

## CURRICULUM VITAE

### Isaiah J. Kaiser

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#### EDUCATION

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**The University of Akron**, Akron, Ohio (8/2019-Present)

**Doctorate of Philosophy**, Mechanical Engineering

Current GPA: 4.00/4.00

Advisor: Dr. K.T. Tan

**The University of Akron**, Akron, Ohio (8/2016-5/2019)

**Bachelor of Science (Summa Cum Laude)**, Mechanical Engineering

Final GPA: 3.95/4.00

**Stark State College**, Ohio (8/2013-5/2016)

**Associate of Science (High Distinction)**, Mechanical Engineering

Final GPA: 3.92/4.00

#### RESEARCH EXPERIENCE & EMPLOYMENT

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**The University of Akron**, Akron, OH

**Graduate Research Assistant**, Department of Mechanical Engineering (8/2019-Present)

- Implement artificial intelligence (AI) through machine learning (ML) techniques that use deep neural networks to identify complex material patterns and provide predictions on structural characteristics.
- Employ concepts from biological systems to design advanced structural materials that can be optimally utilized in aerospace technologies.
- Perform finite element analysis (FEA) to simulate, predict, and characterize failure mechanics of polymer matrix composite joints for aerospace structural applications at extreme temperatures.
- Conduct material characterization techniques to analyze surface morphology and chemical reactivity of composites and implement non-destructive techniques (NDT) to study its internal damage.
- Develop and conduct experimental tests to further research, present novel concepts, and validate analytical and numerical models of failure in composite adhesive joints.

**The University of Akron**, Akron, OH

**Graduate Teaching Assistant**, Department of Mechanical Engineering (8/2019-5/2021)

- Taught freshman-level engineering students important software (Solidworks and MATLAB) and hardware.
- Conducted computer lab sessions for engineering students to practice what they have learned.
- Graded weekly assignments and provided feedback for students to make improvements.
- Advised students on good engineering principles so that they could be well-trained engineers.

**The University of Akron, Akron, OH**

**Undergraduate Researcher, Department of Mechanical Engineering (8/2018-5/2019)**

- Performed finite element analysis (FEA) to observe a comprehensive stress analysis and the damage evolution of titanium and carbon fiber reinforced polymer (CFRP) tubular adhesive joints.
- Conducted a parametric study to observe the effect of adhesive geometry and adhesive properties on the failure mode of the composite joint.
- Provided solutions to increase composite joint strength by utilizing a hybrid adhesive approach.

**Diebold Nixdorf, North Canton, OH**

**Mechanical Engineering Co-Op, Terminal Solutions Group (5/2018-5/2019)**

- Performed tolerance stack-up analyses on new products by utilizing statistical tolerance analysis techniques.
- Designed mechanical enclosures to protect Automated Teller Machine (ATM) units against environmental effects.
- Conducted thermal tests to analyze airflow/heat transfer through duct-work within ATM units utilizing thermocouples.
- Built trusting relationships with employees in various departments by leading new product projects, spending time in communication and collaboration, and ensuring that all teams were up to date on the project's progress.

**Diebold Nixdorf, North Canton, OH**

**Mechanical Engineering Co-Op, Innovation Center (1/2017-1/2018)**

- Led projects to enhance airflow for overheating conference monitors, specialized tooling for production parts, and a rotational component to increase efficiency during powder coating processes.
- Assisted in the development and design of a part tracking software utilizing VBA code to generate metrics, prices, and time estimations for all prototypes manufactured within the Innovation Center.
- Provided engineering support for pilot builds at a manufacturing plant in North Carolina by assisting the New Product Introduction (NPI) team in diagnosing and resolving manufacturing, sequencing, and design issues.
- Readily took on additional responsibility and continued to meet project deadlines while taking initiative and learning new skills.

**RESEARCH INTERESTS**

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Mechanics of advanced composites, mechanics of adhesive joints, multiscale modeling of composites, biomimicry, machine learning, data science, environmental effects, structural mechanics, fracture and damage.

**HONORS & AWARDS**

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- **American Society for Composites, PhD Scholarship (09/2021)**
- **American Society for Composites, Inaugural 4 Minute Doctoral Research Impact Competition (08/2021)**
- **US National Committee on Theoretical and Applied Mechanics, Attendee Fellowship Program (08/2021)**

- **American Society for Composites**, Best Paper Award (09/2020)
- **The University of Akron**, Mechanical Engineering Graduate Scholarship (08/2019-Present)
- **Tau Beta Pi Honor Society**, Inducted (10/2018)
- **The University of Akron**, President's List (08/2017-05/2019)
- **Phi Theta Kappa**, Scholarship (05/2016-05/2019)
- **Partners in Excellence**, Transfer Scholarship (05/2016-05/2019)
- **Stark State College**, President List (08/2014-05/2016)

## **PEER REVIEWED JOURNAL PUBLICATIONS**

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### **Published Journal Articles**

1. I. Kaiser, C. Tan, and K.T. Tan (2021). Bio-inspired patterned adhesive single-lap joints for CFRP and titanium, *Composites Part B: Engineering*, 224:109182.
2. I. Kaiser and K.T. Tan (2020). Damage and Strength Analysis of Carbon Fiber Reinforced Polymer and Titanium Tubular Adhesive Joints, *International Journal of Adhesion and Adhesives*, 103:102710.

