

# TABLE OF CONTENTS

## FRICTION AND LUBRICATION

| <b>Paper ID</b> | <b>Title and Author (s)</b>  | <b>Page No</b> |
|-----------------|--|----------------|
| <b>RTC 006</b>  | <b>INVESTIGATION OF VISCOSITY OF R123-TIO<sub>2</sub>NANOREFRIGERANT</b><br><i>I.M. Mahbubul, R. Saidur and M.A. Amalina</i>   | 1              |
| <b>RTC 007</b>  | <b>THE EFFECT OF FRICTION MODIFIER ON THE PERFORMANCE OF AUTOMOTIVE BRAKE</b><br><i>W.B. Wan Nik, A.F. Ayob, R.J. Talib, H.H. Masjuki and M.F. Ahmad</i>   | 5              |
| <b>RTC 030</b>  | <b>STRESS RELAXATION OF SELECTED VISCOELASTIC HERBS</b><br><i>Y. A. Yusof, S. N. Mohd. Din, N. L. Chin, and M. S. Anuar</i>  | 11             |
| <b>RTC 031</b>  | <b>STRUCTURE INTEGRITY ANALYSIS OF PISTON CROWN AGAINST THERMAL STRESS FOR COMPRESSED NATURAL GAS DIRECTINJECTION ENGINE</b><br><i>A.J. Helmisyah, S. Abdullah, and M.J. Ghazali</i>   | 16             |
| <b>RTC 033</b>  | <b>THE USE OF PALM OIL METHYL ESTER AS LUBRICANT ADDITIVE IN LOW-SPEED MILLING OF STAINLESS STEEL WITH TITANIUM ALUMINUM NITRIDE COATED CARBIDE SOLID TOOL</b><br><i>Sebastian Dayou, W.Y.H. Liew, Mohd. Azlan Bin Ismail and JedolDayou</i> | 22             |
| <b>RTC 038</b>  | <b>PRESSURE BEHAVIOUR OF LUBRICANT OIL DURING ENGINE OPERATION</b><br><i>A.F.A. Rasid, M.J. Ghazali, T.I. Mohamad&amp;W.M.F.W. Mahmood</i>   | 28             |
| <b>RTC039</b>   | <b>EFFECTS OFVULCANIZATION IN SEMI-METALLIC FRICTION MATERIALS ON FRICTION PERFORMANCE</b><br><i>A. Almaslow, M. J. Ghazali, R. J. Talib, C. T. Ratnam and C. H. Azhari and S. M. Forghani</i>   | 33             |
| <b>RTC 040</b>  | <b>INFLUENCE OF OIL VISCOSITY ON THE IMPACT ACCELERATION OF PISTON SLAP</b><br><i>Y.C. Tan, Z. MohdRipin</i>   | 37             |
| <b>RTC 046</b>  | <b>FRICTION CHARACTERISTICS OF JATROPHA OIL USING FOUR BALL TRIBOTESTER</b><br><i>TiongChiongIng, A.K. MohammedRafiq, S. Syahrullail</i>   | 42             |
| <b>RTC 047</b>  | <b>FRICTION AND WEAR CHARACTERISTICS OF WASTE VEGETABLE OIL CONTAMINATED LUBRICANTS</b><br><i>M. A. Kalam, H. H. Masjuki, M. Varman, and A. M. Liaquat</i>   | 47             |
| <b>RTC-050</b>  | <b>FRICTION AND WEAR PERFORMANCE OF ESTERIFIED JATROPHA OIL AS LUBRICANT ADDITIVES</b><br><i>A.M.H.S. Lubis, M. B. Sudin, B. Ariwahjoedi, K.A. Kurnia</i>  | 53             |

| <b>Paper ID</b> | <b>Title and Author (s)</b>  | <b>Page No</b> |
|-----------------|--|----------------|
| <b>RTC 052</b>  | <b>ANTI-WEAR CHARACTERISTICS OF JATROPHATRIMETHYLOLPROPANE (TMP) ESTER</b><br>N.W.M. Zulkifli, M.A.Kalam, R. Yunus and H.H. Masjuki  | 58             |
| <b>RTC 069</b>  | <b>STUDY OF FRICTIONAL CHARACTERISTICS AND EXTERNAL HARD PARTICLE EMBEDMENT IN AUTOMOTIVE BRAKING SYSTEM DURING HARD BRAKING</b><br><i>M. K. Abdul Hamid, G.W. Stachowiak and S.Samion</i> | 64             |

