

BENJAMIN CULMER

Philadelphia, Pennsylvania • U.S. Citizen • 703-894-8048 • bculmer@seas.upenn.edu
<https://benjamin-culmer.github.io>

EDUCATION

University of Pennsylvania, Philadelphia, PA

Master of Science in Engineering, Fluid Mechanics Concentration

September 2022 – Present

GPA 3.88/4.0

Dartmouth College, Hanover, NH

Bachelor of Engineering, Mechanical Concentration

September 2016 – June 2020

Major GPA 3.35/4.0

Bachelor of Arts, Engineering Science

GPA 3.29/4.0

EXPERIENCE

WD Lab Grown Diamonds, Beltsville, MD

Mechanical Design Engineer for Research and Development Group

Part-Time August 2022 – Present

Full-Time June 2021 – August 2022

- Designed modifications to custom chemical vapor deposition (CVD) chambers using SolidWorks (CAD)
- Created drawings including Geometric Dimensioning & Tolerancing (GD&T) principles
- Communicated with machine shops, negotiated quotations, and had custom parts manufactured based on drawings
- Introduced 3D Printing to the company resulting in rapid prototyping and manufacturing of cost-effective parts
- Conducted research and read academic papers to influence designs and explain phenomena occurring within the equipment
- Designed and executed experiments to improve equipment and infrastructure
- Managed data migration to Product Data Management (PDM) software
- Troubleshoot equipment malfunctions and designed solutions to prevent future malfunctions
- Coordinated with vendors to perform simulations optimizing pre-existing designs
- Designed mechanical solutions to achieve simulation results
- Optimized the maintenance department by providing them with updated tools, techniques, and a new task prioritization order
- Reviewed new engineer's drawings and designs prior to manufacturing and testing
- Reviewed standard operating procedures as the mechanical subject matter expert

Merck & Co. (AllSource PPS), Harrisonburg, VA

Associate Specialist Engineering (Operations Engineer) V590, V591, MK7110 (Covid-19 vaccines and therapeutic projects)

July 2020 – May 2021

- Researched, authored, and peer-reviewed standard operating procedures (SOP) for factory equipment and facilities operation
- Conducted a Personal Protective Equipment (PPE) hazard analysis for the MK7110 manufacturing process
- Contributed to facility and equipment commissioning and qualification walk-downs for factory preparation
- Analyzed numerous Plumbing and Instrument Diagrams (P&ID) for equipment and facility tracing
- Studied and presented process descriptions to team members after project changes
- Instructed and trained team members on equipment use
- Handled hazardous chemicals and responded to hazardous chemical spills
- Troubleshoot and corrected issues in real time on the factory floor
- Diagnosed, recorded, and reported defects on equipment in a clean room
- Executed published documents on the factory floor to aid in process development

University of Pennsylvania School of Medicine, Philadelphia, PA

Research Assistant for the Penn PET Explorer (First Full-Body PET Scanner)

June 2019 – August 2019

December 2018 – March 2019

- Assembled and wired an entire PET scanner from the ground up to learn about the system and build a product
- Diagnosed and repaired unknown defects in components through trouble shooting and testing using Linux
- Developed procedures and produced documentation for manufacturing and testing the Explorer
- Instructed others on manufacturing procedures, defined tasks, and delegated work
- Engineered and manufactured a method for safely mixing radioactive materials in an artificial body using SolidWorks (CAD)

Dartmouth College, Thayer School of Engineering, Hanover, NH

Research Assistant

March 2019 – June 2019

- Researched alternative methods and materials to use in an artificial kidney system and preformed a cost-benefit analysis
- Created 3D models of kidney systems from CT scans using Mimics software
- Built parts of the artificial kidney system and wrote a procedure for building future parts

