

MAHDI NEKAHI

Toronto, ON | 647-617-0452 | nekahimohamadmahdi@gmail.com | [linkedin.com/in/mohammad-mahdi-nekahi](https://www.linkedin.com/in/mohammad-mahdi-nekahi)

Wear Specialist, PhD, EIT

HIGHLIGHTS

- **5+ Years of Experience in Processing & Analyzing Wear Data** as a doctoral and postdoctoral researcher at Toronto Metropolitan University, delivering actionable insights into the erosive behavior of neat or composite materials.
- **Extensive Hands-On Experience With Wear Testing & Surface Analysis Equipment**, including Comco micro-abrasive blaster, 2D Nanovea and 3D Sensofar optical profilometers, Clemex particle sizing microscope, SEM, etc.
- **Track Record in Numerical & Experimental Research in Wear of Materials** with original research publications in Wear (Elsevier), Tribology Letters (Springer), Tribology International (Elsevier), and Polymer Composites (Wiley).
- **Skilled in Wear Modeling, Finite Element Analysis (FEA), & Programming Software Packages**, including COMSOL Multiphysics, LS-DYNA, Abaqus, SolidWorks Flow Sim, MATLAB, and Python.
- **History of Successful Teamwork experience** at FujiFilm VisualSonics Inc., Siemens, Komatsu, and WIMTACH.

WORK EXPERIENCE

Abrasive Air-Jet Micromachining Lab, Toronto Metropolitan University | Toronto, Ontario, Canada

Wear Postdoctoral Researcher (Full-Time)

September 2024 – Present

- Design and perform erosion tests on the in-house fabricated polymer composites reinforced with ceramic particles.
- Analyze wear data and interpret surface statistics using optical and electron microscopy as well as 2D and 3D profilometers, to validate and verify analytical and numerical wear models.
- Manage air-jet micromachining lab operations to support research initiatives.
- Guide and mentor researchers and engineers in their professional development.
- Document technical processes and research findings with meticulous attention to detail.
- Publish scholarly articles and contribute to grant proposal writing to advance the field.

FUJIFILM VisualSonics Inc. | Toronto, Ontario, Canada

R&D Scientist (Full-Time)

May – August 2024

- Developed a thermal CFD model of UHF29x Ultrasound transducer to numerically investigate its maximum lens temperature within Vevo F2 imaging system with respect to the average input power.
- Developed an analytical model of the maximum safe voltage that can be applied on UHF29x Ultrasound transducer within Vevo F2 imaging system with respect to the user-defined imaging parameters.
- Conducted a bunch of automated tests on newly developed P29 transducer using FLIR thermal camera to collect the necessary thermal data to calculate its thermal coefficients.
- Conducted experimental investigation on the lens temperature measuring with K- and T-type micro thermocouples.

Wearable, Interactive and Mobile Technology Access Centre in Health (WIMTACH) | Scarborough, Ontario, Canada

R&D Lead (Part-Time)

August 2023 – April 2024

- Coordinated mechanical lab facilities such as a textile microscope, a textile abrasion device, and a tensile machine.
- Collaborated with stakeholders to brainstorm and refine test procedures for new materials and product enhancements.
- Prepared funding proposals for small- and medium-sized companies (SMEs) to apply for federal and provincial research agencies: NSERC Applied Research and Development (ARD) grant, NSERC Applied Research Tools and Instruments (ARTI) grant, Ontario Research Fund-Research Excellence (ORF-RE).
- Chaired weekly update meetings with industry partners to review completed tests and determine next steps.
- Conducted weekly workshops on design thinking process and product development lifecycle to clients, faculty, and students.

Abrasive Air-Jet Micromachining Lab, Toronto Metropolitan University | Toronto, Ontario, Canada

Wear Doctoral Researcher (Full-Time)

September 2019 – June 2024

- Coordinated micromanufacturing research lab facilities including Sensofar 3D-Sneox optical profilometer, Nanovea 2D optical profilometer, Clemex particle sizing microscope, and Comco micro-abrasive blaster.
- Designed and conducted wear experiments on ceramics, polymers, and polymer composites to create micro channels investigate their erosion resistance against the high-velocity impact of irregular-shaped silicon carbide abrasives.
- Developed a 3D Surface Evolution modeling of particulate-reinforced epoxy-matrix composites in COMSOL.
- Developed a numerical modeling (FEM/SPH) of the erosion of alumina particulate reinforced epoxy-matrix composites: material removal mechanisms including reinforcement fracture.
- Developed a numerical simulation (FEM) of solid particle erosion of alumina by overlapping irregular-shaped particle impacts.

