



James Tillotson

Support Engineer || M.S. Mechanical Engineering

Email. jameswtillotson@gmail.com || Tel. 1.970.218.1922

Portfolio. jamestillotson.com

Curriculum Vitae for submission to Colorado State University Mechanical Engineering Department

Technical and Professional Skills

Manufacturing - HAAS CNC Milling Center | HAAS CNC Turning Center | Injection Molding | Additive Manufacturing | Welding (GTAW, GMAW) | Shop metrology | CMM | End Mill | Lathe | CNC Fiber Laser | CNC Waterjet | ABB Robotics | Lost Resin Investment Casting | DFM | GD&T

Software:

SolidWorks | ProEngineer Wildfire | ProEngineer Creo | BOB CAD | MasterCAM | SketchUp

Programming **DAQ, HMI:**

Visual Basic | PIC Basic | Arduino | Python | MATLAB | Mathcad | LabVIEW Core 1, Core 2, Core 3

Analysis Tools:

MS Excel | LabVIEW | Diadem | Fluent | Abaqus | SolidWorks | FEA | Chemkin

Lab Equipment:

Educational – Minilab SR30 Turbojet engine, Rankinecyclor Rankine cycle, Free Piston Sterling Engine Combined Heat and Power Industrial Hybrid System, Diesel Engine System, wind tunnel, water tunnel, Custom lab equipment design maintenance and improvement.

Gaseous Emissions - Siemens Ultramat 6 series analyzers | California Analytics FID | VIG FID | MKS FTIR | ECOM-J2KN | Testo 350 Emissions Analyzer | Gaset DX4000 FTIR | Nicolet FTIR | LICOR CO₂ Analyzer

Particulate Emissions - Gravimetric PM sampling | ECOC PM Analysis | GRIMM SMPS+C

Fuel Analysis - Anton-Paar DSA 5000 M Density and Sound Velocity Meter | Anton-Paar SVM 3000 Stabinger Viscometer | C200 Calorimeter | FIT

Engines - Cummins QSK50 | Cummins QSK19 | Cummins 6.7L Ag derivative | Cooper

Bessemer GMV-TF4 | CAT CG137-8 | CAT 3304 | John Deere 4.5L | Kohler 993T | CFR

Industrial – Pumps | actuators | valves | mixers | heat exchangers | compressors

DAQ - National Instruments [cRIO, PXI, cDAQ] | LabJack | Arduino

Certifications and Licenses - ISO CAT 1 Vibration Analyst | Private Pilot's License | SSI Open Water SCUBA | Technician Class Radio License [In progress, Interrupted by COVID] | HAAS CNC Lathe and CNC Mill Certification [in progress, interrupted by COVID] | Toyota Fork Truck Operator | Kruse Injection Molding Training

Education

M.S. Mechanical Engineering | Colorado State University | May 2019

“Translating Biomass Gasifier Research to a Market-Ready Prototype”

M.S. Thesis, Colorado State University

- Developed data analysis techniques to quantify time dependent gaseous and particulate emissions during multiple combustion regimes.
- Fabricated stainless-steel components for modular parametric testbed.
- Performed experiments quantifying the effect of fuels and configuration on emissions and performance of top-lit updraft gasifier cookstoves.
- Designed, constructed, and evaluated a market ready prototype based on the findings from the modular parametric test bed, including IC design, sheet metal work, coatings, prototype code, and testing.

B.S. Mechanical Engineering | Colorado State University | May 2014

- Member of award-winning Senior Capstone Design team that resulted in a start-up company
 - Worked for the Advanced Cookstove Laboratory at Engines Laboratory to develop charcoal and biomass cookstoves for the developing world.
-

Teaching Experience

EMEC Director | Instructor | Colorado State University M.E. Department MECH 200A, MECH 200B | Spring 2022 - Current

In the spring and summer of 2022, I served as the interim instructor for the Introduction to Manufacturing Processes Lecture and Laboratory (MECH 200 A and MECH 200B) as well as the director of the EMEC laboratory. Pedagogically I built this course around applied concepts and content through highly interconnected and interactive lectures and labs. I constructed course content around industry experience and interviews with industry partners. The objective is to provide engineering students with the firsthand skills to manufacture components in the EMEC, an understanding of a broad range of manufacturing processes and their applications, and confidence to navigate an industrial environment and operate industrial tools and machinery safely and efficiently. Inclusive, open, and intentional engagement with the students, colleagues, peers, and community members form the basis for my pedagogy and personal ethos. It is my objective that by respectfully addressing each student as a complex individual and striving to understand and meet each need to the best of my ability, I can cultivate a culture of inclusive academic excellence in MECH 200 and the EMEC that is part of the larger mission vision and values of the Mechanical Engineering Department, Walter Scott Jr. College of Engineering, and Colorado State University.

