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Focus on IFA's work

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Crushing forces of power operated doors

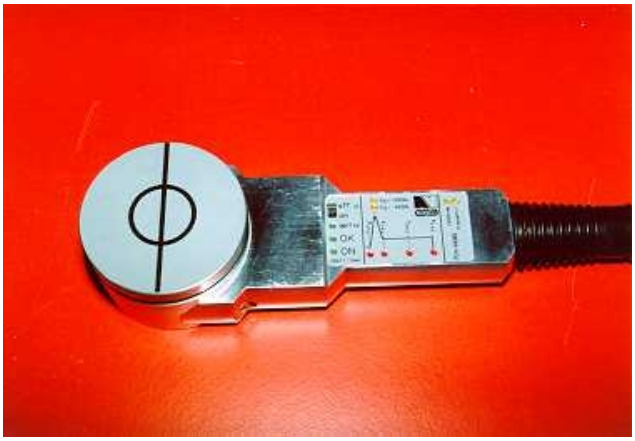
Problem

Bruises, contusions and compression injuries are by far the most common occupational accidents caused by doors. Fingers and hands are most commonly affected.

If a person is hit by a closing or opening door, dynamic forces arise resulting from the motion of the door alongside the static forces in play. If the crushing forces remain within certain limits, additional often high-cost measures to make these potential sources of crushing injuries safer are rendered unnecessary. The still applicable national regulations and guidelines name a threshold force value here of 150 N for static force. No threshold values have yet been named for dynamic forces, which can be considerably greater than the static forces. It was thus necessary to develop a procedure for measuring static and dynamic forces and to evaluate the measured values.

Activities

A measuring device was developed to measure the chronological pattern of crushing forces exhibited by power operated doors. In order to obtain realistic values for the forces involved, the stiffness of the device was adapted to represent the stiffness of fingers and hands as the body parts most affected by these doors. In addition, sensory tests on test subjects suggested threshold values for dynamic crushing forces.



Device for measuring crushing forces

Results and Application

The device for measuring closing forces can be used in the design and development of power operated doors. On the basis of the graphs of crushing forces over time, the effectiveness of technical measures for reducing these forces can be directly observed. A simple and hence less expensive variant of the device – developed in the meantime – allows measurements to be conducted on site, eg: to test the crushing forces after the door is installed and to adjust the settings on the door mechanism as needed.

The measurement principle along with the threshold values for dynamic forces produced in this study were introduced into the European standards setting process.

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Area of Application

Construction industry and the construction trades (firms that manufacture and/or install power operated door systems)

Additional Information

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Expert Assistance

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Expert Committee trade and logistics of the DGUV, Subject structural objects, Bonn

Literature Requests

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