

# Alexandra (Bella) Reed

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## SUMMARY

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Mechanical Engineering student with applied experience in aerodynamic design, CAD, and performance optimization through Queen's Aerospace and Formula SAE. Strong background in analysis using OpenVSP, CATIA, SolidWorks and Python. Highly collaborative team member with experience working across sub-teams, incorporating feedback, and aligning designs with project and competition requirements. Seeking an aerospace-focused internship to contribute to real-world aerodynamic design and analysis.

## EDUCATION

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**Bachelor of Applied Science in Mechanical Engineering**, GPA 3.58/4.0

**2024-2028**

*Queen's University, Kingston ON*

## RELEVANT EXPERIENCE

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**Mechanical and Human Factors Engineer**

**Jan 2025-April 2025**

*Baja SAE Steering Wheel Design Challenge*

- Designed a steering wheel for a Baja SAE vehicle while considering competition constraints, like size, rotational limits, force limits, and cost
- Used SolidWorks to analyze and design a scaled-down final model
- Designed a weighted evaluation matrix and surveys to gather stakeholder feedback to improve the design, focusing on ergonomics and usability
- Maintained frequent client communication, including meetings to communicate progress
- Considered stress concentration regions and material selection during design refinement
- Applied SolidWorks to analyze and design a scaled-down final model, assessing structural feasibility through FEA and static analysis

**Aerodynamics Analyst**

**Sept 2025-Present**

*Queens Aerospace – AIAA Design, Build, Fly, Kingston ON*

- Developed a carbon-fibre banner-towing, twin prop, fixed-wing vehicle in a team of 14
- Contributed to aerodynamic design through OpenVSP, and Queen's aerodynamic optimization code to maximize scoring metrics
- Conducted tail wing research to improve vehicle stability and performance
  - Quality control and optimization of Python code to ensure tail variables were accurate (static margin, tail volume coefficients, wing area, span, and chord)
- Communicated meshing and CFD analysis results to project lead, and assessed risks to improve feasibility

**Aerodynamics Analyst**

**Sept 2025-Present**

*Queen's Formula SAE, Kingston ON*

- Developed floor, front wing of a Formula SAE vehicle using CATIA (surface CAD modelling)
- Applied aerodynamic analysis and iterative testing in CATIA on carbon-fibre front wing design to maximize downforce, considering competition constraints, like size, material, and manufacturability
- Coordinated with project lead to evaluate design changes and implementation feasibility
- Through simulation and FEA ensured structural feasibility of design
- Tracked design iterations and integration considerations to support project timeline and vehicle assembly and testing

**Mechanical and Test Engineer**

**Sept 2024-Dec 2024**

*Water Filtration Design Challenge*

- Designed and tested a small-scale water filtration system based on real-world circumstances
- Researched gear ratio effectivity, and used SolidWorks/GD&T model a gearbox
- Conducted iterative prototyping and experimental testing to assess effectiveness
- Used quantitative testing (turbidity, flow rate, contaminant removal) to evaluate performance
- Microcontroller, Arduino code for turbidity (particulate levels) sensor, servo pumps
- Identified system and performance risks through testing, and implemented design changes to improve reliability

**Manufacturing Processes and Metal Shop Laboratory****Sep 2025-Dec 2025***Queen's University, Kingston ON*

- Hands-on experience machining metals using milling, drilling, laser cutting, waterjet cutting, and welding, considering tolerances, alongside additive manufacturing and prototyping using 3D printing

**Materials Science and Engineering Laboratory****Jan 2026-Present***Queen's University, Kingston ON*

- Conducted standardized mechanical testing (tensile, hardness, impact, creep) on metals and polymers
- Analyzed relationships between material processing, microstructure, and mechanical properties through heat treatment, cold work, and annealing experiments

**LANGUAGES**

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**English**

- Fluent

**French**

- Professional Proficiency (written and spoken)

**SKILLS**

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**CAD**

- Fusion / SolidWorks (parts, assemblies, drawings, BOMs, material lists), CATIA (surface modelling), GD&T
- Engineering drawings: orthographic, isometric, auxiliary, and section views

**Programming**

- Python, MATLAB, C / Arduino

**Manufacturing**

- Milling, Drilling, Bending, Laser cutting, waterjet cutting, and 3D printing, welding fundamentals
- Manufacturing process selection and tolerance considerations

**Project Management**

- Iterative design refinement and trade-off analysis (weighted evaluation matrix)
- Technical documentation
- Risk identification and mitigation

**RELEVANT CLASSES**

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**Materials Science Engineering****Sep 2025-Dec 2025**

- Analyzed phase diagrams, diffusion behaviour, and strengthening mechanisms in metals and alloys
- Evaluated microstructure properties, including crystallography, slip systems, and heat treatment effects

**Applied Thermodynamics****Sep 2025-Dec 2025**

- Performed energy and entropy balance analyses on closed and open systems (piston-cylinder, turbines, compressors, heat exchangers) using ideal and real gas models
- Analyzed power and propulsion cycles (Rankine, Brayton, Otto, Diesel), including efficiency calculations and aircraft gas turbine applications using thermodynamic tables

**Solid Mechanics****Sep 2025-Dec 2025**

- Calculated stresses, strains, deflections, and angles of twist for beams and shafts under axial, torsional, and bending loads

**Engineering Graphics****Sep 2024-Dec 2024**

- Produced technical drawings with GD&T, including orthographic, isometric, auxiliary, and section views with proper dimensioning standards
- Created SolidWorks parts, assemblies, and drawings, generated bills of materials and material lists for engineered components

**Manufacturing Methods****Sep 2025-Dec 2025**

- Analyzed machining, metal forming, casting, welding, and additive manufacturing processes, including force, power, and material removal rate calculations
- Applied dimensional tolerancing, surface roughness specifications, and manufacturing process selection for part design

**INTERESTS**

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Equestrian Competitions, Baking, Mentorship, Fitness, Rugby