Jacob Miller, Ph.D.

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Education

Doctor of Philosophy, Explosives Engineering, Missouri University of Science and Technology, 2021
Master of Engineering, Mining Engineering, Missouri University of Science and Technology, 2012
Master of Science, Explosives Engineering, Missouri University of Science and Technology, 2012
Master of Engineering, Manufacturing Engineering, University of Missouri – Rolla (Now Missouri S&T), 2005
Bachelor of Science, Mechanical Engineering, University of Missouri – Rolla (Now Missouri S&T), 2003

Professional Experience

Facilities Engineer (July 2022 - Present)
Brewer Science, Rolla, MO

- Plan, implement, and maintain infrastructure and equipment required for research buildings and production facilities.
- Perform analyses of operational processes, resource allocation, energy use, safety processes, and implement improvements.
- Review construction blueprints and schedules to facilitate completion of tasks on time and on schedule.
- Determine facility and equipment specifications.
- Design and oversee the implementation of facility expansion, layout, various systems, and quality controls.
- Coordinate and oversee contractors performing maintenance activities.
- Troubleshoot and resolve problems with contractors to maintain construction deliverables.

Lecturer (January 2023 – Present)
Missouri University of Science and Technology, Rolla, MO
Department of Mechanical and Aerospace Engineering

- Aid with the instruction and practices of ME 2653, *Introduction to Manufacturing Processes,* lab component.
- Instruct the use of manual lathe machines to students through verbal directions and in-person demonstrations.
- Review machining errors produced by students and developed corrective actions to allow successful completion of machined components.
- Aid in the development of students' practical skills related to the use of machine tools, tooling, and measurement devices.

Core Engineer (June 2005 – June 2022)
CNS Y-12 National Security Complex, Oakridge, TN
DOE Security Clearance: Q (inactive)

- Modified part designs which facilitated production via additive manufacturing techniques instead of traditional machining enabling functional parts to be made faster than raw material for traditional machining could be procured.
- Designed prototypes manufactured via additive manufacturing techniques to permit fast production and test fitting that allowed four designs to be evaluated within one day.
- Oversaw the installation and operation of modern machining centers that reintroduced machining capabilities that had been absent on site for over 20 years.
- Developed process plans to effectively utilize capabilities of machine tools which increased machine utilization time from 6 hours a day to 20 hours a day.
- Conducted standardized ASTM testing on potentially explosive dusts.
- Evaluated data from internal and external testing of energetic materials for reaction rate and determination of explosibility.
- Designed and modified test apparatus to evaluate radioactive and pyrophoric materials for explosibility.
- Conducted testing to quantify the ARF-RF (Airborne Release Fraction – Respirable Fraction) of particles generated when materials are exposed to fire and thermal insult.
- Designed and modified test apparatus as needed to meet required test parameters of time and temperature.

- Characterized the performance of Explosively Formed Projectiles generated from a novel launch system.
- Managed explosive formed projectile research program costing $450k over 2 years.
- Developed test methodology, conducted field research and evaluated data related to the wall breaching program.
- Managed explosive wall breaching research program costing $600k over 3 years.

Graduate Teaching Assistant (August 2015 – December 2017)
Missouri University of Science and Technology, Rolla, MO
Department of Mining Engineering
- Setup and initiated over 100 high explosive detonations for research and course work using explosives including; TNT, C4, HMX, RDX, PETN, ANFO, Emulsions, Prima-sheet, dynamite.
- Taught course topics including shaped charges, IMESAFR risk analysis, improvised explosive devices, destructive devices, pyrotechnic manufacturing and assembly.
- Provided research publication guidance to graduate students in the field of Explosive Engineering
- Aided in the experimental design, proposal writing, and pursuit of external funding.
- Graded course work and interfaced with students to supply feedback on tests and exams.

Machine Operator (August 2004 – May 2005)
Briggs & Stratton, Rolla, MO
- Ran rotary transfer machines, machining transfer lines, single axis mill, and drills, in the aluminum and cast iron machining departments utilized to produce vertical and horizontal gas engine cylinders, heads, sumps, covers, cranks, and flywheels.
- Supported the repair and diagnostic troubleshooting of automated machinery.

Work Study (August 1997 – May 2005)
University of Missouri- Rolla (now Missouri S&T), Rolla, MO
Mechanical Engineering Machine Shop
- Aided in the fabrication of prototype machinery used for research and design projects.
- Designed parts, developed manufacturing process and machined components for laser based additive manufacturing prototypes on campus.
- Designed blanks and fixtures for sterling engines required for Thermodynamics classes.
- Machined components for tabletop steam engines.
- Fabricated the components for the front spindles on a Human Powered Vehicle.

