

# Table of Contents

## Preface and Committee

## Chapter 1: Applied Materials and their Applications

<b>The Effect of Loading Mode on Fracture Toughness of Arcan Adhesive Joint</b> K. Prakash, K.S. Basaruddin, M.A. Rojan and H. Idrus	3
<b>Effect of Aging in Acidic Condition on Mechanical Properties of Copper (II) Oxide Added LDPE Composites</b> T.T. Tee, S.T. Bee, L.T. Sin, C.T. Ratnam, H.K. Jogindar Singh and C.Y. Low	8
<b>Effect of Electron Beam Irradiation on Mechanical Properties of Copper (II) Oxide Added LDPE Composites Aged under Acidic Condition</b> T.T. Tee, S.T. Bee, L.T. Sin, C.T. Ratnam, H.K. Jogindar Singh and C.Y. Low	13
<b>Effect of Heat Treatment on Microstructure, Hardness and Wear of Aluminum Alloy 332</b> F. Zainon, K.R. Ahmad and R. Daud	18
<b>Effects of Alkaline Concentrations on the Tensile Properties of Napier Grass Fibre</b> M.J.M. Ridzuan, M.S. Abdul Majid, M. Afendi, S.N. Aqmariah Kanafiah and M.B.M. Nuriman	23
<b>Effects of Temperatures on the Compressive Strength of Napier Grass Filler-Filled Unsaturated Polyester Resin</b> M.S. Fartini, M.S. Abdul Majid, M. Afendi and A. Mohamad	28
<b>Elasto-Plastic Deformation of Colony Boundaries in Pearlite Microstructure by Finite Element Analyses</b> L. Roslan, T. Ohashi, Y. Yasuda and C. Suruga	33
<b>Evaluation of Adhesive T-Joint Using Finite Element Analysis</b> B. Izzawati, M. Afendi, S. Nurhashima, A. Nor, A.R. Abdullah and R. Daud	37
<b>Failure Investigation of Tubular Adhesive Dissimilar Joint</b> M. Faizi, W.M. Syafiq, M. Afendi, N.G. Chuen and A.B. Shahrman	43
<b>Fatigue Performance of Hybrid Adhesive Dissimilar Joint</b> K. Hafizan, M. Afendi and A. Logashanmugam	48
<b>Finite Element Stress Analysis of Adhesive T-Joint with Crack in Fluidization Bed</b> A. Nor, M. Afendi, M.S. Abdul Majid, B. Izzawati, S. Nurhashima and A.R. Abdullah	53
<b>Full Factorial Design Analysis on Mechanical Properties of Electron Beam Irradiated-Flame Retarded LDPE/EVA Composites</b> T.T. Tee, S.T. Bee, A. Hassan, C.T. Ratnam, L.T. Sin and C.Y. Low	58
<b>Hot Set Characterization of Electron Beam Irradiated-Copper (II) Oxide Added LDPE Composites under Acidic Aging</b> T.T. Tee, S.T. Bee, L.T. Sin, C.T. Ratnam and H.K. Jogindar Singh	63
<b>Influence of Heat Treatment and Surface Roughing to the Adherent Surface and Adhesion Strength: A Review</b> N. Atikah, M. Afendi, N. Amira and M. Mohd Noor	68
<b>Interfacial Shear Stress in Kenaf/Polyethylene Terephthalate Fiber Reinforced Polyoxymethylene Composite</b> Y. Dan-Mallam, M.S. Abdul Majid and M.Z. Abdullah	74
<b>Investigation of Flexure Strength on Carbon Fiber Reinforced Epoxy (CFRE) for Aircraft Panel</b> A.R. Syayuthi, Haftirman, K.S. Basaruddin and M.S. Abdul Manan	79
<b>Porous Solid Carbon Dioxide Adsorbent Using Cost Effective Materials: A Review</b> Y. Yasmin, M. Mohd Noor, W.H. Chan, J.B. Shamsul and A. Rahmat	84
<b>Determining the Accuracy of the Life Determination Analysis for Low Carbon Steel</b> N.I.I. Mansor, S. Abdullah, A.K. Ariffin and M. Mahmud	89
<b>Failure Stress Analysis of Adhesive T-Joint under Moisture Condition</b> S. Nurhashima, M. Afendi, B. Izzawati, A. Nor, A.R. Abdullah, N.A.M. Amin, M.S. Abdul Majid and R. Daud	94

