AIRSECURE- safety through filtration and detection

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SUMMARY

AIRSECURE project develops a protective solution against airborne threats for airport environment. The development efforts are based on risk analysis, and the developed technologies include high efficiency particle filtration, chemical filtration, detection of aerosol particles and hazardous chemicals

INTRODUCTION

The AIRSECURE project is a European Research (CRAFT) project, where the Commission supports the work by providing participating small companies the possibility to utilize the work of large research institutes. The AIRSECURE project will develop a system that consists of filtration and detection solutions against airborne threats at airports. The design and operation of the system is based on Risk analysis and Risk management. Thus the complete AIRSECURE system can be divided into three main component groups: risk management, filtration solutions, and detection solutions.

The fear of terrorist attacks against civil targets has increased recently. One of the most frightful scenarios is the use of airborne chemical, biological or radiological (CBR) weapons against unprotected civilians. Of particular concern are airports where such an attack may cause extensive injury and severe impact on the aviation industry and the whole economy of the European Union.

In a possible attack with CBR agents it is credible that the mechanical ventilation system will be used for agent delivery since any release into the ventilation system would be rapidly spread throughout the ventilated spaces. High efficiency filtration and real-time detection of hazardous agents are among the potential measures that can be implemented in advance to reduce the consequences of intentional CBR agent release. However, while it is possible to rapidly detect chemical compounds, it is a very challenging task to develop fast and sensitive sensors for biological agents.

In principle, high efficiency filtration can be used to reduce the risk of airborne threats delivered through mechanical ventilation systems. However, because of the high pressure

drop, large space requirements and the high initial and operating costs the present high efficiency filters are not practical solutions for existing buildings. Moreover, their installation would need costly and time-consuming renovation of the whole ventilation system. The AIRSECURE system will improve the security of passengers and workers at airports by a comprehensive approach including risk analysis for identifying the high-risk areas, novel protective filtration systems, proper air distribution, and detectors for early warnings of threat.

The main idea of the AIRSECURE solution is to combine promising new filtration technologies for removal of both biological and chemical agents with a protective filtration unit. These distributed units can be flexibly and quickly installed in the supply or exhaust air ducts of the high-risk areas. The very low flow resistance of the filter allows its installation without extensive modifications to the ventilation systems. New particle detectors will be developed to monitor the performance of the filtration system for maximum security. The optimum number and location of both particle and gas detectors and protective filtration systems are based on risk analysis. The secure air-filtration and advanced warning systems can deter the attacks, and reduce the effects of a CBR agent release by removing the toxic agents from supply air of the building.

MAIN INNOVATIONS OF AIRSECURE

The main challenges of a protective system and the ways AIRSECURE tackles these challenges are presented in Figure 1. In order to overcome preceding technological barriers, the AIRSECURE system consists of

1) Chemical detectors with centralized monitoring
- Fast evacuation
- Real-time information of the dispersion of toxic chemicals (impurities)
- Protecting large spaces (halls)

2) High efficiency filtration combined with particle detectors
- Continuous protection against bio- and other aerosols in selected premises
- Particle detectors ensure safe operation of the filters at all times and give information about abnormal particle concentration levels
- Particle detectors are monitored through the same centralized system as the chemical detectors
- Versatile chemical filters applied in areas of sensitive operations

The principle of the AIRSECURE system with the possible locations of detectors is shown in Figure 2. Among crowded populations, airborne transmission predominates the spread of several diseases in enclosed spaces. Thanks to the improved filtration, the AIRSECURE system also provides the added benefit of minimizing the transmission of natural diseases through the ventilation system.

In the presentation results of the laboratory tests of the developed components and preliminary field tests will be presented.

