

# Focus on IFA's work

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## Combinations of PPE – falling safety, respiratory protection and protective headwear

### Problem

Due to the working conditions in many industries, other personal protective equipment (PPE) is used alongside equipment to protect against falls. The mine and gas protection squads in the mining industry are one example of jobs that require the simultaneous use of respiratory protection, protective headwear and personal protective equipment against falls.

It is an open question whether the functionality of respiratory and head protective gear remains intact after an individual has fallen in a protective harness. There are also indications that respiratory protection equipment can cause injury to individuals due to uncontrolled movement in the process of catching them after they have fallen.

### Activities

Case studies were conducted with a dummy that was equipped with different combinations of respiratory, head and fall protective gear. Heavy respiratory protection (compressed air breathing apparatus) and two different masks with dry air filters were used. The fall distance in the tests was around 4 metres. The falling conditions were varied for the dummy, which included the type of connection to the harness, the body posture and the direction of fall. The fall procedure was recorded with video cameras and the acceleration rates were measured to assess the potential for internal injuries.



A dummy protected in a fall arrest system. The breathing mask was pushed up by the front harness hook such that the seating no longer provided an airtight seal. This also indicates the risk of injury to the face.

After the fall tests, the personal protective equipment combinations were inspected to determine their functioning and the risk of injury to a person wearing such loads was determined.

## Results and Application

In the fall procedure using a dummy hooked at the front hook eye on the harness, there was often sporadic contact between the respiratory mask and the hook eye that pushed the mask out of place so that it was no longer properly seated. Pushing the mask aside in this manner could also lead to face or head injuries. The harness system against falls pushed the respiratory belt aside when catching the fall victim so that the compressed air breathing device was pushed against the body or especially against the head. The helmet was often pushed so violently by the rear harness hooks or by its own inertia that the mask and filter were partly severely damaged. This also created a risk of injury to the head and neck region. The combinations of protective equipment tested here indicated basic design flaws that need to be corrected. Work is currently underway at finding practicable improvements.

## Area of Application

Construction and mining industries

## Expert Assistance

IFA, Division 5: Accident prevention – Product safety

Expert Committee personal protective equipment of the DGUV, Dortmund

German Social Accident Insurance Institution for the raw materials and chemical industry, Bochum

## Literature Requests

IFA, Central Division