

2021 Innovation Award

Precision ADM - AIR N95 Reusable Respirator



Precision ADM (PADM) is a Winnipeg-based advanced digital manufacturing company whose core business is design for manufacturing 3D metal additives of high-precision custom products for medical, aerospace, energy, and industrial customers.

When the COVID-19 pandemic hit Manitoba in 2020, certified medical device manufacturer PADM recognized an opportunity to pivot in support of healthcare providers. In response to calls from the Government of Manitoba for locally sourced personal protective equipment (PPE), PADM initiated the development of a reusable N95 respirator for frontline healthcare workers.

The PADM design team responded quickly and created a novel, reusable >95 PFE elastomeric, half-face respirator device for use in medical applications. The first of its kind, the Precision AIR™ Reusable Respirator (or Precision AIR™ for short) mask body encompasses an elastomeric face seal with two large replaceable filter cartridges. The mask design allows for a comfortable seal, without overheating or fogging eyewear, while high acoustic performance allows for clear speech, a significant feature for frontline healthcare workers in critical care situations. Large filters allow greater airflow and higher breathability than other respirators and recyclable mask components reduce environmental waste compared to disposable masks. Constructed from materials and design geometry that permits wipeable disinfection method for up to 30 uses, while adhering to strict biocompatibility and cytotoxicity requirements, the mask also features replaceable filter media, which makes the respirator much less expensive than disposable N95 masks from a life cycle cost perspective.

The compressed timeline and pressure under which the team developed a functional and attractive product in response to the COVID-19 pandemic is a monumental accomplishment. Throughout the project, objectives for design and implementation were dynamically changing. At each turn, the team responded to the client's and Health Canada's requirements, all while managing continuous manufacture, held to the ISO 13485 medical device standards, and testing and certifying to NIOSH and CAN/CSA standards. Precision AIR™ was designed to meet and exceed N95 Particle Filtration and Breathability metrics and has also been improved to meet blood penetration resistance specifications not previously integrated into other respirator products. Environmental impact was seriously considered during the design and material selection, resulting in a product that is over 75% recyclable.

The design of this product was initiated in May 2020. Health Canada released documentation on approval standards for half-face respirators in September 2020. The team acquired Health Canada approval for their design, manufacturing process, and disinfection procedures on November 2, 2020, and delivered an approved product to the Province of Manitoba (Shared Health) on November 14, less than six months from initial concept to product delivery.

In recognition of the engineering excellence demonstrated in the Precision AIR N95 Reusable Respirator, Engineers Geoscientists Manitoba is pleased to present the inaugural 2021 Innovation Award to Precision ADM.