## **SURFACE ENGINEERING AND MACHINING**

| <b>Paper ID</b> | <b>Title and Author (s)</b>   | <b>Page No</b> |
|-----------------|---|----------------|
| <b>RTC 002</b>  | <b>MACHINING PERFORMANCE AND WEAR MECHANISM OF TiAIN-COATED INSERT</b><br>R.J. Talib, H,M. Ariff&M.F. Fazira  | 69             |
| <b>RTC 008</b>  | <b>CHARACTERIZATION OF ELECTROLYTIC ZrO<sub>2</sub> COATING ON MARTENSITIC STAINLESS STEEL</b><br><i>SitiHawa Mohamed Salleh, MohdNazreeDerman, MohdZaidi Omar, ShaifulRizamShamsudinand SalmieSuhanaChe Abdullah</i>     | 74             |
| <b>RTC-017</b>  | <b>MACHINED SURFACE OF FCD 700 DUCTILE CAST IRON IN A DRY TURNING ENVIRONMENT USING CARBIDE TOOLS</b><br><i>Jaharah A.Ghani , Mohd Nor Azmi Mohd Rodzi, Kamal Othman, Mohd Nizam Ab. Rahman, and Che Hassan Che Haron</i> | 78             |
| <b>RTC 018</b>  | <b>INVESTIGATION OF TRIBOLOGICAL ISSUES IN MICROFORMING: A REVIEW</b><br><i>M. Y. Ali, M. A. Maleque, A. Banu and N. Atiqah</i>   | 82             |
| <b>RTC 019</b>  | <b>FRACTOGRAPHY ANALYSIS OF Al6061 UNDER FATIGUE SPECTRUM LOADINGS</b><br><i>K.A. Zakaria, S. Abdullah, M.J. Ghazali, Z.M. Nopiah</i>   | 88             |
| <b>RTC027</b>   | <b>THE WEAR PROGRESSION OF TiN COATED CARBIDE INSERT IN TURNING FCD 700 CAST IRON</b><br><i>P. C. Siow, J.A. Ghani, S. C. V. Tan</i>  | 93             |
| <b>RTC037</b>   | <b>EFFECT OF PARTICLE SIZE AND BONDING LAYER ON PLASMA SPRAYED Al<sub>2</sub>O<sub>3</sub>-13%TiO<sub>2</sub> COATINGS</b><br><i>N.H.N. Yusoff, M.J. Ghazali, M.C. Isa, A. Muchtar, S. M. Forghani</i>                    | 99             |
| <b>RTC 041</b>  | <b>MODELING OF BRAKE SHOE IN DRUM BRAKE SQUEAL</b><br><i>C.Y. Teoh, Z. MohdRipin, M.N. Abdul Hamid</i>  | 105            |
| <b>RTC048</b>   | <b>ELASTIC-PLASTIC ANALYSIS OF SURFACE CRACKS IN ROUND BARS UNDER TENSION LOADING</b><br><i>A.E Ismail, A.KAriffin, S. Abdullah, M.JGhazali</i>   | 111            |

| <b>Paper ID</b> | <b>Title and Author (s)</b>   | <b>Page No</b> |
|-----------------|---|----------------|
| RTC 051         | <b>EXPERIMENTAL STUDY ON TOOL WEAR AND SURFACE ROUGHNESS IN END MILLING MACHINING OF AIN REINFORCED ALUMINIUM METAL MATRIX COMPOSITE (MMC)</b><br><i>S.H. Tomadi, J.A. Ghani, Che Hassan C.H, A.R. Daud</i> | 117            |
| RTC 058         | <b>SIGNAL STATISTICAL APPROACH OF ACOUSTIC EMISSION FOR FATIGUE FAILURE IN METALLIC COMPONENT</b><br><i>M.Mohammad ,S.Abdullah' , N.Jamaluddin', M.M. Padzi</i>   | 122            |
| RTC 071         | <b>TOOL WEAR IN END MILLING OPERATION WHEN MACHINING OF HASTELLOY C-2000 USING UNCOATED CARBIDE INSERTS</b><br><i>N.H. Razak, M.M. Rahmanand K. Kadirgama</i>   | 127            |
| RTC 072         | <b>SURFACE ALLOYING OF Ti-6Al-4V USING Cu-TaC COMPOSITE ELECTRODE DURING ELECTRICAL DISCHARGE MACHINING</b><br><i>M. B. Ndaliman<sup>1</sup>, A. A. Khan and M. Y. Ali</i>                                  | 133            |
| RTC074          | <b>EFFECT OF VOLTAGE ON THE CONSOLIDATION OF TIC PARTICULATES ON STEEL SUBSTRATE FUSED BY TIG WELDING ARC</b><br><i>S. Mridha A. N. MdIdriss M.A. Maleque Suryanto<sup>4</sup> and Souad A.</i>             | 139            |

