

# Focus on BGIA's work

Institut für Arbeitsschutz der Deutschen Gesetzlichen Unfallversicherung

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## Transponder technology for the protection of persons

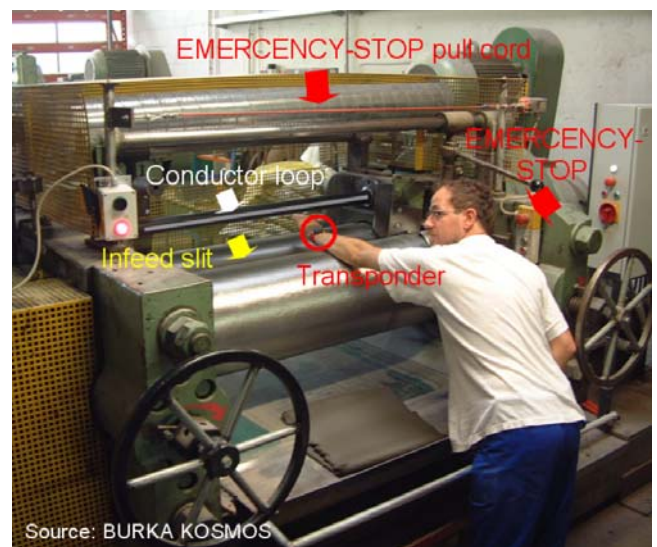
### Problem

Numerous examples exist of machinery and plant upon which it has been possible up to now to safeguard the danger zones only unsatisfactorily, if at all, by means of conventional protective devices. These devices, such as laser scanners, light barriers or light curtains, are unsuitable when they detect the product rather than a person and consequently (and repeatedly) interrupt the production process. Protective devices which are capable of distinguishing between human beings and products or tools, in some cases under adverse ambient conditions, continue to be more wish than reality.

Machinery and installations are encountered in practice on which the process requires the continual transport of products, often heterogeneous in form, but on which at the same time sporadic and in some cases regular intervention in danger zones is necessary. Scope exists here for the use of transponder technology (wireless communication) for the protection of persons. In this case, an electrical conductor routed in the form of a loop generates a precisely definable magnetic protective field. A transponder with a spherical directional characteristic unambiguously marks the person to be protected or their body parts. A wireless command then halts the hazardous movement of the machine or plant as soon as the marked body parts are located within the protective field. The new technology was to be tested for its suitability for use in practice, and its use thus promoted.

### Activities

Transponder systems employing magnetic sensing fields were installed for trial purposes on a



Safeguarding of danger zones: infeed slit on a calendering machine with horizontal roller arrangement in the abrasive materials industry (during trialling)

number of machines and installations presenting a high hazard potential to employees, complex geometry, and extreme ambient conditions (temperature, mechanical stress, soiling).

It was found that conductors for the generation of sensing fields with precisely defined field boundaries and an adequate depth could be installed with a high level of robustness. Other studies revealed that battery-operated transponders now present decisive safety advantages.

In the past, transponder technology has been used successfully in supplementary protective devices on channel-baling presses and, for example, on wood chippers. The figure shows a calendering machine the infeed slit of which is encompassed by a magnetic sensing field. The field is generated by the conductor loop above the rear roller. The employees wear the transponders like wristwatches on both wrists.

Both tightly constrained and very large sensing fields can be achieved flexibly. Multiple conductor loops could also be operated at different frequencies in order to enable persons to be located on a large plant site. If the loops are laid in a meandering form, a highly uniform field-strength distribution can be achieved. In this way, areas can be safeguarded without detection gaps, and the sensing field cannot be defeated by reaching over or around it or stepping behind.

The transponder technology merely provides suitable sensors. Whether they are able to bring a machine or installation to a halt in the shortest possible time is dependent upon the control technology employed, including the drive technology, and the physical properties of the industrial process.

### Results and Application

The BGIA recommends the use of transponder systems in the first instance as a supplement to existing protective devices. They should always be used in conjunction with design and organizational measures, in order to promote user acceptance of the transponders and a willingness to wear them, and thereby to reduce the system's dependence upon these factors.

In liaison with the responsible accident insurance institutions, the BGIA is currently revising test recommendations for the use of transponder systems as supplementary protective devices on baling presses and wood-chippers. Further trials of the technology in other industrial sectors are anticipated. The manufacturers have been encouraged to integrate additional convenience and safety functionality in order to increase acceptance among users. All parties concerned, down to and including the staff in the plants, should be involved in considering how occupational safety and health can be improved by this technology.

In the view of experts, further potential scope for application exists. The BGIA may be consulted for this purpose.

### Area of Application

Small and medium-sized enterprises, manufacturers and operators of safety components and machines, test bodies, prevention departments of the accident insurance institutions

### Additional Information

- Finkenzeller, K.: RFID-Handbuch, Grundlagen und praktische Anwendungen induktiver Funkanlagen, Transponder und kontaktloser Chipkarten. 3<sup>rd</sup> updated and extended edition. Carl Hanser, Munich 2002
- Rovedo, F.: Protection against injury on channel baling presses. KANBrief (2006) No. 4, p. 15, [www.kan.de/uploads/tx\\_kekandocs/2006-4\\_Kanalpressen-e.pdf](http://www.kan.de/uploads/tx_kekandocs/2006-4_Kanalpressen-e.pdf)

### Expert Assistance:

BGIA, Division 5: Accident prevention – Product safety

### Literature Requests:

BGIA, Central Division

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