chemically to improve the interface between the polypropylene matrix and the cellulosic fillers. The modification was done using vinyltriacetoxysilane and PP-g-MA compatibilisant agent. Several formulations of PP filled with 10, 20 and 30% by mass of olive pomace treated and untreated were prepared. The mechanical and thermal characteristics of composites according to the rate of flour and type of treatment were investigated.

## INFLUENCE OF CUTTING PARAMETERS ON CUTTING FORCE IN TURNING OF POLYTETRAFLUORETHYLENE WITH REGENERATE GRAPHITE

A. Munteanu\*, C. Fetecau\* and F. Stan\*

\* Dunarea de Jos University of Galati

E-mail: [ana.munteanu@ugal.ro](mailto:ana.munteanu@ugal.ro), Web page: <http://www.ugal.ro>

**Key words:** Turning operation, Polytetrafluoretylena, Two-level full factorial design

**Abstract.** In this paper, experiments were carried out to study the effects of machining parameters and their significant interaction on the main cutting force during turning of the thermoplastics polytetrafluorethylene with regenerate graphite (PTFE GR). Full factorial design is used to determine the cause and the effect of the response. The feed rate and depth of cut are found to be significant to cutting force.

## STUDIES REGARDING MACHINABILITY DURING THE TURNING PROCESS OF PA 66 GF 30 POLYAMIDE WITH CERAMICS INSERTS

M. Moțoi

University of Pitesti

E-mail: [marian.motoi@upit.ro](mailto:marian.motoi@upit.ro), Web page: <http://www.upit.ro>

**Key words:** Polyamide, Cutting Process, Roughness, Machinability, Taguchi Methodology, Turning, Cutting Tools

**Abstract.** Polyamide PA 66 GF 30 is a technical thermoplastic material which has excellent mechanical and physical properties and which is more and more often used in the automotive engineering industry. This is the reason why we need to know the machinability characteristics of this thermoplastic material during the turning process. In this paper we intend to study the influence of the cutting parameters on the power of cut, the main cutting force, the specific cutting pressure, the roughness of the surface and the dimensional accuracy during the turning process of PA 66 GF 30 polyamide. The planes of experiments were established based on the Taguchi Methodology. The works were done with a carbide tipped lathe tool.

## STUDY CONCERNING THE CUTTING FORCES OBTAINED BY MILLING OF PA 6 SA POLYAMIDE

Gh. I. Vasile†

† University of Pitesti, Romania

E-mail: [gh\\_vasile@yahoo.com](mailto:gh_vasile@yahoo.com), Web page: <http://www.upit.ro>

**Key words:** polyamide, cutting force.

**Abstract.** *This work presents the dependency of the main force of milling,  $F_z$ , in the depth of cut  $t$ , of the cutting feed  $s$ , and of the speed  $v$ , using even a factorial of the guy  $2^{3-1}$ . As we know, the main cutting force is one of the machinability indicator during the cutting process. The main cutting force during the milling process is directly determined by measuring the force device. Polyamide PA 6 SA is produced by the ERTA Company.*

## STUDY CONCERNING THE SPECIFIC CUTTING PRESSURE AND THE INTERNATIONAL DIMENSIONAL ACCURACY DURING THE MILLING PROCESS OF PA 6 SA POLYAMIDE

Gh. I. Vasile†

† University of Pitesti, Romania

E-mail: [gh\\_vasile@yahoo.com](mailto:gh_vasile@yahoo.com), Web page: <http://www.upit.ro>

**Key words:** polyamide, specific cutting pressure, international dimensional accuracy.

**Abstract:** *In this work we determine the influence of the cutting regime parameters on the specific cutting pressure and the international dimensional accuracy, during the milling process of a polyamide PA 6 SA. Polyamide PA 6 SA is produced of the ERTA Company.*

## SOME ASPECTS REGARDING THE SIMULATION OF TWO-COMPONENT INJECTION PROCESS

D. Nedelcu<sup>1</sup>, D. Mindru<sup>2</sup>, L. Tabacaru<sup>1</sup> and Gh. Cretu<sup>1</sup>

<sup>1</sup>Universitatea Tehnica "Gheorghe Asachi" din Iasi,

E-mail: [dnelcu@tcm.tuiasi.ro](mailto:dnelcu@tcm.tuiasi.ro)

<sup>2</sup> SC CADWORKS International SRL, Romania

E-mail: [danielm@cadworks.ro](mailto:danielm@cadworks.ro)

