



**Dr Thomas Ochuku Mbuya**

Senior Lecturer and Chairman, Department of Mechanical and Manufacturing Engineering,  
University of Nairobi

Office: Engineering Block, Room E312 and Room E402

Telephone: +254 (020) 4913527

Email address: [tmbuya@uonbi.ac.ke](mailto:tmbuya@uonbi.ac.ke)

**Academic Background:**

PhD in Engineering Materials (2012) [Engineering Materials Group, Engineering, University of Southampton](#), UK

- My PhD studies on ‘[Analysis of microstructure and fatigue micromechanisms in cast aluminium piston alloys](#)’, for automotive applications. The work involved use of state of the art facilities such three dimensional microstructure evaluation using synchrotron X-ray Microtomography, Scanning Electron Microscopy and advanced image analysis tools.

MSc in Mechanical Engineering (Industrial Engineering Option) (2003) - University of Nairobi

- My M.Sc. degree focused on industrial engineering with emphasis on management principles including:
  - Production planning, scheduling and control
  - Maintenance management
  - Quality control and reliability
  - Works systems design and measurement
  - Engineering economics
  - Management information systems
  - Operations research

BSc in Mechanical Engineering (1997) – University of Nairobi (First Class Honours)

- My undergraduate program included optional advanced courses in production processes, fracture of materials and operations research.

Kenya Certificate of Secondary Education (KCSE) at Cardinal Otunga High School, Mosoch, 1990

Kenya Certificate of Primary Education (KCPE) at Bogitaa Primary School, 1987

### **Work Experience**

**April 2019 to Date:** **Chairman**, Department of Mechanical and Manufacturing Engineering

**June 2013 to Date** **Senior Lecturer**, Department of Mechanical and Manufacturing Engineering, University of Nairobi.

#### **Teaching duties include:**

- Engineering Design - BSc
- Engineering Drawing - BSc
- Materials Science and Engineering – BSc
- Materials Processing - BSc
- Iron & Steel Metallurgy – MSc
- Properties and Testing of Materials - MSc
- Modern Analytical techniques (AFM, XRD, SEM, TEM, etc) – MSc

#### **Administrative duties include:**

- Coordination of examinations
- School Board Committee on the Review of Examination regulations - Chairman (completed)
- Department committee on module II income –Chairman
- School committee on exhibitions - member
- Departmental committee on Performance Contracting – Chairman
- College staff training committee - Member

**Mar. 2007 to June 2013** **Lecturer**, Department of Mechanical and Manufacturing Engineering, University of Nairobi. I carried out limited teaching duties (laboratory demonstrations) at the University of Southampton during my PhD studies from November 2008 to December 2011. I resumed teaching at the University of Nairobi on 4<sup>th</sup> January 2012.

**Mar. 2004 to Mar. 2007** **Assistant Lecturer**, Department of Mechanical and Manufacturing Engineering, University of Nairobi.

**1998 to 2004**

**Graduate Assistant**, Department of Mechanical and Manufacturing Engineering, University of Nairobi

### **Awards and Recognitions**

- UON@50 Outstanding Achievers Award for Academic Excellence at the College of Architecture and Engineering - 2021
- Awarded the Commonwealth Rutherford Fellowship – 2018/2019
- Awarded a PhD scholarship by the Overseas Research Students Awards Scheme (ORSAS) – 2008
- Biographical profile included in the Who's Who in the World (R) 2016 (33rd Edition).
- Consistently rated as Exemplary during annual staff appraisals

### **Internal and External Responsibilities**

April 2019 to Date: Chairman, Department of Mechanical and Manufacturing Engineering

April 2019 to Date: Member, University of Nairobi Senate

April 2019 to Date: Member, School of Engineering Management Board

Nov 2014 to Date: Member and Chairman of the Steel and Aluminium Products Technical Committee of Kenya Bureau of Standards

Jan to Feb 2021: Member, UON Strategic Plan 2018-2023 Mid-Term Review Committee

Oct 26<sup>th</sup> 2020 to Nov 6<sup>th</sup> 2020: Ag. Dean School of Engineering

March 2011 to July 2012: Editorial Assistant, Materials Science and Engineering A - Published by Elsevier ltd.

### **Professional Memberships & Research Networks**

Member, Materials Research Society (MRS)

Member, African Materials Science and Engineering Network (AMSEN). a consortium of material science experts across several African countries dedicated towards promoting training high calibre African Material Scientists to MSc and PhD.