Responsibilities and Accomplishments

- Lead the design and delivery of MECH 200A and MECH 200B, foundational courses in manufacturing processes, emphasizing hands-on learning and industry relevance for more than 1,000 sophomore mechanical engineering students.
- Developed a comprehensive curriculum grounded in industry interviews, real-world case studies, and state-of-the-art manufacturing technologies, incorporating innovations such as AI-driven assignments, VR/AR integrations, and physical GD&T demonstrations.
- Enhanced student engagement and accessibility through inclusive pedagogical practices, tailored content for ESL learners, and expanded lab operating hours.
- Spearheaded EMEC improvements, including commissioning a lost resin investment foundry, welding and metrology labs, and advanced manufacturing automation facilities.
- Secured over \$1.4M in funding and equipment donations to expand and modernize the EMEC, including the installation of a 2kW CNC fiber laser and robotic arms for automation training.
- Advised and supported over 20 Senior Design Teams, including award-winning projects such as the Pitter Patter Prosthetic Foot Team and the Rocket Test Cart.
- Established collaborations with external partners and university programs to enhance cross-disciplinary learning and provide students with professional networking opportunities.
- Received accolades for innovative teaching, lab modernization, and fostering a culture of safety, inclusivity, and excellence.

Instructor | Colorado State University | Walter Scott Jr. College of Engineering ENGR 180 – Engineering your Success | Fall 2024

- Provided instruction and support for 32 first year engineering students.
- Built hands on engineering activities and instructional content
- Created a welcoming and open classroom environment

Teaching Faculty | Olive Tree School High School Introduction to Physics | 2020 - Current

- Created flipped classroom with new and original laboratory experiments, quizzes, and assignments.
- Presented 70 minuet Physics Lectures 2x weekly.
- Delivered Creative firsthand teaching laboratories to support the educational objectives.
- Delivered remote lectures due to COVID pandemic as needed.
- Created content for college preparation.
- Arranged tours of the CSU Mechanical Engineering Program and Undergraduate Teaching Laboratories.

Graduate Teaching Assistant | Mechatronics Laboratory | CSU MECH 307 Fall 2015

- Provided inclusive and practical instruction
- Graded laboratory quizzes and other materials.
- Prepared and facilitated laboratory sections to teach the proper techniques to design, build, evaluate, troubleshoot, and improve IC and mechatronic systems.
- Held office hours and assisting mechatronics projects teams with their lab assignments, and course projects.

Grader | Thermodynamics and Heat Transfer | CSU MECH 237 Spring 2015

- I graded 110 homework sets each week
- I ensured that grades were posted prior to each exam

Work Experience

Support Engineer | Colorado State University Mechanical Engineering Dept. May 2016 to Current

With approximately 1,000 undergraduate students, the Dept. of Mechanical Engineering (ME) is the largest program in the Rocky Mountain region, and the third largest major at Colorado State University (CSU). The program offers a curriculum that combines classroom learning with engineering practice. Firsthand, rigorous laboratory coursework is a requirement for undergraduates in six dedicated labs. Additionally, students complete a year-long senior capstone project. I have the good fortune to support these students throughout their academic study in these labs and projects by providing technical expertise in project development, electro-mechanical devices, instrumentation, and control systems.

Responsibilities

- Responsible for the day-to-day operation and maintenance of the equipment in the undergraduate laboratories.
- Fabricate and implement new apparatus, experiments, infrastructure, and control systems.
- Modify, debug, and implement control software (i.e., LabVIEW, MATLAB).
- Work with faculty to maintain and upgrade/replace laboratory equipment and infrastructure.
- Develop collaborations with industry and academic partners.
- Mentor and facilitate senior capstone projects.
- In conjunction with the college and campus IT depts. develop and implement computer hardware and software.
- Assist with developing written laboratory practices, protocols, and lab manuals- Manage inventory of laboratory consumables.
- Sourcing and procurement of lab and project materials.
- Manage laboratory fees in consultation with department staff.
- Manage all ME undergraduate lab tools and equipment on loan.
- Supervision of undergraduate student assistant(s).
- Ensure undergraduate labs are operated in a safe manner.
- Coordinate training, tracking, and disposal of hazardous waste.
- Work with Graduate Teaching Assistants to ensure that lab sections are prepared for and executed.
- Participate in outreach and recruiting events.

