

DHS Science and Technology Directorate

Respiratory Protection for Medical Personnel

Why it's Needed

The threat of exposure to contagious diseases for healthcare workers and first responders is usually high and tends to intensify even further during epidemic outbreaks. Protective respirators for these practitioners would help prevent infections through inhalation, the most risky route of exposure to contagious diseases. For example, during the 2009 H1N1 pandemic, several institutes around the world suggested that the N95 masks, which are regularly used by the healthcare workers, do not provide sufficient protection against infection by the virus. These findings raise the need for the development and production of an advanced protective medical respirator.

To address this need, the Department of Homeland Security Science and Technology Directorate's First Responders Group has partnered with the Technical Support Working Group within the Department of Defense's Combating Terrorism Technical Support Office to develop an ergonomic medical facemask that will protect users against biological threats and/or outbreaks of infectious diseases.

How it Works

The first step of the Respiratory Protection for Medical Personnel program included the gathering of requirements from end users and performing analysis of respirator functionality, ergonomics, and interface with other medical equipment and accessories. The Combating Terrorism Technical Support Office and the Israel Ministry of Defense jointly conducted an extensive survey among Israeli medical healthcare workers (first responders and first receivers), which led to the accumulation of informative results which drive the current program.

The current phase of development focuses on initial designs and feasibility studies of respiratory equipment designed and developed for the medical response community.



Single-use (disposable) mask prototype

The preliminary models for disposable facemasks share the following attributes:

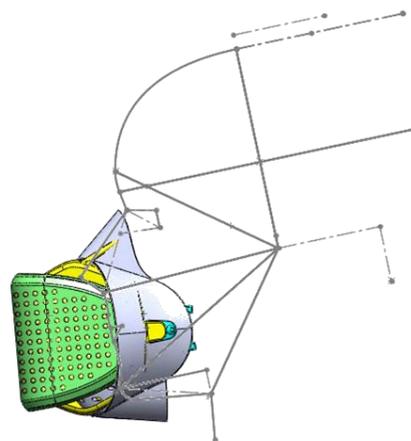
- Unique shape that provides a high level of seal and protection;
- Wide field of view;
- Ease of use/ease of breathing while in use;
- Harnessing mechanism that ensures maximum fit, while using comfortable and user-friendly materials;
- Enhanced sealing options around the nose bridge area; and,
- Exhalation valve for relief of user-generated moisture/heat.

The preliminary models for the multiple-use masks share the following attributes:

- Optimal mouth-nose piece for maximum seal and protection;
- User-friendly, comfortable harness mechanism;
- Disposable filtration unit;
- Lowest breathing resistance to allow long-term use;
- Wide field of vision; and,
- Reusable following sterilization with autoclave.

The Value

The Respiratory Protection for Medical Personnel program aims to protect healthcare workers and first responders from infection through inhalation of biological threats including both natural and man-made threats, outbreaks of infectious diseases, and bioterrorism.



Multi-use mask prototype

The Future of the Program

User trials were held during the Personal Protective Equipment 2012 Workshop in Hollywood, Florida. In addition to receiving a briefing on the project, users will be able to participate in a hands-on trial with several prototypes and then have the opportunity to help down-select.