### **Manuscripts in Preparation/Submission**

3. I. Kaiser, C. Zhang, and K.T. Tan (2021). Mechanical Behavior and Failure Mechanisms of CFRP and Titanium Tubular Adhesive Lap Joints at Extreme Temperatures, *under review*.
4. C. Zhang, I. Kaiser, and K.T. Tan (2022). Numerical investigation on Tubular Sandwich Structures subjected to Low-Velocity Impact, *in preparation*.
5. K. Doong, A. Banik, I. Kaiser, C. Zhang, and K.T. Tan (2022). Investigating Impact Tolerance of Sea Urchin Shell Structure, *in preparation*.

## **PEER REVIEWED CONFERENCE PUBLICATIONS & PRESENTATIONS**

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1. I. Kaiser and K.T. Tan (2021). Effect of Surface Preparation on the Damage and Fracture Behavior of Carbon Fiber-Reinforced Polymer and Titanium Tubular Adhesive Lap-Joints at Elevated Temperatures, Technical Presentation for **ASME 2021 International Mechanical Engineering Congress & Exposition (IMECE)**, 1-4 Nov, Virtual.
2. I. Kaiser, C. Zhang, and K.T. Tan (2021). Failure of CFRP and Titanium Tubular Adhesive Lap Joints at Extreme Temperatures, Conference Proceeding for **American Society for Composites 36<sup>th</sup> Technical Conference**, 19-23 Sept, Virtual.
3. I. Kaiser and K.T. Tan (2020). Fracture Behavior and Damage of CFRP and Titanium Tubular Adhesive Lap-Joints at Elevated Temperatures, Technical Presentation for **ASME 2020 International Mechanical Engineering Congress & Exposition (IMECE)**, 16-19 Nov, Virtual.
4. I. Kaiser and K.T. Tan (2020). Gecko Inspired Adhesive Patterned Single-Lap Joints, Conference Proceeding for **American Society for Composites 35<sup>th</sup> Technical Conference**, 14-17 Sept, Virtual.
5. I. Kaiser and K.T. Tan (2019). Damage and Strength Analysis of Carbon Fiber Reinforced Polymer and Titanium Tubular Adhesive Joints, Conference Proceeding for **American Society for Composites 34<sup>th</sup> Technical Conference**, 23-25 Sept, Atlanta, Georgia.

## INVITED ADDRESSES & TALKS

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1. I. Kaiser (2021). Design and Characterization of Adhesive Joints, **The University of Akron, Aerospace Structures (4900:336)**, 9 Nov, Akron, Ohio
2. I. Kaiser (2021). Graduate Fair Student Panel, **2021 NAESC Midwest Engineering Conference**, 10 Oct, Akron, Ohio
3. I. Kaiser (2020). Gecko Inspired Hybrid Patterned Adhesive Joints, **The University of Akron, Analysis of Mechanical Components (4600:336)**, 27 Jul, Akron, Ohio.
4. I. Kaiser (2019). Damage Analysis of Carbon Fiber Reinforced Polymer and Titanium Adhesive Tubular Lap Joints, **The University of Akron, Aerospace Structures (4900:336)**, 11 Nov, Akron, Ohio.
5. I. Kaiser (2019). Damage Analysis of Carbon Fiber Reinforced Polymer and Titanium Adhesive Tubular Lap Joints, **NASA Glenn Research Center**, 13 May, Cleveland, Ohio.

## VOLUNTEER & OUTREACH ACTIVITIES

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- **US NSF I-Corps Sites Program**, Entrepreneurial Lead (06/2021-07/2021)
- **ZIPS: Engineered for Success**, Volunteer (08/2021-10/2021)
- **Growing Grace Homeschool Group**, Algebra 1 Teacher (08/2019-11/2019)
- **Akron-Canton Regional Food Bank**, Volunteer (08/2018–08/2019)
- **New Baltimore Community Church**, Highschool Youth Group Leader (2016-2019)
- **Operation Christmas Child**, Volunteer (11/2015-11/2018)
- **Haven of Rest Ministries**, Volunteer (2014-2016)

## MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS

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| 1. American Institute for Aeronautics and Astronautics (AIAA) | 2020–Present |
| 2. American Society for Composites (ASC)                      | 2019–Present |
| 3. Tau Beta Pi Engineering Honor Society                      | 2018–Present |
| 4. American Society of Mechanical Engineers (ASME)            | 2016–Present |
| 5. Tau Sigma National Honor Society                           | 2016–Present |

## REVIEWING OF MANUSCRIPTS

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Assisted advisor in the review of manuscripts submitted to the following international journals:

- *Composites Part A: Applied Science and Manufacturing*
- *Journal of Composite Materials*
- *Materials Today*

Reviewer of manuscripts submitted to the following international journals:

- *Journal of Composite Materials*
- *International Journal of Lightweight Materials and Manufacture*

## RESEARCH SKILLSETS

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**Computer Software:** Abaqus, Ansys, PTC Creo, Siemens NX, SolidWorks, MATLAB, LabVIEW, Python, VBA, Tensorflow, Google Colab, Jupyter Notebook, Microsoft Office.

**Experimental Techniques:** Instron/MTS universal testing machines, Additive manufacturing machines, Environmental chambers, Micro-computed tomography imaging machines.

## PROFESSIONAL REFERENCES

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- **Dr. Kwek-Tze “K.T.” Tan**  
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- **Dr. Christopher Daniels**  
Professor of Engineering Practice  
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- **Dr. Evan Pineda**  
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