- Taught MEC626 (Applied Finite Element), MEC430 (Solid Mechanics I), MEC323 (Statics and Mechanics of Materials), MEC311 (Dynamics), MEC222 (Engineering Graphical Communication), and MEC734 (Design for Manufacturing: DFMA).

International Goods Inspection Co. (IGI) | Tehran, Tehran, Iran

Inspector: Materials and Mechanical Equipment (Full-Time)

April – July 2019

- Inspected imported/exported materials and equipment to ensure they met the required specifications and standards.
- Assisted the company in technical and document preparation areas to meet the ISO/IEC 17025:2005 general standards for testing and calibration competence, including sampling.

Opal Kani Pars Mineral Processing Co. | Sangan Mine, Khorasan-e-Razavi, Iran

Senior Assembly Team Member (Full-Time)

June 2017 – March 2018

- Completed assembly of 4 PC4000 Komatsu excavators by working alongside a team of 10+ engineers and 30+ assembly workers.
- Supported team in quality checking of all assembly components before and during fitting while contributing to the preparation of the mounting site and planning reports.
- Tested and reviewed assembled machinery during and after assembly to ensure everything worked correctly and met all regulations.

Matlab Kish Co. (Siemens Healthcare Advanced Partner in Iran) | Tehran, Tehran, Iran

Maintenance Team Member (Full-Time)

December 2016 – May 2017

- Contributed to the installation and maintenance of PET-CT scans as a member of a team of 30+ engineers hailing from a variety of subfields within engineering, including mechanical, electrical, and medical engineering.

Sharif University of Technology | Tehran, Tehran, Iran

MSc Researcher (Full-Time)

September 2014 – May 2016

- Developed a new strain-based analytical model to determine the heat paths required in the line heating manufacturing technique.
- Generated a desired shape from a flat metal plate using the strain-based method developed; this technique is typically utilized to form ship hulls when conventional metal forming processes cannot be applied.

SAIPA Automaker Company | Tehran, Tehran, Iran

Intern: R&D (Full-Time)

June – August 2014

- Numerical simulation of a head-on car collision utilizing finite element method (FEM) in PAM-CRASH software.

Iran-Khodro Automaker Company | Tehran, Tehran, Iran

Intern: New Product Development Process (NPDP) (Full-Time)

May – August 2012

- Practiced effective communication in a multi-functional team.
- Familiarized with functional safety, safety-related systems, and corresponding ISO standards.
- Familiarized with NPDP concepts in car companies from T-release to test plane and V-release.

EDUCATION

Ph.D. in Mechanical Engineering - Wear, Toronto Metropolitan University (TMU) – Canada

2019 – 2024

M.Sc. in Mechanical Engineering - Manufacturing, Sharif University of Technology (SUT) – Iran

2014 – 2016

B.Sc. in Mechanical Engineering - Automotive, Iran University of Science and Technology (IUST) – Iran

2010 – 2014

AWARDS AND HONORS

Toronto Metropolitan University | Toronto, Ontario, Canada

Wear Scientist: Doctoral and Postdoctoral Researcher (Full-Time)

September 2019 – Present

- NSERC Postdoctoral Fellowship Fund: \$78k.
- Nominated for the Governor General's Gold Medals Award by the PhD Dissertation Exam Committee.
- Faculty of Engineering and Architectural Science (FEAS) Graduate Research Funding and Stipend: \$128k.

PUBLICATIONS

Toronto Metropolitan University | Toronto, Ontario, Canada

Wear Scientist: Doctoral and Postdoctoral Researcher (Full-Time)

September 2019 – Present

- **Nekahi, M. M.,** Villasenor Vazquez, E., & Papini, M. (2024). "Prediction of the gradual solid particle erosion of particulate-reinforced epoxy-matrix composites using surface evolution modeling," *Tribology International (Elsevier)*, 109422. (Q1)
- **Nekahi, M. M.,** Villasenor Vazquez, E., & Papini, M. (2023). "Numerical modeling of the erosion of alumina particulate reinforced epoxy-matrix composites: Material removal mechanisms including reinforcement fracture," *Wear (Elsevier)*, 204710. (Q1)
- **Nekahi, M. M.,** Vazquez, E. V., & Papini, M. (2022). "Numerical Simulation of Solid Particle Erosion of Alumina by Overlapping Irregular-Shaped Particle Impacts," *Tribology Letters (Springer)*, 70(2), 1-19. (Q1)
- Arani, N. H., Eghbal, M., **Nekahi, M. M.,** & Papini, M. (2021). "Numerical and experimental investigation of the erosion of zirconia particulate-reinforced epoxy matrix composites by angular silicon carbide particles." *Polymer Composites (Wiley)*, 42(1), 220-235. (Q1)