**Key words:** injection, nozzle, temperature, location, simulation

**Abstract.** *The paper presents the simulation of two-component injection process in order to obtain one piece from polymer PPG40 using the software MoldFlow. The simulation takes into consideration a Taguchi research plan with six factors and two levels for each of them, as follows: nozzle form, melting temperature of the material, mould temperature, injection time, injection pressure and gate location. The following results are presented: filling time variation based on injection pressure, flow front temperature, cooling time variation.*

## OPTIMIZATION OF THE INJECTION MOLDING PROCESS WITH 3D SIMULATION

N. Ivascu<sup>\*</sup>, C. Fetecau<sup>\*\*</sup>, I. Postolache<sup>\*\*</sup> and C. Voicu<sup>\*\*</sup>

<sup>\*</sup>Wastequip-CUSCO, Richmond Hill, Ontario, Canada

Email: [nicki@wastequipcusco.com](mailto:nicki@wastequipcusco.com)

<sup>\*\*</sup>Dunarea de Jos University of Galati

E-mail: [catalin.fetecau@ugal.ro](mailto:catalin.fetecau@ugal.ro), Web page: <http://www.ugal.ro>

**Key words:** Polymers, Injection Molding, Design, Optimization.

**Abstract.** *This work aims to present the optimization of the design of a plastic part manufactured at Accurate Machine and Tool Ltd. Canada, by using Moldflow combining with the optimization method developed by Villarreal and Cabrera-Ríos. The method uses design of experiments and adaptive meta-modeling techniques. The application of the method to several global optimization test functions as well as non linear polynomial and non polynomial functions point leads towards a quick convergence to highly attractive solutions with a low number of simulations [3]. Using these methods, with a modest number of simulations runs, the resultant savings are significant. The part has the weight reduced from 0.031b for the initial part to 0.0221b. On this one design alone it is saved 27% of the material for each part.*

## DETERMINATION OF THE RESIDUAL STRESSES IN THE INJECTION MOLDED POLYMERIC PARTS

A. Niță<sup>\*</sup> and P. Bârsănescu<sup>†</sup>

<sup>\*</sup> Constanta Maritime University

E-mail: [alexandranita@imc.ro](mailto:alexandranita@imc.ro), Web page: <http://www.cmu-edu.eu>

<sup>†</sup> Gheorghe Asachi Technical University of Iasi

Email: [paulbarsanescu@yahoo.com](mailto:paulbarsanescu@yahoo.com), Web page: <http://www.mec.tuiasi.ro/>

**Key words:** Polymers, Residual Stresses, Strain Gage Rosette, Injection Molding

**Abstract.** *This paper presents the measurements of the residual stresses using the strain gage rosette on three different used plastics: ABS, PP and PS. We done it with the most widely used practical technique for measuring residual stresses, the hole-drilling strain gage method described in ASTM Standard E837. With this method, a specially configured electrical resistance strain gage rosette is bonded to the surface of the test object, and a small shallow hole is drilled through the center of the rosette. The local changes in strain due to introduction of the hole are measured, and the relaxed residual stresses are computed from these measurements. The strain measurement on a plastic or composite test object will frequently call for much greater skill, expertise, and knowledge of mechanics than that typically required with the structural metals.*



## STUDY REGARDING THE INFLUENCE OF THE MOULD TEMPERATURE OPTIMIZING OF LARGE MOLD ON PIECE QUALITY OF MATERIAL THERMOPLASTICS

Ș. Mihăilă\*, F. Ardelean\*, S. Ilie\*\* and D. Chira\*\*\*

\*University of Oradea

Email: [mihailasna@yahoo.com](mailto:mihailasna@yahoo.com) Web page: <http://www.uoradea.ro>

\*\*S.C. Plastor S.A.

E-mail: [sorin\\_ilie@plastor.ro](mailto:sorin_ilie@plastor.ro), Web page: <http://www.plastor.ro>

**Key words:** Injection, temperature, polymer, semimould, cooling, homogenous

**Abstract.** *The paper presents a study on the influence of temperature moulds quality injected plastic parts than used in the industry. It presents briefly the phenomena that occur in the injection process; also determine a set of equations on thermal phenomena that occur in the mould injected during work. Continued presents two constructive solutions that contribute significantly to the homogenization temperature of semimoulds injected with one or more nests which increase the quality of parts. In the second part of the paper presents a case study on the size of strains according to the water used in temperature input circuit cooling. It uses five types of polymer range of reckoning is widely used in practice.*

## STUDY OF THE MOULD CAVITY MANUFACTURING USING CAM SOFT

F. Ardelean\*, S. Ilie†, Ș. Mihăilă\* and D. Chira\*

\* University of Oradea

Email: [aflavius@uoradea.ro](mailto:aflavius@uoradea.ro), Web page: <http://imt.uoradea.ro>

† S.C. Plastor S.A.

