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Improved interface between gasmask and hood

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INTRODUCTION

Substantial (research) attention is spent on developing novel CBRN protective materials and improving existing materials. However, CBRN personal protective equipment (PPE) is roughly only as effective as its weakest component, i.e., the component with the lowest protection factor. However, extensive experience with Whole System Tests indicates that the components with the lowest protection factors are often the interfaces between different PPE components. Especially, the interface between the hood and the gasmask is a weak component. Thus, the materials of the individual equipment might be excellent, but the system will function suboptimal if leakage occurs through the interfaces. Therefore, we set out to develop a showcase of an improved interface as to explore what level of improvement potential can be gained if interfaces are improved.

METHODS

In an iterative process different virtual prototypes were developed. One of these prototypes was selected and developed into a physical prototype. This prototype met the following criteria:

- Reduces the leakage between gasmask and hood;
- Lightweight and easy to install;
- Compatible with many different combinations of gasmasks and suits;
- Could be produced with current technologies.

The selected prototype was submitted to several evaluations, of which leakage visualization, based on fluorescent aerosols, was one. After different trials with a defined exercise protocol in a fluorescent aerosol containing chamber, differences in leakage between the prototype and a standard were qualified.

FINAL PROTOTYPE

In brief, the selected prototype consisted out of a rubber annulus to be mounted on a gasmask (Figure 1) and a rubber brim as part of the hood (Figure 2).

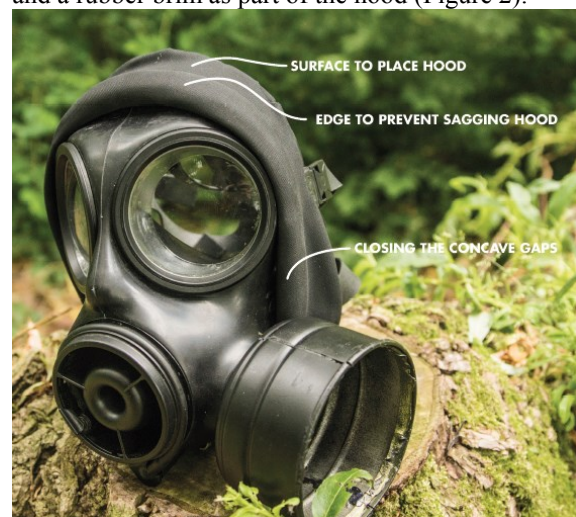


Figure 1 A commercial available gasmask with the prototype annulus.

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Figure 2 The modified gasmask and hood combined.

RESULTS AND DISCUSSION

The aerosol trials allowed for qualitative evaluations, indicating that less leakage occurred through the gasmask-hood interface (Figure 3 and 4).



Figure 3 Leakage through a typical gasmask-hood interface.



Figure 4 Leakage through the prototype gasmask-hood interface.

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