Mohammad A. Gharaibeh

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Department of Mechanical Engineering
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Google Scholar: https://scholar.google.com/citations?user=LYqDazUAAAAJ&hl=en
YouTube Channel: https://www.youtube.com/channel/UCamovQX_Xb8b7hWJrqHJGWg/playlists

Education

Ph.D. Mechanical Engineering, 2015, State University of New York at Binghamton, Dissertation Title: *Finite Element Modeling, Characterization and Design of Electronic Packages under Vibration*.
[Advisor: James M. Pitarresi, Co-advisor: Quang T. Su]

M.Sc. Mechanical Engineering, 2011, Jordan University of Science and Technology, Thesis Title: *A General Equation for Stress Concentration Factor in Countersunk Holes in Orthotropic Plates*.
[Advisor: Feras H. Darwish]

B.Sc. Industrial Engineering, 2009, Jordan University of Science and Technology.

Academic Experience

April 2021 – Present, Associate Professor, Mechanical Engineering Department, The Hashemite University, Zarqa, Jordan.

September 2015 – April 2021, Assistant Professor, Mechanical Engineering Department, The Hashemite University, Zarqa, Jordan.

August 2011 – August 2015, Graduate Research Assistant, Mechanical Engineering Department, Binghamton University & Universal Instruments Corporation, Binghamton, NY, USA.

February 2009 - August 2011, Research and Teaching Assistant, Mechanical Engineering Department, Jordan University of Science and Technology, Irbid, Jordan.

Research Interests

Finite Element Model Correlation and Validation; Electronic Packages Characterization and Reliability, Plate Vibration; Vibration and Shock Testing/Measurement; Statistical Analysis and Optimizations, Mathematical Modeling.

Experimental and Computer Skills

Experimental Skills: Modal Measurements by Hammer Testing, Vibration, Drop and Bending Reliability Testing. Failure Analysis Techniques: Cross-sectioning, Dye and Pry.
Computer Applications: ANSYS, MATLAB, MINITAB, Mathematica, CREO Parametric, AutoCAD, MS-Office Suite.

Teaching Experience

My teaching experience involves both in-class and long-distance teaching methods. Courses Taught:
Undergraduate Courses: Mechanics of Materials class and laboratory, Machine Design, Mechanical Vibrations, Mechanical Drawing using CREO Parametric Software, Numerical Analysis.
Graduate Courses: Advanced Mechanics of Materials, Advanced Mechanical Vibrations, Advanced Engineering Mathematics, Computational Methods in Mechanical Engineering.

YouTube Channel Courses

Undergraduate Courses: Mechanics of Materials, Mechanics of Materials Laboratory, Numerical Analysis, Mechanical Vibrations, Special Topics in ME (Vibrations Measurement and Control), Mechanical Drawing using CREO Parametric Software.
Graduate Courses: Advanced Mechanics of Materials, Computational Methods in Mechanical Engineering.

Current Funding

Hashemite University (PI) $70,898
January 2017 – December 2021
Experimental and numerical investigations of vibrating elastic plates on four rigid supports.

Publications

Books

Gharaibeh, M., (2014) *"Stress Concentration Factor of Countersunk Holes in Orthotropic Plates: A General Equation",* Scholars' Press, ISBN: 978-3639667875.

Book Chapters

1. **Gharaibeh, M.**, & Makhlouf, A. S., (2020) "*Failures of electronic devices: solder joints failure modes, causes and detection methods"*, Chapter in book "*Handbook of Materials Failure Analysis: With Case Studies from the Electronic and Textile Industries", pp. 3-17, Butterworth-Heinemann (ELSEVIER).*
2. **Gharaibeh, M.**, (2020) "*Analytical Solutions for the Failure of Electronic Assemblies Subjected to Shock and Vibration Loadings"*, Chapter in book "*Handbook of Materials Failure Analysis: With Case Studies from the Electronic and Textile Industries", pp. 179-203, Butterworth-Heinemann (ELSEVIER).*

Journal and Conference Papers

- **2021**

1. **Gharaibeh, M.**, (2021) "*Optimization of Dwell and Ramp Times for SAC305 Solder Thermal Cycling Fatigue Life for Testing and Real-Life Applications",* IEEE Transactions on Components, Packaging and Manufacturing Technology, (Under Review).
2. Lai, J., Su, Q., & **Gharaibeh, M.,** (2021) **"***Finite Element Modeling of Printed Circuit Boards by Modal Testing and Response Surface Methods",* Circuit World, (Under Review).
3. **Gharaibeh, M.**, (2021) "*A High-Accuracy Empirical Formula for the Strain Concentration Factor in Countersunk Holes",* International Journal of Structural Integrity, (Accepted).