Member, Arua Centre of Excellence in Materials, Energy and Nanotechnology

### **Research Interests**

Dr Mbuya's research interests include evaluation of failure mechanisms in engineering materials and structures, development of effective recycling methodologies and assessing safety in manufacturing industries. His current research activities involve the following:

- Development of novel plastic waste based composite materials for low cost construction.
- Value addition to agricultural residue through production of synthetic gas and geopolymers: Improved technology development and system optimization.
- Additive manufacturing of carbon fibre reinforced polymers for biomedical applications
- Design of low cost small-scale machinery for applications in construction and farming activities
- Development of high performance secondary cast aluminium alloys: Microstructural engineering through understanding the role of minor elements & process optimization.
- Performance based approach to design of concrete mixes for durable reinforced concrete structures
- Assessment of clay-polymer composite adsorbents for water defluoridation.
- Laser beam welding of high strength low alloy steel

### **Funded Projects**

- 2020 to 2023 (Ongoing). [National Research Fund](#) (NRF). Multidisciplinary Research Grant. Kshs. 19,930,000. Project: Development of novel construction materials and energy generation systems that make use of selected agricultural waste. Co-Investigator (PI: Dr Siphila Mumanya)
- 2018-2021 (Ongoing). National Research Fund (NRF). Multidisciplinary Research Grant. Kshs. 6.1 million. Project: Cyclic Economy Inspired Product Innovations (Eco-Construct). Co-Investigator (PI: Prof George Rading)
- 2018-2019 (Completed). NRF Newton Utafiti Fund Institutional Links Bilateral Research Grant. Kshs.13.8 million. Project: Innovative Composite roofing/pavement Product Development Through Blending of Plastic Waste & Quarry By-Products. [Grants Awarded | British Council](#). Co-Investigator (PIs: Prof George Radinf and Prof Philippa Reed)
- 2017-2021 (Ongoing): Design and fabrication of a small scale stone crushing machine. In collaboration with Dr Mutuku Muvengei (JKUAT). Funded up to Kshs 3.8 million (USD 38,000) for 3 years. Co-Investigator (PI: Dr Onesmus Muvengei)
- 2017 (Ongoing) Design and fabrication of a pedal powered concrete mixer. This project is funded by the National Commission for Science, Technology and Innovation (NACOSTI) – Kshs 400,000 (USD 4000). Principal Investigator
- 2016-2021 (Ongoing) Development of recycle-friendly cast aluminium alloys for automotive and structural applications. Funded up to Kshs 4 million (USD 40,000). In collaboration

with Dr Bruno Mose of Jomo Kenyatta University of Agriculture & Technology (JKUAT). Co-Investigator (PI: Dr Bruno Mose)

## **Supervision of Higher Degrees**

### **PhD Thesis**

1. Daniel Ng'era Wangombe (Ongoing). Development of Recycled Friendly Aluminium Alloys for Automotive and Structural Applications. PhD, Department of Mechanical Engineering, Jomo Kenyatta University of Agriculture and Technology. Expected to graduate in 2022
2. Gaudence Nyiranzeyimana (Ongoing). Optimization of Process Parameters for Manufacture of 3D Printed Biopolymer for Medical Implant. PhD, Department of Mechanical Engineering, Jomo Kenyatta University of Agriculture and Technology. Published one paper and submitted the 2<sup>nd</sup> paper. Expected to graduate in 2022
3. Johnson Ngugi (Ongoing). Development of Composite Construction Materials from Waste Plastics and Kenyan Granitic Quarry Dust. PhD, Department of Mechanical and Manufacturing Engineering, University of Nairobi. Expected to Graduate in 2022
4. Kelly Mutonga (Ongoing). Development of a construction material from plastic waste mixed with Kenya bentonite as compatibilizer and reinforcement. PhD, Department of Mechanical and Manufacturing Engineering, University of Nairobi. Expected to Graduate in 2022
5. Gladwell Wanjiku Ng'ang'a (Ongoing). Towards a performance-based approach for design of concrete mixes for durable reinforced concrete structures. PhD, Department of Mechanical and Manufacturing Engineering, University of Nairobi. Expected to Graduate in 2022
6. Enock Musyoka (Proposal Stage). Laser Cutting of Aluminium and Steels. PhD, Department of Mechanical and Manufacturing Engineering, University of Nairobi.
7. Moses Gichana (Proposal Stage). Friction Stir Welding of 7075 Aluminium Alloys. PhD, Department of Mechanical Engineering, Jomo Kenyatta University of Agriculture and Technology.