Previous Supported Research Projects

- Coal Dust Explosibility
- ARF-RF Generated During Uranium Fires
- Explosive Dust Testing and Review
- Explosive Bulk Charge Generated Flyplates
- Laser Based Metal Powder Additive Manufacturing
- Explosively Formed Projectile (EFP) Design
- Breach Charge Penetration Performance
- Improvised Explosive Devices
- Explosive Welding and Etching
- Shockwave Analysis over a Blast Barrier
- Blast Induced Traumatic Brain Injury

Awards

- 2014-2017, Missouri University of Science and Technology Chancellors Fellowship
- Awarded US Patent 9010249, 11400688 and 10655939

Peer Reviewed Publications

- Mulligan P. and **J. Miller** “Shockwave Uniformity Associated with Various Free Air Burst Configurations,” *Proceedings of the International Society of Explosive Engineers 43nd Annual Conference on Explosives and Blasting Technique, 2017*
- **Miller J**., Shafler J., Mulligan P., Eades R., Perry K. Johnson C., “Explosive Dust Test Vessel Comparison using Pulverized Pittsburgh Coal.” *Journal of Archives of Mining Sciences*, 63 (2018), 3, 713-726
- **Miller J**., Mulligan P., Johnson C., J. Miller et al., "Explosive Dust Characteristics Evaluation of Pulverized Pittsburgh Coal using ASTM E1226-12a," *Proceedings of the 2018 Spring Technical Meeting of the Eastern States Section of the Combustion Institute* (2018, State College, PA), Eastern States Section of the Combustion Institute, Mar 2018.
- R. Q. Eades, K.A. Perry, C. E Johnson, **J. Miller**., "Evaluation of the 20 L Dust Explosibility Testing Chamber and Comparison to a Modified 38 L Vessel for Underground Coal," International Journal of Mining Science and Technology, vol. 28, no. 6, pp. 885-890, China University of Mining and Technology, Nov 2018.
- Quinn, Michael, and **Miller, Jacob**. Determine Airborne Release Fractions (ARF) / Respirable Fractions (RF) for Use in Safety Based Documents. United States: N. p., 2019. Web.
- **J. Miller** et al., "Comminution of Pulverized Pittsburgh Coal during ASTM E1226-12a Dust Combustibility Testing," *Powder Technology*, vol. 375, pp. 28 - 32, Elsevier, Sep 2020.
- **Miller, Jacob Lee**, "Investigation of anomalous data trends during coal dust explosibilty testing" (2021). *Doctoral Dissertations*. 3062.

Teaching

- **Mechanical Engineering 2653: Introduction to Manufacturing Processes** *(Spring 2023, Spring 2024)*
  ***Course Description*:** Introduction into the fundamentals of manufacturing processes. Welding, joining, casting, forming, powder metallurgy and material removal are covered. The material is presented in a descriptive fashion with emphasis on the fundamental working of the processes, their capabilities, applications, advantages and limitations.

- **Explosives 5112: Explosives Handling and Safety (***Spring 2016; Spring 2017)*
  ***Course Description*:** Introduce students to explosives safety procedures and regulations. Topics: practical applications in the safe handling and use of explosives, energetic materials, initiators, safe transportation, storage, and disposal of energetic materials, discussion of illegal explosives use and the misuse of Improvised Explosive Devices (IEDs).

- **Explosives 6312: Scientific Instrumentation for Explosives Testing and Blasting** *(Fall 2015; Fall 2016; Fall 2017)*
  ***Course Description*:** Application of scientific principles, equipment description, and instrumentation of explosive events. Topics: Photography, high-speed imagery (digital and film), data acquisition system, pressure sensors, seismographs, and velocity of detonation.

Professional Memberships and Licenses

- 2018 Department of Energy Explosives Safety Training
- 2018 Missouri Blasters License, #580 - expired
- 2016 IMESAFR Training, APT-01302016-07 2016-02
- 2003 Passed the FE (EIT) Exam

Personal Statement

Jacob Miller graduated from the Missouri University of Science and Technology with a doctoral degree in Explosives Engineering in December of 2021. His education and professional preparation focused on manufacturing process design, conceptual prototyping utilizing computer aided design and manufacturing, and evaluation of combustible dust explosions. He has been responsible for developing, manufacturing and evaluating the performance of novel components and assembled systems in both his doctoral and masters’ research, as well as in his work at the Y-12 National Security Complex.

Some of Mr. Miller's most recent projects include development of manufacturing processes for new and novel materials, creation and analysis of design of experiments, explosibility characterization of combustible dusts, explosive breaching of hardened concrete structures, and explosively formed projectiles from bulk charges. His ambition is to utilize his unique hands-on experiences and understanding of manufacturing processes to support innovative research and develop applied manufacturing courses for his employer.