IFA
Institut für Arbeitsschutz der
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Focus on IFA's work

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# Standard bus systems in safety technology

## Problem

Many types of machinery and plant equipment now commonly use electronic bus systems to transmit data and signals safely among the various control devices. Two-wire circuits are normally used within these and are shared by all the sensors, servo components and control systems. Taken together, the bus system is then equivalent to the "nervous system" of the controls, whose "intelligence" is spread out over the entire machine or plant.

Distributed intelligence in safety technology today still means individual wiring of the safety components or safety equipment. This can be viewed as a disadvantage because each signal is transmitted over a separate line. This results in a considerable limit on flexibility when installing and starting the machine, when troubleshooting and when performing diagnostics. Modern production facilities, such as those of the automotive industry, have a greater need for a quick reconfiguration of production cells so that the wiring should be done especially rapidly and incomplex.

These problems can be substantially reduced by bus systems, but then the question of safety also comes to rely on the correct functioning of the bus electronics. Yet standard bus systems and their electronics cannot be considered as safe. Before such transmission systems can be used for safety technologies, a level of safety that is comparable to that of conventional systems must first be achieved.

Examining a safety bus system

## Activities

IFA has conducted core research in this area on the initiative of various Expert Committees of the DGUV. The most important bus systems were examined to find out how useful they could be in safety technology as IFA cooperated with the vast majority of manufacturers to work out measures for improved efficiency of systems.

Aside from the qualitative study of the measures, mathematical models were used to quantify the required measures in terms of their inherent risks. For instance, depending on the bus architecture, the number of data transmission errors per hour can be estimated mathematically and then associated with the necessary level of safety.

## Results and Application

Under the auspices of and in cooperation with IFA, most bus system manufacturers drafted a common set of principles for testing and certifying “bus systems for transmitting safety-relevant data”. With publication of the test principles, the safety concepts of a number of bus systems such as AS-Interface, CANopen, DeviceNet, ESALAN, Interbus and Profibus were assessed at the IFA. A number of certifications were also performed based upon the results.

The results were taken into account during international standardization work on IEC 61784-3. The second edition of the test principles has since been published. Further technical discussion is taking place on the international standardization committee.

## Area of Application

Control manufacturers, machine manufacturers and testing bodies

## Additional Information


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## Expert Assistance

IFA, Division 5: Accident prevention – Product safety

Expert Committee energy, textile, electrical and media products sector of the DGUV, Cologne

## Literature Requests

IFA, Central Division

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