### **MSc Thesis**

1. Polline Mwambe (2021). Design development and characterization of 3D Hi-Flexi CFR recycled plastic filament for sustainable 3D printing. MSc, Mechanical Engineering (Material and Metallurgy option) in the Pan African University Institute for Basic Sciences, Technology, and Innovation
2. Chrispin Ouko Zamzu (2021), Analysis of Microstructure and Micromechanisms of Long Fatigue Crack Growth in Secondary Cast Al-Si-Mg Alloys with Transition Element

Additions. MSc Thesis, Mechanical Engineering in the Pan African University Institute for Basic Sciences, Technology, and Innovation

3. Peter Ndung'u Mwangi (2021). **Energy Optimization of a Single Toggle Jaw Crusher Using Discrete Element Method for Improved Comminution Process**. MSc Thesis, Department of Mechanical Engineering, Jomo Kenyatta University of Agriculture and Technology.
4. Harrison Shagwira (2021). **Investigation and Characterization of Plastic–Quarry Dust Composite for Construction Industry**. MSc Thesis, Department of Mechanical Engineering, Dedan Kimathi University of Technology.
5. Nelson Wanjala Barasa (2020). **Development of a Small-Scale Machine of Extraction and Brushing of Sisal Fibre**. MSc Thesis, Department of Mechanical and Manufacturing Engineering, University of Nairobi. Laura, Wambani Simiyu (2020). **Solidification and Microstructure-Mechanical**
6. Laura W. Simiyu (2019). **Behavior of Al-Si-Mg(Cu) Alloys with Ti, Zr, V, Cr, and Cu Additives**. MSc Thesis, Department of Mechanical Engineering, Jomo Kenyatta University of Agriculture and Technology.
7. Timothy Ngigi Ngeru (2018). **Effect of Transition Elements of the Microstructure and Mechanical Properties of Secondary Al-7Si-Mg Cast Aluminium Alloys**. MSc Thesis, Department of Mechanical and Manufacturing Engineering, University of Nairobi.
8. Kelly Mutonga (2018). **Characterization of Microstructure and Mechanical Properties in the HAZ of EN24 Steel After Post Weld Heat Treatment**. MSc Thesis, Department of Mechanical and Manufacturing Engineering, University of Nairobi.
9. Gaudence Nyiranzeyimana (2017). **Effect of Fe, Sr And Mn on the Microstructure and Mechanical Performance of Secondary Cast Al-Si-Cu-Mg Alloys For Cylinder Head Applications**. MSc Thesis, Department of Mechanical Engineering, Jomo Kenyatta University of Agriculture and Technology.
10. Enock Kimanzi Musyoka (2016). **Development of Key Performance Indicators Model for Manufacturing Safety in Paint Manufacturing Firms in Kenya**. MSc Thesis, Department of Mechanical Engineering, Jomo Kenyatta University of Agriculture and Technology
11. Japheth Oirere Obiko (2015). **Micromechanical Analysis of Fatigue Crack Initiation and Growth Behaviour of Recycled Cast Aluminium Silicon Piston Alloys**. MSc Thesis, Department of Mechanical Engineering, Jomo Kenyatta University of Agriculture and Technology.
12. Fredrick Madaraka Mwema (2015). **Microstructural and Microhardness Characterization of Primary and Recycled Cast Al-Si Piston Alloys Processed by High-Pressure Torsion**. MSc Thesis, Department of Mechanical Engineering, Jomo Kenyatta University of Agriculture and Technology.

13. Ghebregzghi Tesfamariam Zeru (2014). Development of Recycle-friendly Secondary Cast Aluminium Alloy for Cylinder Head Applications. MSc Thesis, Department of Mechanical Engineering, Jomo Kenyatta University of Agriculture and Technology.
14. Bruno Robert Mose (2009). Effect of Minor Elements on Castability, Microstructure and Mechanical Properties of Recycled Aluminium Alloys. MSc Thesis, Department of Mechanical Engineering, Jomo Kenyatta University of Agriculture and Technology.
15. Alfred Muchangi Mureithi (Ongoing). A Study of Fatigue Properties of the Aluminium-Lithium Alloy 2195. MSc, Department of Mechanical and Manufacturing Engineering, University of Nairobi.
16. Hillary Buore Ongicha (ongoing). The effect of arrival rate, routing efficiency and station availability on the stability of the queueing system at the Kenya Pipeline Petroleum Depot, Eldoret. MSc, Department of Mechanical and Manufacturing Engineering, University of Nairobi.
17. Mercy Konuko (Ongoing). Life cycle analysis and mass flow analysis of agricultural waste streams in Kenya. MSc, Department of Mechanical and Manufacturing Engineering, University of Nairobi.
18. Robert Kipng'eno Too (Ongoing). A Study of Water Defluoridation using White Clay-Polymer Composite Adsorbent Material. MSc, Department of Mechanical and Manufacturing Engineering, University of Nairobi.
19. Pritchard Elmon Marozva (Ongoing). Laser Beam Welding of High Strength 600 MPa Quenched and Tempered Low Alloy Steel. MSc, Mechanical Engineering (Material and Metallurgy option) in the Pan African University Institute for Basic Sciences, Technology, and Innovation
20. Solomom Orwa (Ongoing). Optimization of Producer Gas Flow, Treatment, and Storage System. MSc, Department of Mechanical and Manufacturing Engineering, University of Nairobi.
21. Dennis Nyukuri Khisa (Ongoing- Proposal stage). Optimization of Process Variables for Densification of Agriculture Residues for use in A Gasifier for Heat and Power Generation. MSc, Department of Mechanical Engineering, Jomo Kenyatta University of Agriculture and Technology.

