

Alex Pawlowski

Energy Science and Engineering PhD Student, exploring additive manufactured metallic gradients for end-use transportation parts.

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Currently

I'm a rising fourth-year energy science and energy PhD student at the University of Tennessee, in partnership with the Fuels, Engines, and Emissions Research Center (FEERC) at Oak Ridge National Lab. In this interdisciplinary study, I have taken full advantage of developing a project that leverages strong core areas for ORNL to a new opportunity for the lab. My primary focus is to develop metallic gradients through additive manufacturing for end-use components to improve vehicle efficiency. Through successfully defending a lab SEED proposal and becoming the first of 2 projects sponsored by the Vehicle Technology Office in additive manufacturing, I have assembled a team in each core competency to tackle this issue: additive manufacturing, high temperature materials, and engines. To add depth to this area of concentration, I have found great interest in fuel economy analysis, helped in the design of 2 additively manufactured vehicles at the lab, and participate in dynamic neutron imaging of fuel injector sprays. I am actively building on programming skills with the R language to introduce statistical methods and web development to help find new ways to collaborate with open science.

Education

2014-18 **University of Tennessee** PhD Energy Science and Engineering (advisors: Derek Splitter and Robert Wagner)
2010-14 **University of Virginia** BSc Mechanical Engineering and Engineering Science - Material Science (3.2 GPA)

Presentations

2015 Spark Ignited Engine Trends: A Historical Analysis with Future Projections (SAE World Congress 2015, Detroit, MI)
Addressing our future mobility needs now (Pecha Kucha Night Knoxville, Vol 14, Knoxville, TN)

Publications

2017 **Pawlowski A**, Cordero Z, French M, Muth T R, Carver J K, Dinwiddie R, Elliott A, Shyam A, Splitter D. Damage-tolerant metallic composites via melt infiltration of additively manufactured preforms. *Materials & Design*. 127:346-351. doi:10.1016/j.matdes.2017.04.072

2015 Splitter D, **Pawlowski A**, and Wagner R (2015). A historical analysis of the co-evolution of gasoline octane number and spark-ignition engines. *Front. Mech. Eng.* 1:16. doi:10.3389/fmech.2015.00016

Pawlowski A, Splitter D (2015). SI Engine Trends: A Historical Analysis with Future Projections SAE Technical Paper 2015-01-0972, doi:10.4271/2015-01-0972.

Technical skills

CAD

_ Solidworks (CSWA)
_ Autodesk Fusion 360
_ OpenSCAD
_ FreeCAD
Scripting
_ LaTeX
_ HTML, CSS, + Javascript

Data visualization

_ R + Shiny
_ Python
_ Inkscape
_ Plotly
Manufacturing
_ CNC Milling
_ Manual Milling

_ Lathing
_ Spincasting
Additive Manufacturing
_ Fused Filament Fabrication / FDM
_ Binder Jet
_ Selective Laser Melting
_ Electron beam melting

Projects

AMIPC

For my dissertation research, we have developed a manufacturing process to produce metal-metal composites combined additive manufacturing with casting. In our first paper on the work, we have demonstrated enhanced damage tolerance of the composite over the standard matrix material, with work ongoing to demonstrate control over a variety of material systems and lattice configurations.

Clean Power Plan Tool

I led the development of an evaluation tool for the EPA's Clean Power Plan using the Shiny Framework based on the R programming language. Follow along with its progress at (bccpp.github.io).

Awards

Bredesen Center Fellowship (PhD fees + enhanced stipend)

Data Visualization Experience

2013 **Toyota Motors North America** Energy and Environmental Research Intern - Designed a GUI for a modeling program and visualized data on CAFE compliance (Washington, DC)

2011-13 **Virginia Department of Transportation** Transportation Planning and Land Development Intern - Redesigned database and GUI for internal tracking; Visualized historical data on annual high occupancy vehicle lane data collection. (Suffolk, VA)

Links

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