



Chris Tranquada

MASc PEng

Project Engineer

contact

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expertise

Failure Analysis

Chris Tranquada is a project engineer in MEA Forensic's Failure Analysis group. He assists with investigations of consumer product failures, water escapes and plumbing leaks, fuel oil escapes, wheel separations, and fires. Chris helps uncover the mechanisms and root causes of failure. "We make sure that we investigate thoroughly, consider all possibilities and are not satisfied until we have answers," he says.

Chris has a Bachelor's and Master's degrees in Materials Engineering from the University of Toronto. His Master's thesis focused on tiny water-repelling features found in certain tree leaves. "Knowing how to examine small-scale features helps me find important details when looking for the source of a fracture or failure," he observes. A thorough analysis of the evidence will determine whether a failure was caused by deficiencies in design, manufacturing, installation, maintenance or use.

Chris enjoys using his expertise to help legal and insurance professionals unravel mysteries. "New questions come up all the time," he says. "It keeps me on my toes."

education

Masters of Applied Science, Materials Engineering, University of Toronto, 2013.

Bachelor of Applied Science, Materials Engineering, with Minor in Bioengineering, University of Toronto, 2011.

professional status

Registered Professional Engineer, Professional Engineers of Ontario (PEO), License No. 100175160, since 2019.

Certified Fire and Explosion Investigator (CFEI), National Association of Fire Investigators, since 2016.

Level 1 X-Ray Fluorescence Operator, Natural Resources Canada, since 2020.

professional associations

Professional Engineers of Ontario (PEO)

National Association of Fire Investigators (NAFI)

professional experience

MEA Forensic Engineers & Scientists

Project Engineer, 2015 to present

Conduct technical investigations of mechanical and material failures related to product, property, transportation, and equipment losses including water escapes, fuel oil escapes and fires. Employing scientific failure analysis tools to isolate root and contributing causes related to defective use, maintenance, inspections, manufacture, or design. Engineering work includes evidence and site examinations, non-destructive and destructive testing, statics and stress analysis, metallurgical analysis, and materials characterization for various metallic, plastic and composite components. Conduct routine experiments to test hypotheses of failure modes and failure sequences for components, products, and machinery relative to reported conditions or applicable standards and codes. Ongoing research involves metallography and scientific analysis (scanning electron microscopy, SEM/EDS).

Sunnybrook Research Institute

Research Engineer/Physicist (EIT), 2014 to 2015

Aid in design changes for MRI guided High-Intensity Focused Ultrasound (HIFU) piezoelectric phased-array transducers currently under clinical development for non-invasive thermal ablation of cancer (bone metastases) and uterine fibroids. Conduct performance testing and general quality assurance of transducer modules and array using a radiation force balance to determine acoustic power output, and fiber optic hydrophone to determine array focusing ability. Execute individual experiments to determine methods of improving transducer acoustic power output, reliability and material performance through accelerated aging tests. Worked in various programming environments (C++, MATLAB, QtCreator and Ruby on Rails) and created databases.

University of Toronto

Graduate Research Assistant (Master's), 2011 to 2013

Member of the Nanomaterials Research Group in the Materials Department under the supervision of Professor Uwe Erb. Complete comprehensive characterization of superhydrophobic aspen and black locust leaf species with micro- and non-scale roughness that acts to effectively resist wetting ('Lotus Effect'). Track evolution of their epicuticular wax morphologies (nano-scale crystals) over one full growing season using Scanning Electron Microscopy. Teaching Assistant, Faculty of Applied Science and Engineering, 2011 to 2012

Directed laboratory and tutorial sessions for first and fourth-year undergraduate courses (Introduction to Materials and Chemistry, Materials Selection II, Synthesis of Nanostructured Materials). Set and graded various assignments, quizzes and tests for the courses. Operated and directed laboratory experiments using Differential Scanning Calorimetry (DSC) for thermal testing and analysis of materials. Offered student help session meetings.

MOUNT SINAI HOSPITAL

Research Assistant, 2010 to 2011

Undergraduate fourth-year thesis project, collaboration of University of Toronto Department of Materials Science and Mount Sinai Hospital Samuel Lunenfeld Research Institute in the Bone Biology laboratory under the supervision of supervisors Dr. Grynpas and Dr. Willett. The thesis involved testing bovine metatarsi samples (cut using a precision metallurgical saw) once incubated to form pentosidine and other biochemical markers characterized by the formation of Advanced Glycation End-Products (AGE's) which can form in bone as a result of kidney failure, diabetes and the natural aging process. Performed various mechanical testing, including three-point bend testing and cyclic fatigue testing.

research activities

MEA Forensic, 2015 to Present

Develop and implement field audit technique to estimate install torque of wheel fasteners for investigation of wheel separation cases.

University of Toronto, 2011 to 2013

Executed research project and various laboratory experiments to characterize the development of micro- and nano-scale roughness asperities on superhydrophobic (extreme non-wetting) aspen and black locust leaf surfaces using analytical tools:

Hands-on use of various instruments including Scanning Electron Microscope (SEM) and Optical profilometer to characterize surfaces.

awards

University of Toronto Open Fellowship Award Scholarship (2011)

National Sciences and Engineering Research Council of Canada (NSERC) Discovery Grant Award Scholarship (2011)

University of Toronto, Dean's Honours List Recipient (2009, 2010 and 2011)

International Student Essay Award, Canadian Standards Association (2003)

publications

Early Season development of Micro/Nano-Morphology and Superhydrophobic Wetting Properties on Aspen Leaf Surfaces

Morphological Development and Environmental Degradation of Superhydrophobic Aspen and Black Locust Leaf Surfaces

training and professional development

April 19, 2021 – Arc Mapping Basics Training Program, International Association of Arson Investigators (IAAI), online.

April 6, 2021 – Update on Electric Vehicle Fires in Canada, Canadian Association Fire Investigators (CAFI), Online.

March 25, 2021 – Arson for Profit, 2021 Spring Seminar, International Association of Arson Investigators (IAAI), Online.

March 14-15, 2020 – Park Tool Bicycle Repair and Maintenance Clinic, The Park Tool School, St. Paul, MN.

July 26, 2018 – ASTM International Webinar: Failure Analysis of Metal Fractures.

July 24, 2018 – ASTM International Webinar: Root Cause Analysis of Product and Manufacturing Problems.

October 16-18, 2017 – Plastic Part Failure: Analysis, Design and Prevention, University of Wisconsin School of Continuing Education, Milwaukee, WI.

July 31, 2017 – Working at Heights: Fundamentals of Fall Prevention, Infrastructure Health and Safety Association (IHSA), Toronto, ON.

October 24-27, 2016 – Canadian National Fire, Arson and Explosion Training Program, National Association of Fire Investigators (NAFI), Markham, ON.

April 20-21, 2016 – Practical Fractography, American Society for Metals (ASM) International, Lansing, NY.

March 7-11, 2016 – Mechanical Engineering for Non-Mechanical Engineers, EPIC Training, Mississauga, ON.

April 2012 – Gearing Up Motorcycling Training Course, Canada Safety Council, Toronto, ON.