### **Thesis Examined**

1. Michael Omondi Owen (2020) . Use of urban surface runoff for groundwater recharge in Nairobi City. MSc, University of Nairobi. (As Chairman of the examination Board)
2. S.V.S. Rajaprasad, (2017). Modelling and Validation of Safety Practices in Indian Construction Organizations. PhD, Koneru Lakshmaiah University, India (External Examiner)

3. Sammy K Rotich (2017). A Study of Fatigue and Fracture Characteristics in the HAZ of AA 7075 Alloy. MSc, University of Nairobi. (As Internal Examiner)
4. Amos Abala Wambura (2015). Determining the physical properties needed for evaluating performance of glass reinforced polymer as material for solar hot water tanks in the coastal areas, MSc. University of Nairobi (As Internal Examiner)
5. Kenneth D. Njoroge (2015). A Multi-scale Dislocation Model Applied to Metal Plasticity, PhD, University of Nairobi. (As a Member of the examination Board)
6. John N. Mwero, (2013). The Behaviour of Sugar Cane Waste Ash as a Cementing Material. PhD, University of Nairobi. (As a Member of the examination Board)
7. Eliakim N. Akhusama (2012). Microstructural Evolution and Fatigue Crack Growth Characteristics Through the HAZ of Welded AA 6061. MSc, University of Nairobi. (As Internal Examiner)
8. Pius K. Koech, (2012). A Study on the Effects of Iron on Microstructure and Mechanical Properties of Aluminium-Silicon Alloys. MSc, University of Nairobi. (As Internal Examiner)

## **Publications**

### **Theses**

T.O. Mbuya (2012), [Analysis of microstructure and fatigue micromechanisms in cast aluminium piston alloys](#), PhD Thesis, School of Engineering and the Environment, University of Southampton.

T.O. Mbuya (2003), [Studies on the micro structure and mechanical properties of recycled cast aluminium scrap](#), MSc Thesis, School of Engineering, University of Nairobi

### **Books**

1. H. Shagwira, F. M. Mwema and T. O. Mbuya (2021), [Polymer-Silica Based Composites in Sustainable Construction: Theory, Preparation and Characterizations](#), Boca Raton, CRC Press. In press
2. F.M. Mwema and T.O. Mbuya (2015), [High-pressure Torsion Processing of Cast AlSi Piston Alloys: Microstructural and Microhardness Characterization](#), Lambert Academic Publishing, (ISBN: 2015 978-3-659-78885-7)

### **Book Chapters**

1. H. Shagwira, T.O. Mbuya and F. M. Mwema, [Advances in animal/plant-plastic composites: preparation, characterization and applications](#), In Plant and Animal Based Composites, Ed. K. Kumar and J. P. Davim, De Gruyter GmbH, Berlin, 2021.
2. H. Shagwira, F. M. Mwema and T.O. Mbuya, [Lightweight Polymer-Nanoparticle-Based Composites: An Overview](#), Nanomaterials and Nanocomposites: Characterization,