<b>Study of PWHT of EN-WB 36 Welded Material for High Pressure Application in Power Plants</b> M. Sarwar and A.M. Mohd Amin	99
<b>Crack Initiation Mechanism of a Cast Hybrid MMC in Low Cycle Fatigue</b> A.K.M.A. Iqbal and Y. Arai	105
<b>Effect of Tool Parameters on Mechanical Properties of Friction Stir Welded Aluminum Alloy</b> S.R. Pedapati, G. Vimalan, M. Awang and A.M.A. Rani	111
<b>Assessment of Fatigue Strength in Small-Specimen of AISI 3140 Steel</b> Haftirman, K.S. Basaruddin, M. Afendi and A.R. Syayuthi	116
<b>Burst Strength of Glass Fibre/Epoxy Composite Pipes Subjected to Impact Loading</b> A. Hawa, M.S. Abdul Majid, M. Afendi, M. Haslan, K. Pranesh and N.A.M. Amin	121
<b>Characterization of Biaxial Fatigue by Using Strain Energy Density Approach for Steel</b> S.A.N. Mohamed, S. Abdullah, K.A. Ariffin, A. Arifin and M.M. Padzi	126
<b>Finite Element Modeling of Intermetallic Compound (IMC) Solder Joints Fracture: Part A</b> E.P. Ooi, R. Daud, N.A.M. Amin, T.W. Hong, M.S. Abdul Majid, M. Afendi, A. Mohamad and A.K. Ariffin	131
<b>Finite Element Modeling of Intermetallic Compound (IMC) Solder Joints Fracture: Part B</b> E.P. Ooi, R. Daud, N.A.M. Amin, T.W. Hong, M.S. Abdul Majid, M. Afendi, A. Mohamad and A.K. Ariffin	136
<b>The Relationship between Strain Energy Release Rate with Crack-to-Width Ratio of Human Phalanx Bone</b> S.A. Abdul Halim, R. Daud, Y. Bajuri, S.K. Zaaba, K.S. Basaruddin, N.A.M. Zain and N.N. Mansor	141

## **Chapter 2: Noise and Vibration Analysis**

<b>Development of an Indigenous Impedance Tube</b> W.H. Tan, R. Ahmad, N.H. Zunaidi, R. Daud and E.M. Cheng	149
<b>Effect of Stiffness Ratio of Piecewise-Linear Spring on the Occurrence of Subharmonic Nonlinear Vibration in Automatic Transmission Powertrain</b> T. Ryu, S. Rosbi, K. Matsuzaki, T. Nakae, A. Sueoka, Y. Takikawa and Y. Ooi	156
<b>Two Way Assessments in Measuring Vibration Exposure among Workers: A Review</b> N.K. Khamis, B. Md Deros and F.R. Ismail	161
<b>Objective Assessment of Vibration Exposure among Workforces: A Review</b> N.K. Khamis, B. Md Deros, M.Z. Nuawi and F.R. Ismail	166
<b>Study of Vibration Absorbers Using Epoxy Reinforced Natural Fibers</b> I.B. Zaman, B. Manshoor and A. Khalid	174

## **Chapter 3: Thermal Engineering, Fluids and Energy**

<b>CFD Modelling and Validation of Newtonian and Non-Newtonian Fluids in Curved Conduits</b> A. Yousif and A. Japper-Jaafar	181
<b>Effect of Porosity on Circle Grid Perforated Plate Performance as a Static Mixer in Laminar Flow</b> B. Manshoor, M.Z. Mat Loddin, A. Khalid and I.B. Zaman	188
<b>Finite Element Analysis of Heater Length in a Porous Annulus - Part A</b> G.A. Quadir, N.J.S. Ahmed, A.A.A.A. Al-Rashed, I.A. Badruddin, H.M.T. Khaleed and S. Kamangar	193
<b>Finite Element Analysis of Heater Length in a Porous Annulus - Part B</b> A.A.A.A. Al-Rashed, S.N.J. Ahmed, G.A. Quadir, H.M.T. Khaleed, I.A. Badruddin, Y.T.M. Khan and S. Kamangar	199
<b>Numerical Simulation for the Aerodynamics of Vertical Axis Wind Turbine with Two Different Rotors Having Movable Vanes</b> H.S. Kadhim, G.A. Quadir, A.K. Farhan, U. Ryspek and K.A. Ismail	205

