Khalil Al Handawi, Ph.D
500 Avenue Des Pins Ouest
H2W 1S7, Montréal, Québec, Canada
+1 (514) 572-7367
khalil.alhandawi@mail.mcgill.ca

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Pratt & Whitney, 1000 Boul Marie, Digital Technology team
Victorin, Longueuil, Québec, Canada, J4G 1A1
Subject: Optimization Specialist - Engineering Design

Dear Hiring Manager,

I am writing to express my interest in the Product Life Cycle Configuration Analyst role within the Digital Technology team at Pratt & Whitney (P&W). I am excited about the opportunity to leverage my optimization, simulation, and modeling experience to facilitate digital thread technology and end-to-end communication across business and engineering related activities in an industry defined by massive supply chains.

I understand that as part of the role, I will be providing Product Lifecycle Management (PLM) solutions pertinent to the aeroengine industry using various enterprise systems while coordinating the activities of various disciplinary teams towards an overarching enterprise roadmap. I have relevant experience in the field of PLM, and multidisciplinary design optimization (MDO) as an instructor at McGill and as a researcher at McGill and Université de Montréal. I have 6 years of experience doing research on aerospace, aeroengine, and aviation related projects at said institutions.

During my doctoral and postdoctoral research, I worked on aeroengine design related projects, where I had to solve various engineering design and lifecycle management problems under uncertainty. I worked on providing solutions for an aeroengine component original equipment manufacturer (OEM) (GKN aerospace). I developed a parametric design platform using API scripting, commercial CAD and FEA software (NX Seimens and Abaqus CAE) to allow me to explore different design and remanufacturing configurations that are robust yet flexible to incoming change in specifications. I authored several open-source software in the form of a Python library and a web application to assess flexibility and robustness to changing specifications as part of this work.

I was also an adjunct lecturer at McGill University, teaching the engineering systems optimization course (MECH559) to engineering students. I covered various topics in optimization starting with basic theoretical foundations leading up to multidisciplinary design optimization (MDO), and derivative-free optimization which are powerful tools for negotiating complex systems engineering problems and coordinating the activities of multidisciplinary teams. I authored several notebooks in Python and Julia to help the students understand the implementation of said algorithms and solve real-world engineering problems in their projects.

I am currently a post-doctoral researcher at the department of computer science and operations research (DIRO) at the Université de Montréal as part of an industrial project with the international air transport association (IATA). My current research focuses on graph representation learning from aviation data collected over the last decade to assess the effectiveness and impact of the IATA operation safety audit (IOSA) on air travel accessibility and cooperation between airlines. AS part of this project, I am developing my business analysis skills which I feel will help me succeed in configuration analyst role at P&W. I also have experience in developing machine learning models using modern artificial intelligence tools (PyTorch, scikit-learn) to help support model development and communication in a digital industry without the need for traditional artifacts.

I believe these experiences are relevant to the role in the following ways:

- I can create parametric CAD and simulation models of various turbomachinery components given my past doctoral and postdoctoral experience working with GKN Aerospace.
- I can apply machine learning and statistical modeling given my experience in surrogate modeling, graph representation learning, and deep learning to dissemenate models and simulations across disciplinary teams.
- I can develop and validate models (both simulation-based, and statistical) given my previous modeling and simulation experience during aerospace design, healthcare, and aviation related projects.
- I can apply mathematical optimization techniques given my optimization background and experience in research and teaching to coordinate engineering activites and find compromises when conflicting objectives arise.
- I can negotiate requirments and specification with customers given my experience working with component OEMs.
- I can build business relationships and collaborations using my experience in attracting research funding for my current project with IATA.

Thank you for considering my application. I would be honored to have the opportunity to discuss my qualifications further and show you my portfolio of projects. Please feel free to contact me through any of the channels at the top of this letter.

Best regards,

Khalil Al Handawi