## Papers

1. N. W. Barasa, K. D. Njoroge & **T. O. Mbuya** (2021), [Design, Fabrication, and Testing of a Raspador for Simultaneous Extraction and Brushing of Sisal Fibers by Small-scale Sisal Farmers](#), Journal of Natural Fibers, in press
2. N. W. Barasa, K. D. Njoroge & **T. O. Mbuya** (2021), [An investigation of the effects of extraction and brushing variables on the properties of hedge sisal fibers using a raspador](#): Journal of Natural Fibers, Journal of Natural Fibers, in press.
3. P. Mwambe, J. M. Mutua, T. O. Mbuya, E. Kyekyere (2021), [Recipe Development and Mechanical Characterization of Carbon Fibre Reinforced Recycled Polypropylene 3D Printing Filament](#), Open Journal of Composite Materials, Vol 11 (3), 47-61
4. G. Nyiranzeyimana, J. Mutua; B. Mose and **T. Mbuya** (2021), [Optimization of process parameters in fused deposition modelling of thermoplastics: A review](#), Materialwissenschaft und Werkstofftechnik (Materials Science and Engineering Technology), Vol 52 (6), 682-694
5. H. Shagwira, **T.O Mbuya**, F.M Mwema, M Herzog, E.T Akinlabi (2021). [Taguchi Optimization of Surface Roughness and Material Removal Rate in CNC Milling of Polypropylene + 5wt% Quarry Dust Composites](#). IOP Conf. Series: Materials Science and Engineering, 1107 (2021) 012040.
6. H. Shagwira, **T.O Mbuya**, E.T. Akinlabi, F.M. Mwema, B. Tanya (2020), [Optimization of material removal rate in the CNC milling of polypropylene + 60 wt% quarry dust composites using the Taguchi technique](#), Materials Today: Proceedings. Vol 44, Part 1, 2021, pp. 1130-1132
7. D.N. Wang'ombe, B.R. Mose, S.M. Maranga and **T.O. Mbuya** (2021), [Effects of friction stir welding on microstructure and mechanical properties of extruded secondary aluminum 6061 alloy](#), Materials Science and Engineering Technology, Vol 52, (3) 2021, 270-278
8. H. Shagwira, F. Mwema, **T. Mbuya**, A. Adediran. [Dataset on impact strength, flammability test and water absorption test for innovative polymer-quarry dust composite](#), Data in Brief, Volume 29, 2020, 105384.
9. P. Mwangi, O. Muvengei, **T. Mbuya** and M. Ndeto, [Energy Optimisation of a Single Toggle Jaw Crusher using Discrete Element Methode](#), Journal of Sustainable Research in Engineering, Vol. 5(4) 2020, 180-193.
10. F.M. Mwema, J.O. Obiko, T. Leso, **T.O. Mbuya**, B.R. Mose, E.T. Akinlabi (2019) [Wear Characteristics of Recycled Cast Al-6Si-3Cu Alloys](#), Tribology in Industry, Vol. 41, No. 4, pp. 613-621.
11. F.M. Mwema, **T.O. Mbuya**, E.T. Akinlabi, P.A. Reed, J.O. Obiko (2019) [Data on the effect of high-pressure torsion processing on secondary cast Al-10%Si- Cu piston alloy: Methods](#),

- [microstructure and mechanical characterizations](#), Data in Brief, Vol 25, 2019, #104160.
12. N. Gaudence, N. Aimable, **T. O. Mbuya**, B. R. Mose (2019). [Effect of Fe, Mn and Sr on the Microstructure and Tensile Properties of Secondary Al-Si-Cu-Mg Cast Alloys](#). International Journal of Engineering Research and Technology, Vol 8(5), pp. 284-289
  13. D. N. Wangombe, B. R. Mose, S. M. Maranga, S.P. Nganga, **T. O. Mbuya** (2019). [Recycling of Aluminium scrap in Kenya: A Survey of Foundry Enterprises and Mechanical Properties of Resultant Alloys](#). Journal of Sustainable Research in Engineering, Vol. 5 (1), pp. 25 – 33.
  14. Enoch Kimanzi, Bernard Ikua, **Thomas Mbuya** (2018). [Key Performance Indicators for Manufacturing Safety in Paint Manufacturing: A Case of the Kenyan Industry](#), International Journal of Engineering Research and Technology, Vol 7 (3), pp. 43-47
  15. **T.O. Mbuya**, I. Sinclair, K.A. Soady and P.A.S. Reed,(2017) [Application of X-Ray Microtomography to Evaluate Complex Microstructure and Predict the Lower Bound Fatigue Potential of Cast Al-7\(0.7\)Si-4Cu-3Ni-Mg Alloys](#), Advanced Engineering Materials, 19 (11): 1700218. (ePrints Soton)
  16. Bruno R. Mose. Shin Dong Kil, **Thomas O. Mbuya**, (2017) [Microstructure and mechanical performance of a secondary cast aluminium piston alloy with minor element additions](#), International Journal of Cast Metals Research, Vol. 30(6), 348-355.
  17. **T.O. Mbuya**, Y. Gu, R.C. Thomson and P.A.S. Reed, (2017), [Effect of intermetallic particles and grain boundaries on short fatigue crack growth behaviour in a cast Al-4Cu-3Ni-0.7Si piston alloy - Mbuya - 2017 - Fatigue & Fracture of Engineering Materials & Structures](#), Fatigue and Fracture of Engineering Materials and Structures, Vol. 40, 1428–1442.
  18. M.F. Oduori, E.K. Musyoka and **T.O. Mbuya**, (2016), [Material Selection for a Manual Winch Rope Drum](#), WASET International Journal of Chemical, Molecular, Nuclear, Materials and Metallurgical Engineering, Vol. 10 (1), 129-141.
  19. **T.O. Mbuya** and P.A.S. Reed, (2014), [Micromechanisms of short fatigue crack growth in an Al-Si piston alloy](#), Materials Science and Engineering A 612, 302-309
  20. M. F. Oduori, **T. O. Mbuya**, J. Sakai, and E. Inoue, (2012) [Modeling of crop stem deflection in the context of combine harvester reel design and operation](#), Agric Eng Int: CIGR Journal, 14 (2), 2012, 21-28.
  21. M. F. Oduori, **T. O. Mbuya**, J. Sakai, and E. Inoue, (2012), [Kinematics of the Tined Combine Harvester Reel](#), Agric Eng Int: CIGR Journal, 14(3), 53-60.
  22. **T.O. Mbuya**, I. Sinclair, A.J. Moffat and P.A.S. Reed, (2012), [Micromechanisms of fatigue crack growth in cast aluminium piston alloys](#), International Journal of Fatigue, 42, 2012, 227-237.
  23. **T.O. Mbuya**, I. Sinclair, A.J. Moffat and P.A.S. Reed, (2011) [Analysis of fatigue crack initiation and S-N response of model cast aluminium piston alloys](#), Materials Science and