<b>Numerical Investigation on the Effect of Injection Pressure on Melt Front Pressure and Velocity Drop</b> M.S. Rusdi, M.Z. Abdullah, A.S. Mahmud, C.Y. Khor, M.S. Abdul Aziz, M.K. Abdullah, H. Yusoff and S.M. Firdaus	210
<b>Preliminary CFD Investigation of Syngas Combustion at Different Operating Pressures</b> N. Mat Zian, H. Hasini and N.I. Om	215
<b>Preliminary Investigation of an Up-Scaled Gamma-Type Stirling Engine for Power Production</b> M.F. Hamid, M. Yusof, M.K. Abdullah, Z.A. Zainal and M.A. Miskam	220
<b>Recent Developments in Efficiency Enhancement of Non-Concentrating Photovoltaic Systems by Thermal Methods</b> Z. Kaneesamankandi, A. Almujaheed and S.A. Al-Sanea	226
<b>Scaled down Design of a Cold and Hot Flow Model Based on a Bubbling Fluidized Bed Pilot Plant Gasifier</b> I. Eslami Afrooz, C.M. Sinnathambi, S. Karuppanan and D. Ling Chuan Ching	232
<b>Power and Thermal Efficiency Study of Offshore Gas Turbines under Various Ambient Temperatures</b> M. Tahan Bouriaabadi, M.A. bin Abd Majid, M.A. Abd Majid and M. Muhammad	238
<b>Thermal Analysis of Cup-Shaped Object and Experiment for Flash-Less Cold Forging Using FEM</b> H.M.T. Khaleed, G.A. Quadir, M.F. Addas, A.A.A.A. Al-Rashed, N.J.S. Ahmed, I.A. Badruddin, T.M.Y. Khan and S. Kamangar	243
<b>Study on Wing Aspect Ratio on the Performance of a Gliding Robotic Fish</b> J. Muhammad Yasar, O. Mark, T. Nagarajan, S.S.A. Ali and U. Barkat	248

## **Chapter 4: Applied Mechanics, Design and Manufacturing**

<b>Development of Articular Cartilage Scaffold Design Selection System</b> S. Maidin and S.E. Shaari	257
<b>A Review on Valuable Trends of Product Data Management (PDM) Occupied in New Product Development (NPD)</b> S. Nallusamy, K. Balakannan, R.S. Rekha and K. Balasubramanian	262
<b>Analysis and Optimization of ‘Y’ Wheel Stair Climbing Mechanism</b> N.P. Kamble and S. Sujatha	269
<b>Comparative Study of Rapid Upper Limb Assessment (RULA) and Rapid Entire Body Assessment (REBA) between Conventional and Machine Assisted Napier Grass Harvest Works</b> M.K.F. Abd Rahman, A.B. Shahrman, H. Desa, R. Daud, Z.M. Razlan, W. Khairunizam, E.M. Cheng and M. Afendi	275
<b>Conceptual Design for Oil Palm Evacuation to Improve Ergonomics Issues of Collecting Fresh Fruit Bunch</b> L.N. Muhammad, A.B. Shahrman, B.M.T. Shamsul, B.M. Deros, A.S. Rambely, Y.G. Ng, M.R. Zuradzman, W. Khairunizam, H. Desa, E.M. Cheng and M. Afendi	281
<b>Design and Analysis of Hand and Wrist Support Device</b> S. Maidin and M. Nazrin	287
<b>Design and Fabrication of Hybrid Vehicle for Disabled Persons</b> E. Bhaskaran	292
<b>Design and Manufacture of Recurve Bow Riser Using Fused Deposition Modeling and Fibre-Reinforced Composite Material</b> S. Maidin and M.H. Jaafar	300
<b>Direct Modelling CAD Technology Comparative Review in Efficiency and Productivity for Product Development Process</b> M.Q. Ibrahim, N. Hassim, A.A. Yusof and S.Z. Abdul Mutalib	305
<b>Minimising Material Handling Cost Using Relative Factors for Fixed Area Cell Layout Problem</b> P.V. Arulkumar and M. Saravanan	311
<b>Numerical Study of Mold Filling during Encapsulation Process</b> M.F. Hamid, M.K. Abdullah, H. Yusoff, S.M. Firdaus, M.Z. Abdullah, Z.M. Ariff and M.A. Azmi	318