## **ENGINEERING WEAR AND TRIBOCORROSION**

| <b>Paper ID</b> | <b>Title and Author (s)</b>   | <b>Page No</b> |
|-----------------|---|----------------|
| RTC 011         | <b>SURFACE TEMPERATURE DISTRIBUTION IN A COMPOSITE BRAKE ROTOR</b><br><i>A.A. Adebisi, M. A. Maleque and Q. H Shah</i>                              | 145            |
| RTC 012         | <b>WEAR PROPERTIES OF Fe-C-AI CAST IRON AND CONVENTIONAL CAST IRON –A COMPARATIVE STUDY</b><br><i>M. A. Maleque</i>                                 | 151            |
| RTC 020         | <b>TRIBOLOGICAL STUDY OF AI-BASED NATURAL FIBRE REINFORCED 'OMPOSITE BRAKE PAD MATERIALS</b><br><i>M. A. Maleque, A. R. Zamani, R. J. Talib</i>     | 156            |
| RTC 021         | <b>MODELLING ASPECT OF CORROSIVE WEAR UNDER BIODIESEL</b><br><i>A.A. Adebisi and M. A. Maleque</i>  | 162            |
| RTC 026         | <b>EXPERIMENTAL EVALUATION OF INDUSTRIAL RUBBER WEAR USING AKRON AND TRIBOMACHINE</b><br><i>R. M. Nasir, A. S. Othman, A. Y. Saad and N. Othman</i> | 169            |
| RTC 032         | <b>DEVELOPMENT OF ADHESIVE WEAR MODEL USING FEA AND EXPERIMENT ALMETHODS</b><br><i>S.Arasu, A. Krishnamoorthy and K.Srinivasan</i>                  | 177            |

| <b>Paper ID</b> | <b>Title and Author (s)</b>   | <b>Page No</b> |
|-----------------|---|----------------|
| <b>RTC 045</b>  | <b>EFFECT OF T6 HEAT TREATMENT ON WEAR PROPERTIES OF ALN REINFORCED AL-SI ALLOY COMPOSITES</b><br><i>M.NWahab, M.J. Ghazali, and A.R. Daud</i>  | 183            |
| <b>RTC053</b>   | <b>EROSION-CORROSION BEHAVIOR OF 316-SS IN SEAWATER SIMULATED ENVIRONMENT AT VARIOUS IMPINGEMENT ANGLES</b><br><i>H.M. Ghasemi, M. Karimi, A. Pasha and M. Abedini</i>                | 188            |
| <b>RTC 061</b>  | <b>INFLUENCE OF PLASMA SPRAY PARAMETERS ON WEAR PROPERTIES OF TITANIA COATINGS</b><br><i>S. M. Forghani, M. J. Ghazali, A. Muchtar, A. R. Daud, N. H. N. Yusoff, A. Almaslow</i>      | 194            |
| <b>RTC 063</b>  | <b>SPECIFIC WEAR RATE OF KENAF EPOXY COMPOSITE AND OIL PALM EMPTY FRUIT BUNCH (OPEFB) EPOXY COMPOSITE IN DRY SLIDING</b><br><i>SalmiahKasolang, AnizahKalam and Mohamad Ali Ahmad</i> | 199            |
| <b>RTC 064</b>  | <b>WEAR PROPERTIES INVESTIGATION OF RAIL AND WHEEL MATERIALS USING PIN-ON-DISK METHOD</b><br><i>M. Bin Sudin and Windarta</i>   | 204            |
| <b>RTC 070</b>  | <b>EFFECTS OF MANGANESE ADDITION ON HARDNESS OF AA6063 ALLOY FOR WEAR RESISTANT MATERIAL APPLICATIONS</b><br><i>H. Pratikno, M.J. Ghazali and A.R. Daud</i>                           | 210            |
| <b>RTC 077</b>  | <b>RICTION AND WEAR CHARACTERISTICS OF PALM BIODIESEL</b><br><i>t. A. Fazal, A. S. M. A. Haseeb, H. H. Masjuki</i>  | 215            |