E-mail: [sorin\\_ilie@plastor.ro](mailto:sorin_ilie@plastor.ro), Web page: <http://www.plastor.ro>

**Key words:** Mould cavity, manufacturing, CAM soft

**Abstract:** *The manufacturing process of the mould cavity implies, in almost all difficult cases, a sustained technological effort, because of the complex shape of the cavity. By combining the classical cutting proceedings with the electro-erosion methods, which are the most used in practice, require higher manufacturing costs, resulting in an expensive final product. By means of the CAM soft such as Solid CAM, Master CAM etc., we can program and execute complex surfaces by milling cutting. In this way the designing, manufacturing of the electrode and the electro-erosion process of the cavity will be excluded. In this paper, a proposal for a foreign client for a stator type piece is presented. The cavity is studied for a semi-core.*

## DISCONTINUOUS COOLING IN INJECTION MOLDING PROCESS

D. Chira\*, Ș. Mihăilă\*, F. Ardelean\* and S. Ilie\*\*

\*University of Oradea,

E-mail: [dan.chira@rdslink.ro](mailto:dan.chira@rdslink.ro), web page: <http://www.imt.uroadea.ro>

**Keywords:** injection molding, continuous cooling, discontinuous cooling, long time cycle,

**Abstract.** *The paper presents a method to improve the injection molding process, through the discontinuous cooling of the mold. Mold temperature have an important influence over the shrinkage and warpage of injection molded piece, requiring a low temperature, but in the same time this temperature influence the flow of melt inside the mold, requiring a high temperature. This method uses a pulsed cycle for cooling water inside the mold. This method can be used only in the case of long time cycle and long pieces.*

## USING CAE PROGRAMMS FOR BETTER ADHESION AT THE CONTACT SURFACE IN INJECTION BI-COMPONENTS PARTS

S. Ilie, M. Ștefan, F. Ardelean and D. Chira†

S.C. Plastor S.A.

E-mail: [sorin\\_ilie@plastor.ro](mailto:sorin_ilie@plastor.ro), Web page: <http://www.plastor.ro>

† University of Oradea

Email: [mihailasna@yahoo.com](mailto:mihailasna@yahoo.com),

**Key words:** Polymers, Injection Molding, Multi-component, Adhesion.

**Abstract.** *One of the most important characteristic of an injection bi-components plastic part is the adhesion between the two components. Why is this characteristic the most important? Because, alls the injection molding bi-component parts needs to be absolute inseparable all of his life. The results of experimental researches were applied for bi-component plastic parts in the serial production of the parts for ski boots. Same parts of the ski boots have a critical surface were the adhesion between the two polyurethanes components was not enough. A very big quantity of scraps of ski boots was caused by non-adhesion. These scraps caused a big increase of production costs because of loosing of materials, production capacities and labors costs. These costs must be reduced as soon as possible. These are the reason because of this study. At the beginning it is necessary to optimize the injection molding parameters using the CAE simulation programs. The simulations results have been used to calculate the optimum roughness of the contact surface to obtain the best adhesion at the contact surface between their two components of the molding part.*

## CONSIDERATIONS REGARDING THE VARIATION OF THE PRESSURE IN COROTATING TWIN SCREW EXTRUDER

V. V. Jinescu\* and N. I. Sporea\*

\* University Politehnica of Bucharest

Email: [vvjinescu@yahoo.com](mailto:vvjinescu@yahoo.com), [nsporea@yahoo.com](mailto:nsporea@yahoo.com), Web page: <http://www.pub.ro>

**Key words:** twin screw extruder, maximum pressure, variation of pressure

**Abstract.** *Starting from the twin screw extruder flow rate expression, the variation of pressure and the maximum pressure in the melting section has been calculated. The values obtained were compared with the one experimental.*