<b>Response Surface Methodology Modeling of Drill Exiting Damage Factor in High Speed Drilling of GFRP Using HSS Twist Drill Bit</b> T.K. Woo, F. Ahmad and S. Sharif	323
<b>Robotic Arm Design for Coconut-Tree Climbing Robot</b> M. Rajesh Kannan, P. Thejus, P. Allan, V. Trayesh and M. Gokul	328
<b>RotoPower – A Real Time Electricity Source Based on Rotational Motion</b> M. Rajesh Kannan, B. Abilash, S. Karthik, M. Anoop and H. Anriudh	334
<b>Scheduling Optimization Cell Formation Problem for Cellular Manufacturing System Using Meta-Heuristic Methods</b> M. Saravanan and S. Karthikeyan	340
<b>Study of Impact Behavior of Aluminum Thin Plate</b> R.A. Siregar, S.F. Khan and C. T. Foo	345
<b>Application of Parallel Flow Line Scheduling Using GA</b> S. Rajendran, K. Balasubramanian and N. Rajeswari	349
<b>Indirect Additive Manufacturing (AM) of Apatite-Wollastonite (A-W) Glass-Ceramic for Medical Implants</b> S.F. Khan, K. W. Dalgarno and R.A. Siregar	354
<b>FSI Analysis of the Effect of Aspect Ratio of Stacked Chip in Encapsulation Process of Moulded Underfill Packaging</b> M.H.H. Ishak, M.Z. Abdullah, M.K. Abdullah, A. Abdul Aziz, W.K. Loh, R.C. Ooi and C.K. Ooi	361
<b>PLC Trainer Kit Simulator: An Improvement for Automation Study in Polimas</b> M. Mahadi, N.A. Mohd Amin, M. Ab Rahim and M.S. Abdul Majid	367
<b>Finite Element Analysis on Robotic Arm for Waste Management Application</b> R. Zol Bahri and D.D. Nurul Atikah	372
<b>Implementation of Gesture Control in Robotic Arm Using Kinect Module</b> M. Rajesh Kannan, M. Deepansh, A. Nitin and S. Nihil	378
<b>Study on Dynamic Behaviour of Grass Trimmer Using Finite Element Analysis</b> I.B. Zaman, M.R. Abdurasad, B. Manshoor, A. Khalid and M.S.M. Sani	383
<b>Kinematics of Foot during Running: A Review</b> N.A.A. Abdul Yamin, W.M.R. Rusli, K.S. Basaruddin, N. Abd Razak and A.F. Bin Salleh	388
<b>An EMG Study for the Application of New Harvesting Oil Palm Fruit Device to Reduce MSDs</b> R. Md Kawi, Z.B. Razali, M.N. Mansor and C.D.M. Asyraf	393
<b>Nonlinear Dynamic Analysis of Cantilever Beam Using POD Based Reduced Order Model</b> K. Atul Shankar and M. Pandey	398
<b>Reverse Engineering and Structural Analysis of Radiator Fan Blades</b> D. Vijayaganapathy and K. Balasubramaniam	404
<b>Determining the Behaviour of Fatigue Strain Histories of Vehicle Coil Springs by Using Statistical Inferences</b> M. Mahmud, S. Abdullah, A.K. Ariffin, Z.M. Nopiah, M.F.M. Yunoh and N.I.I. Mansor	409
<b>Influence of Different Anvil Back Plates on Heat Dissipation Velocity of the Micro-Friction Stir Welding Process</b> W.S. Chu and F. binti Yusof	415
<b>Analysis of Bending Behavior of Laminated Composite Beam</b> R. Arravind, M. Saravanan and K. Balasubramanian	421
<b>The Effect of Mesh Size And Frictional Force on Simulation of Aluminium Honeycomb Under Quasi-Static Loading</b> A.Z. Pokaad and M.R. Said	426