

Should You Use AI-Based “Smart” Respirators at Your Workplace



Respirators have been widely deployed across a wide variety of industries for many decades. But artificial intelligence is taking the respirator you know and love to an entirely different level. Here's a quick briefing on the 4 key features of “smart respirators” and whether you should use them to [improve respiratory protection](#) at your own workplace.

1. Real-Time Monitoring of Air Quality

Many smart respirators use embedded sensors that continuously monitor the air to detect specific hazardous agents and provide users real-time alerts to detected dangers. Such equipment can be used to protect workers against airborne exposure to:

- Biological agents and [pathogens](#).
- Chemicals and substances above their respective permitted exposure levels.
- Particulate matter from dust, smoke and fibers.
- Hazardous levels of heat and humidity.
- Volatile organic compounds.
- Flammable and combustive materials.

2. Data Logging & Analytics

Some smart respirators come with a device that uses a microprocessor, memory, and sensors to record and log data about exposure levels and other variables that can be stored and transferred to a computer for analysis. A related feature, log analytics, allows you to centralize and analyze the log data you generate to identify patterns and trends, potential problems, and parts of your respiratory protective program that you need to correct. For example, you can use aggregated data to determine which work areas, operations or jobs are most prone to particular kinds of respiratory injuries or illnesses.

3. Real-Time Monitoring of Supplied Air System Respirator Filter Life

Respirators that protect workers by providing a continuous supply of clean air may not offer workers adequate protection if the filter becomes saturated or wears out. But smart versions of supplied [air respirators](#) have an integrated pressure or optical sensor that tracks the filter's usage, effectiveness, and remaining life and alerts the user in real time when the filter needs to be replaced.

4. Respirator Comfort & Fit Enhancement

Ill-fitting respirators may leave gaps around the nose or face that compromise the equipment's effectiveness. Accumulation of moisture inside the respirator may also cause the device and user's eyewear to fog up. Smart respirators can eliminate these problems via adaptive fit mechanisms that ensure a secure and comfortable seal for a wide range of face sizes and shapes. For example, smart filtering facepiece respirator (SFFR) systems that integrate graphene sensors for real-time

humidity monitoring and pressure sensors and actuators to achieve fit may potentially optimize respirator useability and performance.

Takeaway: Should You Use Smart Respirators Right Now?

While smart respirators offer some exciting advantages over conventional equipment, nobody is suggesting that you need to begin deploying them right now. Like all [OHS systems based on AI](#), smart respirators are a work in progress. The technology remains in its early stages and there are no validation standards or definitive studies proving that it's going to work for you and your company. And using smart respirators that don't work will actually increase your risk of workplace injury and liability under OHS laws. Smart respirators may also be expensive and require a significant investment in hardware, software, and training.

One strategy for harnessing the benefits of AI for your [respiratory protection program](#) but at a reduced level of legal and investment risk is to try it out on an experimental basis with small-scale test projects targeting a limited number of workers or locations. Establish a plan and set of goals, along with a mechanism to gather the data you need, especially workers' feedback, to evaluate the experience of using smart respirators. Above all, exercise due diligence in selecting smart respirators and other AI products and vendors:

- Thoroughly vet the AI products you use before you deploy them for any OHS purpose.
- Ensure that the vendor performs rigorous testing and validation of its own products.
- Get the vendor to instruct and train your staff how to use the product properly.
- Include product warranties and other assurances in the vendor contract.