- **2020**

4. Jreissat, M., & **Gharaibeh, M.,** (2020) "*Analysis and Optimization of the Strain Concentration Factor in Countersunk Rivet Holes via Finite Element and Response Surface Methods*", Multidiscipline Modeling in Materials and Structures, (In-Press).
5. **Gharaibeh, M.**, (2020) "*A Study on the Stress Concentration Factor Induced in Double Countersunk Holes Due to Uniaxial Tension"*, International Journal of Applied Mechanics and Engineering, 25 (4), 59-68.
6. **Gharaibeh, M.**, (2020) "*Analysis, formulation, and optimisation of the strain concentration factor in double countersunk holes due to uniaxial tension",* Australian Journal of Mechanical Engineering, DOI: 10.1080/14484846.2020.1842615.
7. **Gharaibeh, M.**, (2020) "*A numerical study on the effect of the fixation methods on the vibration fatigue of electronic packages"*, Microelectronics Reliability, 115, 113967.
8. **Gharaibeh, M.**, (2020) "*Experimental and numerical fatigue life assessment of SAC305 solders subjected to combined temperature and harmonic vibration loadings"*, Soldering & Surface Mount Technology, 32 (3), 181-187.

- **2019**

9. **Gharaibeh, M.**, & Pitarresi, J., (2019) "*Random Vibration Fatigue Life Analysis of Electronic Packages by Analytical Solutions and Taguchi Method"*, Microelectronics Reliability, 115, 238-247.

10. **Gharaibeh, M.**, & Tlilan, H., (2019) "*Stress Concentration Factor Analysis of Countersunk Holes using Finite Element Analysis and Response Surface Methodology",* Australian Journal of Mechanical Engineering, DOI: 10.1080/14484846.2019.1565069.
11. Obaidat, M., Obeidat, A., Al-Ghandoor, A., **Gharaibeh, M.,** & Al-Momani, H., (2019) "*Modeling Energy Consumption of the Jordanian Transportation Sector: The Application of Multivariate Linear Regression and Adaptive Neuro-Fuzzy Techniques*", International Journal of Sustainable Energy, (In-Press).
12. **Gharaibeh, M.**, Stewart, A., Su, Q., & Pitarresi, J., (2019) "*Experimental and Numerical Investigations of the Vibration Reliability of BGA and LGA Solder Configurations and SAC105 and 63Sn37Pb Solder Alloys"*, Soldering & Surface Mount Technology, 31 (2), 77-84.

- **2018**

13. **Gharaibeh, M.**, Su, Q., & Pitarresi, J., (2018) "*Transient Analysis of Electronic Assemblies Subjected to Impact Loading"*, Microelectronics Reliability, 91, 112-119.
14. Su, Q., **Gharaibeh, M.**, Pitarresi, J., Stewart, A., & Anslem, M., (2018) "*Accelerated Vibration Reliability Testing of Electronic Assemblies Using Sine Dwell with Resonance Tracking*". ASME Journal of Electronic Packages, 140, 4.
15. **Gharaibeh, M.**, (2018) "*Reliability Analysis of Vibrating Electronic Assemblies using Analytical Solutions and Response Surface Methodology*". Microelectronics Reliability, 84, 238-247.
16. **Gharaibeh, M.**, (2018) "*Reliability Assessment of Electronic Assemblies under Vibration by Statistical Factorial Analysis Approach*". Soldering & Surface Mount Technology, 30 (3), 171-181.
17. **Gharaibeh, M.,** & Obiedat, A., (2018) "*Vibration Analysis of Rectangular Plates with Clamped Corners*", Open Engineering, 8 (1), 275-283.
18. **Gharaibeh, M.**, Obeidat, A. & Obaidat, M., (2018) "*Numerical Investigation of the Free Vibration of Partially Clamped Rectangular Plates*". International Journal of Applied Mechanics and Engineering, 23 (2), 385-400.
19. **Gharaibeh, M.**, (2018) "*Finite Element Model Updating of Board-Level Electronic Packages by Factorial Analysis and Modal Measurements*". Microelectronics International, 35 (2), 74-84.
20. **Gharaibeh, M.**, (2018) "*Vibration Analysis of Rectangular Plates Resting on Four Rigid Supports*". World Journal of Engineering, 15 (1), 110-118.
21. Obeidat, A., & **Gharaibeh, M.,** (2018) "*Electrochemical Performance of MnO_2 for Energy Storage Capacitors in Solid-State Design*", International Journal of Renewable Energy Research, 8 (3), 1229-1235.