## IMPACT OF ACCELERATED PARTICLES WITH PLEXIGLAS OBJECTS SURFACES

L. Slătineanu, M. Coteață, N. Pop and F. Negoescu

Technical University "Gheorghe Asachi" of Iași

E-mail: [slati@tcm.tuiasi.ro](mailto:slati@tcm.tuiasi.ro), [mcoteata@tcm.tuiasi.ro](mailto:mcoteata@tcm.tuiasi.ro), [popnic@gmail.com](mailto:popnic@gmail.com), [fnegoescu@gmail.com](mailto:fnegoescu@gmail.com), Web page: <http://www.tuiasi.ro>

**Key words:** Plexiglas, Engraving, Abrasive Jet Machining, Impact Effect, Surface Roughness

**Abstract.** *The Plexiglas is a light transparent weather resistant thermoplastic, whose name is Poly(methyl methacrylate) (PMMA) poly(methyl 2-methylpropenoate). It can be considered as a substitute for the glass; the mechanical properties, easy processing and low cost contributed to an extended use of the Plexiglas for solving different problems in machine manufacturing. There are different methods to achieve inscriptions or images on the objects of Plexiglas; one of these methods is based on the controlled impact of the accelerated particles with the surface layer of the Plexiglas object. The paper firstly presents some theoretical considerations concerning the phenomenon of impact of the particles with the surface layer of the Plexiglas object, by taking into consideration the presence or the absence of the sharpened edges. There are different factors able to influence the effect of the impact phenomena between the particles and the Plexiglas object; a short analysis of these factors was elaborated.*

## IDENTIFICATION OF RELEVANT INDICATORS FOR PREFORMING PROCESS SELECTION

M. Mihaluta, P. Martin, H.-F. Perrin and A. D'Acunto\*

\* Arts et Métiers ParisTech of Metz

E-mail: [marius.mihaluta@metz.ensam.fr](mailto:marius.mihaluta@metz.ensam.fr), Web page: [http://www.ensam.eu/fr/centres\\_et\\_instituts/centre\\_metz](http://www.ensam.eu/fr/centres_et_instituts/centre_metz)

**Key words:** Preforming, Concurrent Engineering, Process Selection

**Abstract.** *Liquid Composite Moulding processes are beginning to be used for the manufacturing of reinforced plastic products in the aeronautical field after having proved their performances in the automotive and nautical fields. Preform fabrication is a key step in the manufacturing of such parts. Different performance indicators are required to perform the selection of preforming manufacturing processes. In this paper we propose a methodology for the selection of possible preforming processes for a given part taking into account processing criteria such as fibre drapability. Relevant indicators related to fibre drapability have been identified. Their quantification has been validated experimentally using a shearing device. These experimental results have been correlated with draping simulation results using PAM-RTM Quik-form. The main objective is the development of manufacturing constraints to be used in a constraint programming algorithm for the development of a decision support software tool for the selection of preforming processes.*

## IMPACT OF PLASTICS, THEIR SPECIFIC TECHNOLOGIES AND THEIR PERFORMANCE, IN THE RENAULT CARS INDUSTRY

V. Perianu\*

\* RENAULT TECHNOLOGIE ROUMANIE

E-mail: [viorel.perianu@renault.com](mailto:viorel.perianu@renault.com)

**Key words:** Plastic parts, automotive industry

**Abstract.** *In the evolution of the automotive industry, one can observe the increase of use and functions of plastic parts. This document presents the main role of the plastic materials in the Renault cars industry, the volume of plastic parts contained by the vehicles and their importance in the vehicle construction. In addition, is described the list of the principal plastic materials used, as well as the most important technologies of plastics processing such as injection, extrusion or thermoforming.*

## NEW ADAPTIVE WING CONCEPT USING SMART MATERIALS

N. Camelia\*, B. Andrei\*, C. Ioan\*, M. Mihalca\*, A. Boritu† and D. Tanase†

\* Transylvania University of Brasov

E-mail: [camelianiculita@yahoo.com](mailto:camelianiculita@yahoo.com) , Web page: <http://www.unitbv.ro>

† University Politehnica of Bucharest

Email: [andreea10delia@yahoo.com](mailto:andreea10delia@yahoo.com) , Web page: <http://www.pub.ro>

**Key words:** Intelligent Materials, Adaptive Wing, Aircraft Performances, Wing Structure

**Abstract.** *The paper is presenting a design concept for the adaptive wing structural using intelligent materials. Latest concepts imply the use of piezoelectric material to create deformations of the structures, limited by the reduced strength of the structure. The adaptive concept combines the advantages of piezoelectric materials, an intelligent material with the advantages of classical structures. The higher performances are based on the active deformation of the structure in order to obtain optimum flight performances for the aircrafts.*