Accomplishments

- Successfully oversaw the implementation of \$381,000 in improvements to the UTL program. Including increased square footage to labs, new equipment and improved capability and capacity.
- Ten percent increase in student capacity across all labs.
- Twenty percent increase in student capacity across all labs piloted successfully
- Renovated new lab space (metrology, welding)
- Increased electrical capacity (480VAC 3P)
- Seventeen new or significantly improved laboratory experiments

Research Engineer | CSU Powerhouse Energy Institute

- Responsible for the day-to-day operation and maintenance of industrial and lab equipment. Including, installation, commissioning, maintenance, repair, reconfiguration, and operations of equipment.
- Work with faculty and clients to conduct experiments and collect data using our research engines and laboratory test equipment that is relevant and appropriate based on the test program objectives.
- Author research proposals, test plans, instruction documentation, checklists, procedures, and other laboratory documentation necessary to safe and effective laboratory operation.
- Implement new apparatuses, experiments, control software and GUIs, and infrastructure.
- Write, modify, debug, and implement DAQ, HMI, and analysis software in LabVIEW, MATLAB, Python, Excel, and others.
- Install, maintain, and repair a variety of data acquisition systems and software packages. Especially National Instruments cRIO hardware and software.
- Maintain, trouble-shoot, and repair/replace computer systems used for data acquisition and engine and instrument control.
- Specify order, configure, and install new equipment including lab instrumentation, data acquisition systems, controls, pumps valves, meters, sensors, and other hardware.
- Work closely with Graduate Research Assistants (GRAs) to ensure that research is conducted in a safe and effective fashion.
- Supervise up to nine undergraduate engineering intern staff members and five graduate students conducting a

wide range of tasks.

- Wrote, and implemented laboratory safety and proficiency training program.
- Coordinate tracking and disposal of hazardous waste.
- Complete our spill prevention and containment inspections
- Manage, maintain, and stock all lab tools and equipment and tool consumables.
- Execute proper disposal of excess, defective or obsolete equipment for the lab

Co-founder and Member Manager | iCordia Surgical, LLC. August 2013 to April 2016

- Pioneered a procedure for the transapical resection and replacement of the aortic valve.
- Designed a medical device to remove aortic valve tissue transapically
- Assessed the medical device in a beating heart simulator to validate efficacy
- Assessed the medical device in a live porcine model to evaluate efficacy and safety
- Completed the first known placement of a temporary artificial valve aortic arch in a live porcine model.
- Co-founded an LLC startup (iCordia Surgical LLC. Established May 2014), which was a CSU Venture Accelerator Company (Fall 2015 Cohort).
- Sponsored a senior design capstone project to improve efficacy and safety of the original tool (August 2014 to May 2015)

Undergraduate Research Assistant | CSU Powerhouse Energy Institute Dec 2011 to May 2014

- Member of interdisciplinary multi-organizational research and design team
- Participated in a concept to product design process
- Design, manufacturing, testing, and validation for industry sponsors
- Performed data analysis for presentation to final customer

Other Positions | 2007 - 2009

- Firewall Forward, short staff aircraft mechanic shop hand, December 2010
- Aqua Pumps Inc., Water Well Repair Technician, Summer 2010
- Aims Community College, Ceramics Lab Technician, 2009 to 2011
- Campus Crusade, fifth grade Head Counselor, Summer 2009
- Whitman's Outdoor Services, Landscaping. Summer 2008
- Thunder Prairie Ranch, Ranch Hand, Summer 2007

Advising

RSO Faculty Advisor Colorado State University

- Faculty advisor for the CSU logging sports team – 2016-2017
- Faculty advisor for the CSU Rams Aviation Club F 2024- Current
- Faculty advisor for the CSU KAMAL Manufacturing Club – S 2025 – Current

Senior Design Teams

1. Pitter Patter Prosthetic foot manufacturing process Team 1 (Fall 22 Start) Awarded Second place BME Team.
2. Pitter Patter Prosthetic foot manufacturing process Team 2 (Fall 23 Start) Awarded Second place BME Team.
3. Pitter Patter Prosthetic foot manufacturing process Team 3 (Fall 24 Start).
4. Novel Prosthetic Arm for Quad Amputee (Fall 21 Start)
5. 1st Year Aerospace Course - Rocket Test Cart (Spring 23 Start) Awarded First Place MECH Team.
6. 1st Year Aerospace Course - UAV Racecourse (Spring 23 Start)
7. Pitter Patter Prosthetic foot Senior Design Teams (Fall 23 Start)
8. Walker Mowers Senior Design Team (Fall 23 Start)
9. EMEC Induction Foundry Project (Spring 24 Start)
10. CSU IREC Rocket Team Graduate Student Advisor 2014-2016
11. Industrial Engine Control Team Advisor 2019
12. Senior Design Team DFM and GD&T Advising for MECH and Biomed Programs 2022 to current