- **2017**

22. **Gharaibeh, M.**, Liu, D., & Pitarresi, J., (2017) "*A Pair of Partially-Coupled Beams Subjected to Concentrated Force*". IEEE Transactions on Components, Packaging and Manufacturing Technology, 7 (8), 1293-1304.
23. Obeidat, A., **Gharaibeh, M.,** & Obaidat, M., (2017) "*Solid-State Supercapacitors with Ionic Liquid Gel Polymer Electrolyte and Polypyrrole Electrodes for Electrical Energy Storage"* Journal of Energy Storage, 13, 123-128.

- **2016**

24. Obaidat, M., Meanazel, O., & **Gharaibeh, M.**, (2016) "*Pad Cratering: Reliability of Assembly Level and Joint Level*", Jordan Journal of Mechanical and Industrial Engineering, 10 (4), 271-277.
25. **Gharaibeh, M.**, Su, Q., & Pitarresi, J., (2016) "*Analytical Solution for Electronic Assemblies under Vibration*", ASME Journal of Electronic Packages, 138, 1.

- **2015 and before**

26. Su, Q., Pitarresi, J., **Gharaibeh, M.**, Stewart, A., Joshi, G., & Anslem, M. (2014) "*Accelerated Vibration Reliability Testing of Electronic Assemblies Using Sine Dwell with Resonance Tracking*". Proc. ECTC, 119-125.
27. **Gharaibeh, M.**, Su, Q., Pitarresi, J., & Anselm, M. (2013) "*Modeling and Characterization for Vibration*", Advanced Research in Electronics Assembly (AREA) Consortium, Universal Instruments Corporation. Binghamton, NY, USA.
28. **Gharaibeh, M.**, Pitarresi, J., & Anselm, M. (2013) "*Strain Correlation: Finite Element Modeling and Experimental Data*", Advanced Research in Electronics Assembly (AREA) Consortium, Universal Instruments Corporation. Binghamton, NY, USA.

29. **Gharaibeh, M.**, Su, Q., Pitarresi, J., & Anselm, M. (2013) "*Board-Level Drop Test: Comparison of Two ANSYS Modeling Approaches and Correlation with Testing*", Advanced Research in Electronics Assembly (AREA) Consortium, Universal Instruments Corporation. Binghamton, NY, USA.
30. Darwish, F., Tashtoush, G., & **Gharaibeh, M**., (2013). "*Stress concentration analysis for countersunk rivet holes in orthotropic plates*". European Journal of Mechanics-A/Solids, 37, 69-78.
31. Joshi, S., Arfaei, B., Singh, A., **Gharaibeh, M**., Obaidat, M., Alazzam, A., & Borgesen, P. (2012). "*LGAs vs. BGAs–Lower Profile and Better Reliability*". Proc. SMTAi, 47-57.
32. Darwish, F., **Gharaibeh, M.**, & Tashtoush, G., (2012). "*A modified equation for the stress concentration factor in countersunk holes*". European Journal of Mechanics-A/Solids, 36, 94-103.