## ECOLOGICAL USE OF THE SOLID POLYMERIC WASTES – QUALITY AND ECONOMIC LIMITATIONS

N.I. Teodorescu\* and M.F.I. Ștefănescu\*\*

University Politehnica of Bucharest

\*E-mail: [nicoleta\\_teodorescu@yahoo.com](mailto:nicoleta_teodorescu@yahoo.com)

**Key words:** Polymeric materials, solid wastes, recycling, degradation, environment.

**Abstract.** *This paper presents the problems arouse at the use/recycling of the solid polymeric wastes (both bio and non-bio-degradable). It is pointed out the actual European legislation concerning plastics recycling (and the degree of their practical applications in the new EU member states, compared with the old ones), the trends in technical solutions and the economic limitations of the polymeric materials reuse.*

## ESTABLISHING THE OPTIMUM WELDING PROCEDURE FOR THERMOPLASTIC LINING MEMBRANE USING THE RESPONSE SURFACE DESIGN

M. Cocard<sup>1</sup>, I. Grozav<sup>2</sup>, A. Murariu<sup>1</sup>, M. Iacob<sup>1</sup> and A. Căneparu<sup>1</sup>

<sup>1</sup>National R&D Institute for Welding and Material Testing

E-mail: [cocardm@isim.ro](mailto:cocardm@isim.ro), Web page: <http://www.isim.ro>

<sup>2</sup>"Politehnica" University of Timisoara, Mechanical Engineering Faculty

E-mail: [igrozav@eng.utt.ro](mailto:igrozav@eng.utt.ro), Web page: <http://www.mec.upt.ro>

**Key words:** Optimizing, heated wedge welding, thermoplastic lining membrane, design of experiments

**Abstract.** *The paper presents a modern method to optimize welding procedures for thermoplastic lining membrane using computer-assisted design of experiments. The design of experiments method RSD (Response Surface Design) was applied to optimize heated wedge welding process of thermoplastic lining membrane. The aim was to establish the influence of controllable factors on the quality of welded joints. It also analyses trends of controllable factors to optimize the imposed objective functions. Experimental researches were made on 2 mm thick lining membrane with a view to apply the mathematical modelling approach of the welding process. So, on the basis of welding technological versions, the optimum welding procedure was established.*

## DETERMINATION OF THE CROSS-WLF VISCOSITY MODEL FOR POLYETHYLENE

I. Postolache\*, E. A. Squeo\*\*, C. Fetecău\* and F. Stan\*

\* Dunarea de Jos University of Galati

E-mail: [ion.postolache@ugal.ro](mailto:ion.postolache@ugal.ro), Web page: <http://www.ugal.ro>

\*\* University of Rome Tor Vergata

E-mail: [squeo@ing.uniroma2.it](mailto:squeo@ing.uniroma2.it)

**Key words:** Polymers, viscosity, storage modulus, WLF model

**Abstract.** *In this paper, the melting behaviour of high density polyethylene (HDPE) and low density polyethylene have been analysed through differential scanning calorimetry (DSC) and thermo-mechanical analysis (TMA). Dynamic mechanical analysis (DMA) has been used to determine the storage modulus as a function of frequency and the Cross-WLF equation were determined by time-temperature superposition technique.*

## Author Index

### A

Abdel Bary E.M. .... 173  
Aleksy D. .... 1  
Aminotowlie Y. .... 197  
Andrei B. .... 351  
Andrei G. .... 64, 78, 86, 102  
Anghel D.F. .... 189  
Anghel V. .... 213  
Anne L.H. .... 1  
Ardelean F. .... 291, 299, 307, 313  
Aydin I. .... 17, 33, 205

### B

Bazgir S. .... 197  
Barsanescu P. .... 283  
Behazin E. .... 197  
Besnea A. .... 102  
Beznea E.F. .... 136, 146  
Bindar D. .... 225  
Bivolaru C. .... 110, 125  
Birsan I.G. .... 64, 70  
Boazu D. .... 146  
Boritu A. .... 213, 351  
Boukerrou A. .... 40, 233  
Bria V. .... 64, 70  
Bruzard S. .... 219