I2P Co-Director

1. Oversee hiring of student staff
2. Oversee tasking of ~12 student staff
3. Oversee I2P funding
4. Provide advising to I2P Student Leadership
5. Oversee accounting, billing, and data generation
6. Served approximately 200 users a year for additive manufacturing

Volunteer

Deacon Board Member | Wellington Community Church December 2018 To January 2022

- Preaching staff, delivering 7 sermons in 2021
- Work with a diverse leadership team to meet the spiritual, emotional, and physical needs of the local community and approximately one hundred congregants.
- Maintained working relationship with Boys and Girls Club.
- Manage and utilize a \$300,000 annual budget and approximately \$3M in assets.
- Serve as board secretary for service year 2020-2021.
- Improve accounting practices, fiscal transparency, and procedures.
- Serve on a team writing new doctrinal statement, other documents.
- Completed a \$450,000 commercial real-estate transaction including HOA contract negotiations, to secure land for a future facility.
- Worked on responses to natural disasters like COVID-19 and inclement weather.

Director of Children's Ministries | Wellington Community Church January 2020 To Current

- Work with a diverse ministry team to equip and meet the spiritual and physical needs of parents and families.
- Created check-in, checkout, and other procedures.
- Write safety and training documentation and procedures.
- Evaluate curriculum for alignment with WCC's mission, vision, and values

Awards

2022 – Walter Scott Jr. College of Engineering Outstanding Staff Award – Rising Star
2021 – Outstanding Project Management Award | CSU Mechanical Engineering Department
2015 – CSU Venture Accelerator Cohort Member 2014 – Sjostrom Family Scholarship
2014 – Outstanding Design Engineer Senior Design Capstone
2014 – second place Biomedical Engineering Project Senior Design Capstone 2012 – Top Mechatronics Project of all time

Publications

1. Tryner, J., Tillotson, J., Baumgardner, M.E., Mohr, J., DeFoort, M. and Marchese, A. J. (2016). The effects of fuel properties, air flow rates, secondary air inlet geometry, and operating mode on the performance of TLUD semi-gasifier cookstoves. Environ. Sci. Technol. 50 (17), pp. 9754-9763.
2. James Tillotson, "Translating Biomass Gasifier Research to a Market-Ready Prototype", M.S. Thesis, Colorado State University, Colorado State University

Conference Papers and Presentation

1. Tillotson, J., Tryner, J., Mohr, J. and Marchese, A. J. (2015). Effects of stove design and fuel bed properties on TLUD operation and performance. 2016 ETHOS Conference. Kirkland, WA, January 30-31, 2016.
2. Tryner, J., Tillotson, J., Mohr, J. and Marchese, A. J. (2016). Achieving Tier 4 Emissions and Efficiency in Biomass Cookstoves. 2016 ETHOS Conference. Kirkland, WA, January 30-31, 2016.
3. Tillotson, J., Tryner, J., Mohr, J. and Marchese, A. J. (2015). Particulate matter and carbon monoxide emissions during transient combustion events in a top-lit up-draft semi-gasifier cookstove Fall Technical Meeting of the Western States Section of the Combustion Institute. Provo, UT, October 5-6, 2015.
4. Tryner, J., Tillotson, J., Mohr, J. and Marchese, A. J. (2015). Measurement of Syngas Composition in a top-lit up-draft semi-gasifier cookstove under varying modes of operation. Fall Technical Meeting of the Western States Section of the Combustion Institute. Provo, UT, October 5-6, 2015.
5. Tryner, J., Tillotson, J., Baumgardner, M. E. and Marchese, A. J. (2015). The effects of secondary air delivery parameters on the performance of a top-lit up-draft semi-gasifier biomass cookstove. The 9th US National Meeting of the Combustion Institute. Cincinnati, OH, May 2015.

Personal Interests

I spend my time chasing joy and exploring the world with my wife Cadie and our two daughters Abigail (7 Yrs.), Hailey (5 Yrs.), and our newest addition Nathan (7Mo). We like to camp and backpack in Colorado. Cadie and I have climbed twenty-four 14ers, I have my private pilot's license, and enjoy operating a quadcopter with my daughters, I build custom fly rods with my dad, and I enjoy fly fishing and hunting big

game. I am studying for my technician class radio operator license. I am open water SCUBA certified. I love serving and worshiping at my local church in Wellington. I am a voracious reader and my top books at the moment are The Lord of the Rings and the Silmarillion by JRR Tolkien, The Count of Monte Cristo by Alexandre Dumas, and Desiring God by Dr. John Piper. I do not follow my passion; I take it with me wherever I go.