Engineering A, 528 (24), 7331-7340.

24. **T.O. Mbuya**, B.O. Odera, S.P. Ng'ang'a and M.F. Oduori, (2010) [Effective Recycling of Cast Aluminium Alloys for Small Foundries](#), Journal of agriculture, science and technology 12 (2), pp 162-181.
25. B. R. Mose, S. M. Maranga and **T. O. Mbuya**, (2009), Effect of Minor Elements on the Fluidity of Secondary LM25 and LM27-Type Cast Alloys. AFS Transactions, Vol 117, pp 93-101. ([researchgate.net](#))
26. M. Oduori and **T. Mbuya**, (2009) [Wire rope selection for manual winch application](#), Journal of Engineering, Design and Technology, Vol. 7 (2), pp. 207-222.
27. M. F. Oduori, **T. O. Mbuya**, J. Sakai and E. Inoue, (2008) [Shattered Rice Grain Loss Attributable to the Combine Harvester Reel: Model Formulation and Fitting to Field Data](#), Agricultural Engineering International: the CIGR Ejournal. Manuscript PM 06 013. Vol. X.
28. **T.O. Mbuya**, B.O. Odera, S.P. Ng'ang'a and M.F. Oduori, (2007) Effect of Some Casting Parameters on the Microstructure and Mechanical Properties of Recycled Aluminium Castings of Various Automobile Components. The Kenya Journal of Mechanical Engineering, vol.3, No. 1, pp. 29-43.
29. **T.O. Mbuya**, M. F. Oduori, G. O. Rading, and M. S. Wekesa, (2006), [Effect of runner design on mechanical properties of permanent mould aluminium castings](#), International Journal of Cast Metals Research, vol. 19, No. 6, pp. 357-360.
30. **T.O. Mbuya**, (2006) Element effects on the fluidity of cast Al-Si alloys. AFS Transactions, vol. 114, pp. 163-180.
31. M.F. Oduori and **T.O. Mbuya**, (2005), The limiting value of the fleet angle of a rope running off a sheave. The Kenya Journal of Mechanical Engineering, Vol. 1, No. 1, pp. 37-46.
32. **T.O. Mbuya**, B.O. Odera and S.P. Ng'ang'a, (2003) [Influence of iron on castability and properties of aluminium silicon alloys: literature review](#), International Journal of Cast Metals Research, Vol. 16, No. 5, pp. 451-465.

### **Conferences, Seminars and Workshops**

1. H. Shagwira, **T.O Mbuya**, F.M Mwema, M Herzog, E.T Akinlabi (2020). Machining of polymer-quarry dust composite (2020). Paper presented in ICESW 2020 conference. [pdf \(iop.org\)](#)
2. H. Shagwira, F.M. Mwema, JO Obiko, **T.O Mbuya**, E.T. Akinlabi (2020). The Optimization of The Surface Roughness of Milled Polypropylene + 60wt.% Quarry Dust Composite Using the Taguchi Technique. publication with Lecture Notes in Mechanical Engineering (SPRINGER).