### C

Camelia N. .... 351  
Cantaragiu A. .... 102  
Caneparu A. .... 367  
Chira D. .... 291, 299, 307, 313  
Chirica I. .... 136, 146  
Chirica R. .... 146  
Chiriac A. .... 225  
Ciortan S. .... 86  
Circiumaru A. .... 64, 70  
Cocard M. .... 367  
Codrut D. .... 213  
Constantin N. .... 213  
Coteata M. .... 327  
Cretu Gh. .... 269

### D

D'Acunto A. .... 335  
Deleanu L. .... 86, 102  
Dima D. .... 78  
Djidjelli H. .... 233

Drozdov A.D. .... 1  
Durmus A. .... 17, 25, 33, 205

### F

El-Taweel S. .... 173  
Eracan N. .... 25, 33, 205

### F

Fetecau C. .... 48, 239, 275, 375  
Florea Spiroiu M. .... 189

### G

Garlea A. .... 225  
Gavan M. .... 213  
Gavrus A. .... 9  
Grohens Y. .... 219  
Grozav I. .... 367  
Grozea M.A. .... 157

### H

Hadar A. .... 118, 157  
Hog Lejre A.L. .... 1

### I

Iacob M. .... 367  
Ilie S. .... 291, 299, 307, 313  
Ioan C. .... 351  
Ivascu N. .... 275

### J

Jiga G. .... 118  
Jinescu V.V. .... 319  
Juganaru M.R. .... 94

### K

Kaci M. .... 40, 219, 233  
Kasgoz A. .... 25, 33, 205  
Kessba N.S. .... 173  
Krim S. .... 233

### M

Maftai L. .... 86, 102  
Mares G.N. .... 165  
Martin P. .... 335  
Melnig V. .... 225  
Mihaila S. .... 291, 299, 307, 313  
Mihalcica M. .... 351  
Mihaluta M. .... 335  
Mindru D. .... 269  
Motoi M. .... 247  
Munteanu A. .... 239  
Musat S.D. .... 146

Murar D. .... 110, 125  
 Murariu A. .... 367  
 Murarescu M. .... 78  
**N**  
 Nedelcu D. .... 269  
 Negoescu F. .... 327  
 Nita A. .... 110, 283  
**O**  
 Opran C. .... 110, 125  
 Ozcan M. .... 17  
**P**  
 Peretz S. .... 181, 189  
 Perianu V. .... 343  
 Perrin H.F. .... 335  
 Petrescu H.A. .... 118  
 Podaru G. .... 86  
 Pop N. .... 327  
 Postolache I. .... 64, 70, 275, 375  
 Prospero C. .... 56  
**Q**  
 Quadrini F. .... 48, 56  
**R**  
 Rahmoune M.A. .... 40  
 Remili C. .... 219  
 Riahinezhad M. .... 197

**S**  
 Santo L. .... 48  
 Slatineanu L. .... 327  
 Soyubol G. .... 33,205  
 Sporea N.I. .... 319  
 Squeo E.A. .... 56, 375  
 Stan F. .... 48, 239, 375  
 Stoian C. .... 181, 189  
 Stoll B. .... 173  
 Stefanescu M.F.I. .... 94, 359  
**T**  
 Tabacarul L. .... 269  
 Tanase D. .... 213, 351  
 Tartau L. .... 225  
 Teodorescu N. .... 94, 359  
 Trufasu G. .... 86  
**V**  
 Vasile Gh.I. .... 257, 263  
 Vlase A. .... 125  
 Vlasceanu D. .... 118, 157  
 Voicu C. .... 275  
**Z**  
 Zgerea Gh. .... 181, 189

**REVISTA DE CHIMIE / REVISTA MATERIALE PLASTICE  
SC BIBLIOTECA CHIMIEI SA București**

**materiale plastice**

**Reviewed in Chemical Abstracts and Current Contents, and included in the  
ISI (Institute for Scientific Information) index for scientific publications.**

**Calea Plevnei 139B, sector 6, 060011, OP 12, CP 109  
Tel. /Fax redacție: 314 24 47**

**Cod IBAN: RO40 RNCB 5010000235550001, BCR sector 1 București  
Cod IBAN: RO51 TREZ 7065069XXX002561, Trezorerie sector 6**

**Cont valută:  
RO18 RNCB 5010000235550009, BCR sector 1 București  
SWIFT CODE RNCBROBUAB10  
CUI: R 13751581; www.bch.ro; email: monica.baluta@syscom18.com**