## **TRIBOLOGY IN MANUFACTURING**

| <b>Paper ID</b> | <b>Title and Author (s)</b>   | <b>Page No</b> |
|-----------------|---|----------------|
| <b>RTC-013</b>  | <b>TESTING METHODS IN TRIBOLOGY: A REVIEW</b><br><i>Umar Nirmal, JamilHashim, SaijodT.W. Lau</i>  | 221            |
| <b>RTC 024</b>  | <b>TRIBOLOGICAL ASPECT OF RESIN IMPREGNATED GUNNY AND RESIN REINFORCED HONEYCOMB FOR BODY SHELL APPLICATIONS</b><br><i>R. M. Nasir, M. R. A. Montaha</i>                    | 230            |
| <b>RTC 042</b>  | <b>INVESTIGATION ON THE EFFECT OF CRUDE PALM OIL (CPO) ON THE SURFACE ROUGHNESS AND TOOL WEAR IN TURNING SS304</b><br><i>N. N. Md Ibrahim, M. Bin Sudin and F. Mohd Nor</i> | 240            |
| <b>RTC 067</b>  | <b>TAGUCHI METHOD FOR OPTIMISING THE MANUFACTURING PARAMETERS OF FRICTION MATERIALS</b><br><i>A.M. Zaharudin, R.J. Talib, M.N. Berhan, S. Budinand M.S. Aziurah</i>         | 246            |

## **MATERIALS FOR TRIBOLOGY**

| <b>Paper ID</b> | <b>Title and Author (s)</b>   | <b>Page No</b> |
|-----------------|---|----------------|
| <b>RTC 014</b>  | <b>ANALYSIS OF WORN SURFACES OF PALM SHELL ACTIVATED CARBON (PSAC) REINFORCED ALUMINIUM MATRIX COMPOSITE</b><br><i>Zamri Bin Yousoff And ShamsulBaharin Bin Jamaludin</i>                         | 252            |
| <b>RTC 016</b>  | <b>NEW NATURAL FIBRE REINFORCED COMPOSITE BRAKE FRICTION MATERIAL</b><br><i>M.A. Maleque, A. Atiqah, R.J. Talib and H. Zahurin</i>  | 258            |
| <b>RTC 057</b>  | <b>CHARACTERIZATION OF INORGANIC NON-METALLIC FIBRE REINFORCED EPOXY-BASED INTUMESCENT COATINGS AND CHARTEX 7 EXPOSED TO HIGH TEMPERATURE</b><br><i>N. Amir, F. Ahmad and P.S.M. Megat-Yusoff</i> | 264            |
| <b>RTC 076</b>  | <b>FERROGRAPHIC TECHNIQUE: ANALYSIS OF MANUAL TRANSMISSION FLUID IN DIESEL ENGINE</b><br><i>SalmiahKasolang, Norhanifah Abdul Rahman and Mohamad Ali Ahmad</i>                                    | 273            |

## **BEARING TECHNOLOGY**

| <b>Paper ID</b> | <b>Title and Author (s)</b>   | <b>Page No</b> |
|-----------------|---|----------------|
| <b>RTC 009</b>  | <b>ASPECT OF JOURNAL BEARINGS LUBRICATION USING NON NEWTONIAN FLUIDS</b><br><i>A. Nessil, S. Larbi, H. Belhaneche</i>   | 277            |
| <b>RTC 023</b>  | <b>ANALYSIS OF GROOVED JOURNAL BEARING WITH PARTIAL SLIP SURFACE</b><br><i>T. V. V. L. N. Rao, A. M. A. Rani, T. Nagarajan, F. M. Hashim</i>                            | 282            |
| <b>RTC 034</b>  | <b>STABILITY OF A RIGID ROTOR IN JOURNAL BEARINGS</b><br><i>A. A. Zakaria and J. I. Inayat-Hussain</i>  | 289            |
| <b>RTC 049</b>  | <b>INCREASING MECHANICAL EFFICIENCY OF TELESCOPIC OIL PALM FRUIT (FFB) HARVESTER BY AIR CUSHION AND MULTIPLE MINI BALL BEARING</b><br><i>Ir. Dr. Abdul Talib b. Din</i> | 295            |

## BIO- AND NANOTRIBOLOGY

| <b>Paper ID</b> | <b>Title and Author (s)</b>  | <b>Page No</b> |
|-----------------|--|----------------|
| <b>RTC 029</b>  | <b>TRIBOLOGICAL PERFORMANCE OF NANO ZINC OXIDE REINFORCED UHMWPE COMPOSITES UNDER ABRASIVE CONDITIONS</b><br><i>B.P. Chang, M.A. Hazizan, M.N. Ramdziah and T.N.T. Shilashazwani</i> | 301            |
| <b>RTC 056</b>  | <b>CUTTING PERFORMANCE AND WEAR BEHAVIOUR OF SINTERED SUB-MICRON WC-Co POWDERS</b><br><i>A.A. Mahaidin, M.A. Selamat, S.A. Manaf and R.J. Talib</i>                                  | 307            |
| <b>RTC 060</b>  | <b>'IN-VITRO' BIOACTIVITY STUDY OF SYNTHETIC WOLLASTONITE PRODUCED FROM MALAYSIAN LIMESTONE AND SILICA SAND</b><br><i>A. R. Rashita</i>  | 312            |