3. **T.O. Mbuya** (2020). On Plastic Waste Based Composites Materials for Applications in Construction, Keynote Speech at the 3<sup>rd</sup> International Conference on Advanced Technologies for Societal Applications (Techno-Societal) at SVERI in India, 11-12<sup>th</sup> December 2020. Website: [Techno Societal-2020 \(sveri.ac.in\)](http://Techno Societal-2020 (sveri.ac.in)) Facebook (video): [3rd International Conference - Techno-Societal 2020 \(facebook.com\)](https://www.facebook.com/3rd International Conference - Techno-Societal 2020 (facebook.com))
4. K Ogila, **T Mbuya**, K Mutonga, J Ngugi, A Evangelou, J Blake, I Williams, M Ogot, G Rading & P Reed (2019). Exhibition at [UK and Kenya](#) Research Symposium on Healthy Cities Strathmore University, Nairobi, Kenya 21-22<sup>nd</sup> May 2019. [UK in Kenya on tweeter](#)
5. Daniel N. Wang'ombe, Stephen M. Maranga, Bruno R. Mose, **Thomas O. Mbuya** (2018). Advances in Friction-stir Processing of Aluminium Alloys. In Proceedings of Proceedings of the 2018 Annual Sustainable Research and Innovation (SRI) Conference, JKUAT Main Campus, Kenya, 2-4<sup>th</sup> May, 2018, pp. 196-202.
6. Peter Ndung'u Mwangi, Onesmus Mutuku Muvengi, **Thomas Ochuku Mbuya** (2018). Review of Discrete Element Modelling in Optimisation of Energy Consumption of a Single-Toggle Jaw Crusher. Proceedings of Proceedings of the 2018 Annual Sustainable Research and Innovation (SRI) Conference, JKUAT Main Campus, Kenya, 2-4<sup>th</sup> May, 2018, pp. 251-259.
7. J. O. Obiko, B.R. Mose, P.A.S. Reed, **T.O. Mbuya**, Effect of Minor Elements on the Crack Initiation and S-N Performance of a Cast Al-Si-Cu-Ni-Fe piston alloy, The 8th International Conference of the African Materials Research Society held in Accra, Ghana, December 6-11, 2015. [AMRS 2015 Book of Abstracts FINAL\(page 250\).pdf \(africamrs.co.za\)](#)
8. J. O. Obiko, B.R. Mose, P.A.S. Reed, **T.O. Mbuya**, Short Fatigue Crack Growth Behaviour of a Cast Al-Si-Cu-Ni piston alloy, The 8th International Conference of the African Materials Research Society held in Accra, Ghana, December 6-11, 2015. [AMRS 2015 Book of Abstracts FINAL \(page 288\).pdf \(africamrs.co.za\)](#)
9. F.M. Mwema, B.R. Mose, J.N. Keraita, C.T. Wang, N. Gao, P.A.S. Reed, **T.O. Mbuya**, Microstructural and Microhardness Evolution during High Pressure Torsion of Cast Al-7Si-4Cu-3Ni alloys, The 8th International Conference of the African Materials Research Society held in Accra, Ghana, December 6-11, 2015. [AMRS 2015 Book of Abstracts FINAL \(page 266\).pdf \(africamrs.co.za\)](#)
10. E.K. Musyoka, **T.O. Mbuya** and B.W. Ikuu, Key performance indicators for manufacturing safety in paint manufacturing: A case study of the Kenyan industry, The 2015 International SRI Conference at Kenya School of Monetary Studies, 6<sup>th</sup> May to 7<sup>th</sup> May 2015, Nairobi, Kenya.
11. T.Z. Ghebregzghi, B.R. Mose, **T.O. Mbuya** and S.M. Mutuli, Investigation of Mechanical Properties of Secondary Cast Aluminium Alloy Developed from Scrap Automotive Cylinder Heads, Presented at the IJAS International Conference for Technology and

Science held from 16th to 20th March 2015 at the University of Nevada Las Vegas (UNLV), Las Vegas, Nevada USA.