Teaching Assistant

September 2019 – November 2019

- Graded homework for Dartmouth's course in Applied Mechanics: Dynamics

Kellogg, Hansen, Todd, Figel & Frederick, PLLC, Washington, DC

Intern for the Litigation Division

June 2017 – July 2017

- Searched for evidence in up to 1,000 emails per day during the discovery phase of legal cases
- Wrote memoranda for Associates and Partners presenting findings and documentation on information found in discovery
- Attended case interviews with potential witnesses and took notes

BENJAMIN CULMER

Philadelphia, Pennsylvania • U.S. Citizen • 703-894-8048 • bculmer@seas.upenn.edu
<https://benjamin-culmer.github.io>

HIGHLIGHTED SKILLS

- Programming languages: ANSI C, MATLAB, and VHDL
- Computer-Aided Design Software: SolidWorks (CSWA Certified), xDesign, Product Data Management
- Modeling: SolidWorks, COMSOL
- Distributed Control System: DeltaV
- Foreign languages: German (7 years in school and 6 weeks in Germany as an exchange student)

ENGINEERING PROJECTS AT DARTMOUTH COLLEGE

- Rotorcraft Trim Analysis**, Rotorcraft, group **Spring 2022**
• Wrote a MATLAB script to perform trim analysis for a mock helicopter design optimization
- Rotor Blade Dynamics**, Rotorcraft, individual **Spring 2022**
• Wrote a MATLAB script to solve for rotor inputs in order to achieve desired rotor performance
- Numerical Lifting Line Theory**, Aerodynamics, individual **Fall 2022**
• Wrote a MATLAB script to evaluate the performance of a wing with two propellers using numerical lifting line theory
- Panel Method**, Aerodynamics, individual **Fall 2022**
• Wrote a MATLAB script to calculate the angle of attack vs. coefficient of lift curve for symmetric and cambered thin airfoils
• Wrote a MATLAB script to calculate the lift generated by and the flow field around a system of symmetric thin airfoils
- Marine Chronometers**, Computer-Aided Mechanical Engineering Design, group **Spring 2020**
• Designed both a complete working marine chronometer and all its components in xDesign (CAD)
• 3D printed the marine chronometer using PLA, achieving ± 1 second precision over 10 seconds
• Voted group leader: communicated with TAs, divided work, assigned tasks, troubleshot issues, and managed overall assembly
• Created the overall design of the chronometer, building a modular aesthetically pleasing displayable product
• Earned an award for designing a chronometer with the “most risky, cutting edge, and out of the box design innovations”
- Microplate Gripper**, Engineering and Design Methodology, group **Fall 2019**
• Designed and hand built a gripping mechanism to pick up microplates from a drone with a 5mm sphere of uncertainty
• Designed two test stands to simulate drone flight to test the gripping mechanism
• Created parts in SolidWorks (CAD), modified them with Finite Element Analysis (FEA), and improved upon testing failures
• Presented progress of project to board of advisors and sponsoring company
- Robot Project**, Mechanical Design, group **Fall 2019**
• Designed a robot to pick up rings and paper balls, cross a bridge, and dump collected items into 15” tall receptacle
• Created custom parts in SolidWorks (CAD), created drawings of the parts, and manufactured the parts by hand
• Tested individual and combined systems, improving upon failures
- Atari Pong Project**, Digital Electronics, partnered **Summer 2018**
• Designed a circuit for Atari Pong, and coded the game in a Digital Hardware Language (VHDL)
• Donated the game on a Field-Programmable Gate Array to the professor, per his request, to display to prospective students
- Stirling Engine Project**, Thermodynamics, individual **Summer 2018**
• Machined, built, and optimized a Stirling Engine by hand
• Acquired experience with 2-D lathing, 3-D milling, and brazing

LEADERSHIP

- Dartmouth College Football** (Division I), Hanover, NH **August 2016 - November 2019**
• 2020 National Football Foundation College Football Hall of Fame Hampshire Honor Society inductee
• Applied rigorous time management skills to succeed as a student and an athlete, completing a five-year program in four years
• Took courses while spending 24+ hours per week practicing and training in season and 6 hours per week out of season
• 2019 Ivy League Co-Champions