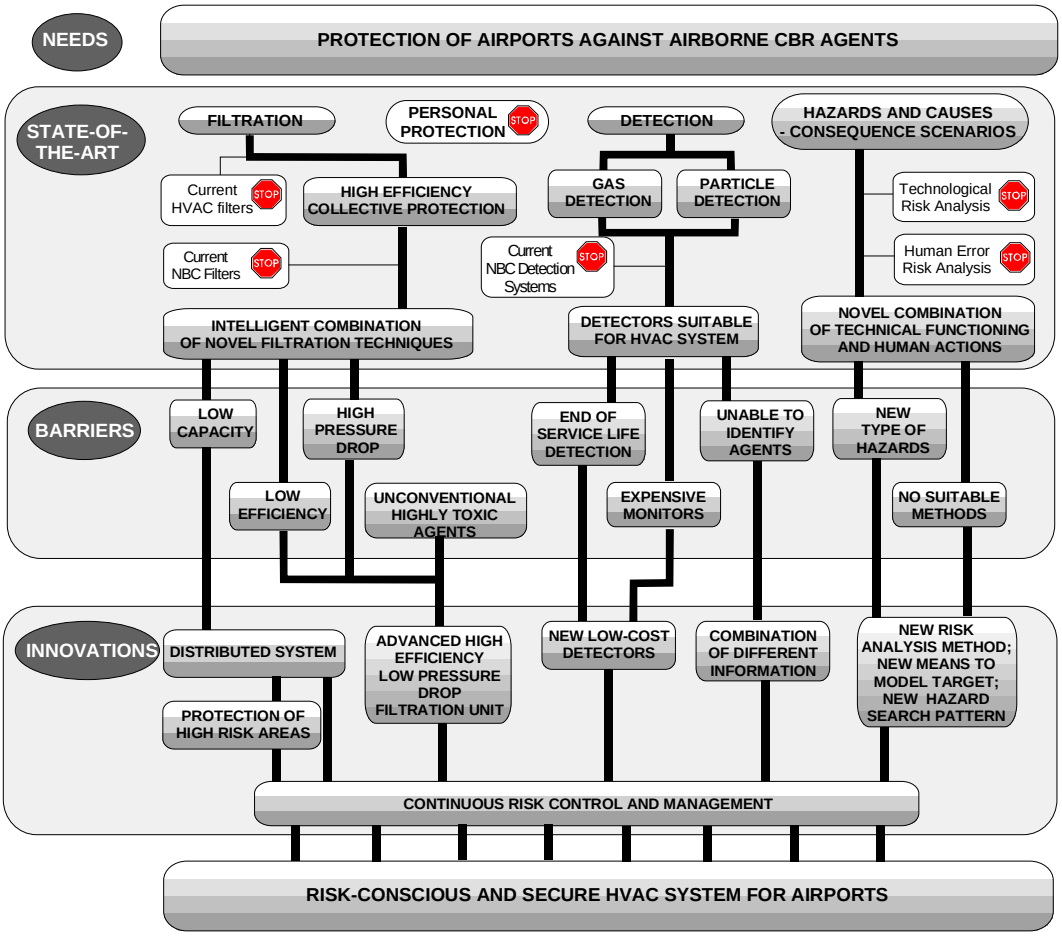

Figure 1: Technology map for risk-based detection and protective filtration system.

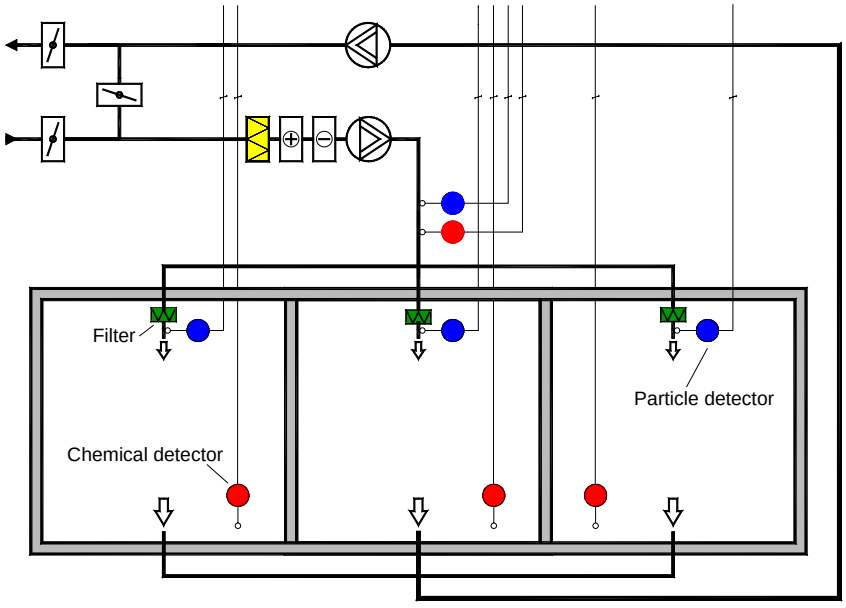

Figure 2. Principle of the AIRSECURE system. The exact location of components is based on the risk analysis and required protection levels.

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