Stefan Martin

Candidate for BASc in Mechanical Engineering (May 2020), University of Waterloo

+1 (617) 309 7194
stefan.martin@edu.uwaterloo.ca
stefan-martin.github.io/Website/
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Stefan-Martin

Technical Skills

- Designing electro-mechanical systems from concepts through to manufacturing. 4 years of CAD experience in Solidworks in a broad range of environments including product development, manufacturing automation, and hybrid rocket engines.
- Simulation and optimization for stresses and thermal performance using ANSYS and Solidworks simulation. Developing and validating models using real-life test data.
- Rapid prototyping experience in manual and CNC milling, waterjet, laser cutting, soldering, and 3D printing.
- Computer vision experience with Python and data analysis with Matlab. System automation using C++ and PLC.
- Root-cause analysis to diagnose and solve mechanical bugs by using statistical testing and precision measurements.

Experience

Inertia Engineering + Design — **Toronto**
Product Development Intern — *Sept - Dec 2019*

- Conceptual mechanical design considering all available design morphologies. Minimized part costs by considering DFM at an early stage.
- Collaborated closely with the industrial design team to develop the overall product user experience and aesthetics.
- Reviewed designs for assembly order and tolerance stack-ups, performed cost studies and implemented error-proofing features.
- Developed structural FEA models for assemblies which accurately predicted the failure locations seen in practical testing.

Formlabs — **Boston, MA**
Manufacturing Engineering — *Jan - May 2019*

- Designed, fabricated, and tested calibration systems for the printer manufacturing line. Applied GD&T to successfully control a high-precision jig and established tolerance limits using the in-house CMM.
- Developed an in-process metrology procedure to evaluate printer quality with an accuracy of 0.01° when validated against CMM data.
- Root-cause investigations for bugs in the optics and sensor calibrations. Isolated them and used statistical tests to eliminate possibilities.
- Provided on-site engineering support to optimize the resin manufacturing line. Suggested improvements to the existing process flow as well as automation options which saved up to 3 hours per pallet shipped.
- Iterated rapidly on designs making use of the waterjet, laser cutter, and Tormach CNC mill to fabricate many prototype parts from scratch.

Synaptive Medical — **Toronto**
MRI Systems Test Co-op — *Sept - Dec 2017 and May - Aug 2018*

Structural and reliability testing leading towards regulatory submission of a cryogen-free brain MRI.

- Designed and built an automated testing rig to perform lifetime testing. The rig consisted of a position-controlled linear stage run off an Arduino which continuously verified the function of the system under test, eventually performing over 20,000 test cycles.
- Learned from test failures to refine designs and meet requirements for impact loading, reliability, mechanical strength, and water ingress.
- Extensive characterization work and debugging of a patient motion system. Identified previously unknown safety risks and design flaws, established their severity and performed FMEA for the drive mechanism and safety interlocks.
- Developed and executed tests for worst-case loading, rough handling, and human factors based on relevant medical device standards.
- Took the initiative to develop a novel test tool using OpenCV for non-contact deflection analysis of support structures.

Waterloo Rocketry
Oxidizer Systems Lead — *2017–Present*

- Mentorship of a team of younger students in the mechanical design and analysis of a student-designed hybrid rocket.
- Used an axisymmetric ANSYS model to optimize the design of a lightweight tank which was successfully pressure tested to 1500psi.
- Transient thermal simulation and performance calculations for a 3D printed Inconel rocket nozzle.
- Co-developed OpenThrust, a python simulation program to model the performance of our hybrid rocket engine. Researched and implemented a thermodynamic model for our self-pressurizing oxidizer system.