Published Technical Presentations

1. Huang, X., Su, Q., & **Gharaibeh, M.,** "*Elevated Temperatures Harmonic Vibrations*", Advanced Research in Electronics Assembly (AREA) Consortium, Universal Instruments Corporation, October, 2016.
2. Su, Q., & **Gharaibeh, M.,** "*Mechanical Response of Solder Joints under Vibration Loading*", Advanced Research in Electronics Assembly (AREA) Consortium, Universal Instruments Corporation, February, 2015.
3. Su, Q., Stewart, A., & **Gharaibeh, M.,** "*Finite Element Analysis and Experimental Characterization for Vibration Reliability of LGA vs. BGA Packages*", Advanced Research in Electronics Assembly (AREA) Consortium, Universal Instruments Corporation, September, 2014.
4. Su, Q., Stewart, A., & **Gharaibeh, M.,** "*Combined Presentations: Vibration Reliability Plans*", Advanced Research in Electronics Assembly (AREA) Consortium, Universal Instruments Corporation, February, 2014.
5. Pitarresi, J., & **Gharaibeh, M.,** "*Modeling and Characterization for Shock and Vibrations*", Advanced Research in Electronics Assembly (AREA) Consortium, Universal Instruments Corporation, September, 2013.
6. Meilunas, M., & **Gharaibeh, M.,** "*Mechanical Testing Using 4pt Bend Test*", Advanced Research in Electronics Assembly (AREA) Consortium, Universal Instruments Corporation, June, 2012.

Thesis Committees Served

Lai, J., (2017 - Present) "*Determination of Orthotropic Properties by Modal Analysis Measurements*", Ph.D Dissertation, Binghamton University, NY, USA.
Huang, X., (2016) "*Vibration Reliability of Electronic Assemblies at Elevated Temperatures*", M.Sc. Thesis, Binghamton University, NY, USA.

Services

Accreditation and Quality Control Committee, Mechanical Engineering Department, the Hashemite University.
ASME Student Section Faculty Mentor, Mechanical Engineering Department, the Hashemite University.

Honors, Awards and Certificates

November 2020, MIE Teacher Academy using Microsoft Teams, Microsoft Corporation, USA.
November 2020, Staying Connected with Remote Learning through Microsoft Teams and Office 365, Microsoft Corporation, USA.
November 2020, Certified Microsoft Innovative Educator, Microsoft Corporation, USA.
March 2013, Academic scholarship from Hashemite University for pursing PhD, The Hashemite University, Zarqa, Jordan.
September 2011, Fellowship Award from Thomas J. Watson School of Engineering and Applied Sciences at State University of New York at Binghamton, Binghamton, NY, USA.
November 2010, Selected by the Mechanical Engineering Students as "The Most Beloved Engineer" in the Mechanical Engineering Department, Jordan University of Science and Technology, Irbid, Jordan.
February 2009, Graduate Scholarship for Outstanding Graduate Students, Mechanical Engineering Department, Jordan University of Science and Technology, Irbid, Jordan.

Journal Editorial and Reviewing Experience

- **Editorial Advisory Board Member,** Soldering & Surface Mount Technology (SSMT), June 2020 - Present. ISSN: 0954-0911. *Publisher: Emerald Publishing, UK*.

- **Associate Editor**, Jordan Journal of Mechanical and Industrial Engineering (JJMIE), May 2016 – April 2017. ISSN: 1995-6665. *Publisher: Ministry of Higher Education, Jordan*.

- **Reviewer for the following journals:**
  - Microelectronics Reliability.
  - Soldering & Surface Mount Technology (SSMT).
  - IEEE Transactions on Components, Packaging and Manufacturing Technology (TCPMT).
  - Journal of Vibration and Control (JVC).
  - Engineering Failure Analysis (EFA).
  - Journal of Electronic Materials.
  - IEEE Access.
  - Fatigue & Fracture of Engineering Materials & Structures (FFEMS).
  - Advances in Mechanical Engineering (AIME).
  - World Journal of Engineering
  - Jordan Journal of Mechanical and Industrial Engineering (JJMIE).
  - Australian Journal of Mechanical Engineering.

Society Membership

American Society of Mechanical Engineers (**ASME**).

Surface Mount Technology Association (**SMTA**).

Jordanian Engineers Association (**JEA**).