12. **T.O. Mbuya**, J. Crump, K.A. Soady, A.J. Moffat and P.A.S. Reed, High temperature short fatigue crack growth micromechanisms in a cast aluminium piston alloys, Presented at the International Conference on Fatigue Damage of Structural Materials X, Hyannis Resort, Hyannis, MA, USA, 21-26<sup>th</sup> Sept. 2014.
13. **T.O. Mbuya**, I. Sinclair, K. Soady and P.A.S. Reed (2012). [Three-Dimensional Analysis of Microstructure in Cast Aluminium Piston Alloys](#). In Proceedings of the 13<sup>th</sup> International Conference on Aluminum Alloys (ICAA13), Carnegie Mellon University, Pittsburgh, Pennsylvania, June 3-7, 2012, pp. 55-60.
14. **T.O. Mbuya**, J. Crump, I. Sinclair, K. Soady, R. Thomson and P.A.S. Reed (2012). [Short Fatigue Crack Growth Micromechanisms in a Cast Aluminium Piston Alloy](#). In Proceedings of the 13<sup>th</sup> International Conference on Aluminum Alloys (ICAA13), Carnegie Mellon University, Pittsburgh, Pennsylvania, June 3-7, 2012, pp. 485-490.
15. **T. O. Mbuya**, B. R. Mose, S.P. Ng'ang'a and S. M. Maranga, "Improving the Mechanical Performance of a Secondary Cast Aluminium Piston Alloy through Addition of Minor Elements", In Proceedings of the 12<sup>th</sup> International Conference on Aluminium Alloys, Yokohama, Japan, Sept. 5-9, 2010, pp. 2432-2437. <http://www.icaa-conference.net/ICAA12/pdf/P150.pdf> (*Received Excellence award*)
16. **T. O. Mbuya**, I. Sinclair, B.R. Mose, S. M. Maranga and P.A.S Reed, "Characterisation of the Effect of Minor Elements on Microstructure Variations in a Secondary Cast Aluminium Piston Alloy", In Proceedings of the 12<sup>th</sup> International Conference on Aluminium Alloys, Yokohama, Japan, Sept. 5-9, 2010, pp. 1279-1284. <http://www.icaa-conference.net/ICAA12/pdf/3D-02.pdf>
17. **T.O. Mbuya**, I. Sinclair, A.J. Moffat, and P.A.S. Reed, "Effect of Hipping on the Microstructure and Fatigue Micromechanisms in Model Cast Aluminium Piston Alloys" Presented at [Fatigue Damage of Structural Materials VIII \(published in a special issue of International Journal of Fatigue\)](#), Hyannis Resort, Hyannis, MA, USA, 19-24<sup>th</sup> Sept. 2010.
18. **T.O. Mbuya**, I. Sinclair and P.A.S. Reed, "Micromechanisms of Long Fatigue Crack Growth in Hipped Cast Aluminium Piston Alloys", The 16<sup>th</sup> PG conference, in Engineering Materials, Bio-engineering & Tribology, 1<sup>st</sup> October 2010, De Vere Hotel New Place, Southampton, UK.
19. **T.O. Mbuya**, A.J. Moffat, B.G. Mellor, I. Sinclair and P.A.S. Reed, "Effect of Hipping on the Fatigue Behaviour of a Cast Aluminium Piston Alloy", The 15<sup>th</sup> PG conference, 2nd October 2009, Lyndhurst Park Hotel, Southampton, UK.
20. **T.O. Mbuya**, B.O. Odera, S.P. Ng'ang'a and M.F. Oduori, "Effect of Some Casting Parameters on Microstructure and Mechanical Properties of Two Recycled Aluminum Foundry Alloys" Presented in a Seminar at Jomo Kenyatta University of Agriculture and Technology in October 2006.

21. M.F. Oduori, D.M. Munyasi, and **T.O. Mbuya**, “Case for Agricultural Mechanization and a Homegrown Agricultural Machinery Industry in Kenya.” Presented during the 10<sup>th</sup> KARI Biennial Scientific Conference and Agricultural Forum, 12-17<sup>th</sup> Nov., 2006 at KARI Headquarters Complex, Loresho, Nairobi.
22. F.M. Oduori and **T.O Mbuya**, “Derivation of the expression for the upper limiting value of the fleet angle of a rope running off a sheave”, Proceedings of the 6<sup>th</sup> Mechanical Engineering Annual Seminar, Jomo Kenyatta University of Agriculture and Technology, June, 2000

### **Referees**

Prof. Philippa A.S Reed

Professor of Structural Materials, Head of Engineering Sciences and Director of EngD at the Faculty of Engineering and the Environment, University of Southampton, Highfield, Southampton, SO17 1BJ. Email: [P.A.Reed@soton.ac.uk](mailto:P.A.Reed@soton.ac.uk)

Prof. George O. Rading

Professor of Mechanical Engineering, Department of Mechanical & Manufacturing Engineering, University of Nairobi, Box 30197 - 00100, Nairobi. Email: [Gorading@uonbi.ac.ke](mailto:Gorading@uonbi.ac.ke)



**Dr. Thomas Ochuku Mbuya**

Dept. of Mechanical & Manufacturing Engineering  
UNIVERSITY OF NAIROBI