

Project Descriptions

1. Aeroflux (<https://aerofluxbrakes.com>)

Project Title: Research & Design of an Optimized Rotor Alloy for Aircraft Eddy Current Brake Applications

Project Description: The technology behind Aeroflux's innovative contactless brakes is based on the principle of eddy current braking. Whereas a typical friction brake decelerates an aircraft through friction generated by bringing a moving and non-moving surface (the stator and the rotor) in contact with one another, an eddy current brake does so without the need for any physical contact between the stator and the rotor. Currently, there are alloys present to perform the work but with limited success on life and consistent performance. An optimization of a current alloy or development of a new alloy will be required to provide consistent performance metrics and meet target life expectations for commercial applications.

Environmental Impact: Frictionless eddy current brakes do not wear, and no brake replacements are required. Eddy brakes produce half the lifetime CO₂ emissions of traditional friction brakes.

2. Drone Delivery Canada Corp. (<https://dronedeliverycanada.com/>)

Project Title: Care by Air – Transport of Time Critical Medical Supplies by Remotely Piloted Aircraft (Drone)

Project Description: The project is a collaboration between Drone Delivery Canada, DSV Air & Sea Inc – Toronto, McMaster University and Halton Healthcare Services Corporation. Through a pilot project, the partners will explore the viability of using remotely piloted aircraft (drones) for the delivery of isotopes and other vital medical supplies from point of production to patients in hospitals, with the aim of alleviating supply chain uncertainties in the transportation of these medical products.

Environmental Impact: Reduced CO₂ emissions from less reliance on traditional aircraft for delivery.

3. DH Aerospace Holdings/Brampton Processing (<http://www.bramptonprocessing.ca/>)

Project Title: Development of Process to Phase-Out Hexavalent Chromium Compounds from Anodizing and Plating Processes

Project Description: Brampton Processing is developing a process to phase-out toxic Hexavalent Chromium Compounds from its anodizing and plating processes. The goal of the project is to eliminate toxic hexavalent chromium emissions into the environment and replace it with less toxic trivalent chromium emissions.

Environmental Impact: Reduced toxic emissions in anodizing and plating processes for metal finishing in aircraft manufacturing. This new process will reduce occupational health risks.

4. Horizon Aircraft (Design) (<https://www.horizonaircraft.com/>)

Project Title: Engineering Design of a Hybrid Power System Novel Power Distribution Scheme

Project Description: Horizon Aircraft is developing a unique hybrid electric Vertical Takeoff and Landing (VTOL) aircraft. To take off and land vertically, the aircraft uses an array of electrically driven lifting fans located in both the main wings and the canards that draw significant power during this short phase of flight. As such, it is beneficial to have a power distribution schema wherein electrical power for vertical flight is routed from two distinct sources: (1) directly from the generator that is part of the main hybrid electric power system; and (2) from an on-board battery array.

Environmental Impact: Use of electrical and battery power in hybrid systems will reduce requirements to use emission-causing fuels.

5. Burloak Technologies Inc. (<https://www.samuel.com/burloak-technologies>)

Project Title: Development of Tungsten Additive Manufacturing & Heat Treatment Processes for Canadian Aerospace

Project Description: The development and use of tungsten powder is very nascent for laser powder bed fusion additive manufacturing (AM) technology. With recent demand for AM tungsten development within the aerospace/defence industry in Canada for purpose-driven weight balancing parts for helicopters, as well as radiation shielding for electronic components, this project will serve to create an all-Canadian solution to meet this demand. It will develop AM processes at Burloak necessary for the use of tungsten, and the tungsten powder will be sourced locally through Tekna in Canada, which is beneficial for security purposes, as other major suppliers of tungsten come from Russia and China.

Environmental Impact: Compared to conventional manufacturing methods, additive manufacturing provides a reduction in material waste, energy usage and machine emissions.

6. HEBÉ (<https://hebe.network/>)

Project Title: HEBÉ Hydrogen Storage and Management for Use as Aircraft Fuel

Project Description: HEBÉ Hydrogen is developing techniques for sealing of underground cavities so that green electrolytic hydrogen produced at pressures of up to 35 bar(g) can be safely stored for future processing. A key challenge is to find an affordable way to install underground storage in the most difficult geologies on earth. HEBÉ has partnered with Petra, as the leading trenchless boring expert, to reduce the cost of undergrounding and to make it economically viable. As part of the project, HEBÉ will use Petra's knowledge in scaled-up cost and technical models. It is anticipated that engineering and field validation works will generate intellectual property registration opportunities for HEBÉ Hydrogen. The project would demonstrate up to two methodologies in this proof-of-concept effort.

Environmental Impact: The hydrogen-storage repositories will provide 100% availability of green fuel on-site for air transportation in all remote regions.

7. Solid Ultrabattery (<https://subattery.com/>)

Project Title: Development of Lithium-ion Battery for Small Drone and UAV applications

Project Description: This project is to develop a 5 Ah lithium-ion battery for testing in a small unmanned fixed-wing drone application. Solid Ultrabattery anticipates that high energy-density lithium ion or lithium metal batteries more than 400Wh/kg will be required for aerospace and drone applications, due to high energy demands during takeoff and cruising stages of flight under inclement weather conditions. The initial battery will target 400Wh/kg as a starting point. The goal is to develop a small 5 Ah building block for a much larger battery that can be developed in the future for substantially larger flight vehicles.

Environmental Impact: Use of lithium batteries will reduce environmental emissions compared to use of traditional fuel sources.

8. OVA (<https://www.ova.ai/>)

Project Title: PhygitalX - Remote Training, Unrestricted

Project Description: PhygitalX is a software used on the latest extended-reality hardware, combining the best of virtual reality (VR) and augmented reality (AR) to remove the requirement for physical travel in training sessions for aerospace manufacturing or maintenance, while preserving the integrity of the learning experience (a feat otherwise impossible with VR-only or AR-only software). Remote training activities are no longer compromised or restricted – everyone, regardless of physical location, has holistic engagement and presence. Cost savings are significant when remote training sessions are just as good or better than in-person sessions.

Environmental Impact: Reduction of environmental emissions by making high-quality training possible without the need for travel.