



Prevent defeating by using appropriate modes of operation and ensuring sufficient overview over the process

Problem

Where machines are frequently set up using capital-intensive workpieces and tools, the operator wants to „play it safe“. Often, machines fail to offer the setter enough possibilities to carry out these setup operations such that he is „sure“ to run the processes to be configured in a stable manner and without unexpected damage. This tempts users to select inappropriate modes of operation and defeat protective devices in order to achieve the desired process reliability – at the expense of their own safety.

Measures

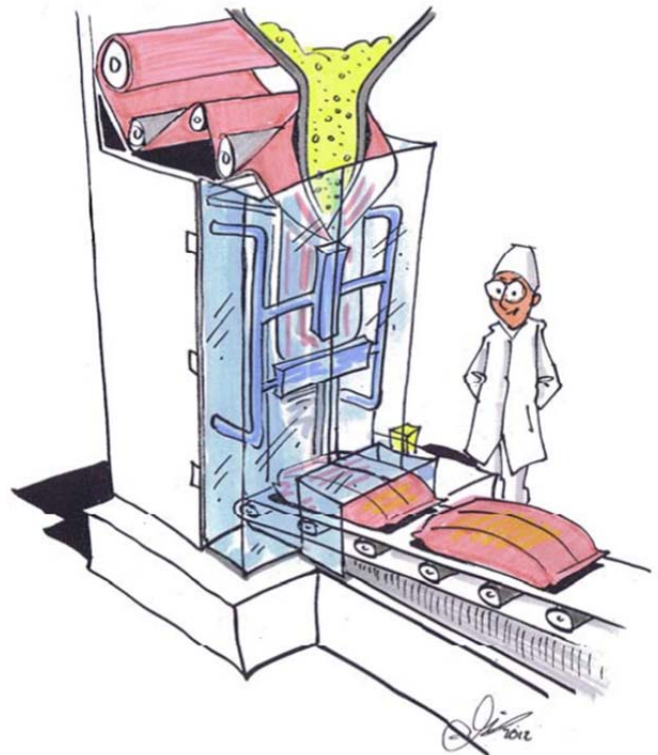
The operator gets the possibility to configure the process he needs with direct observability.

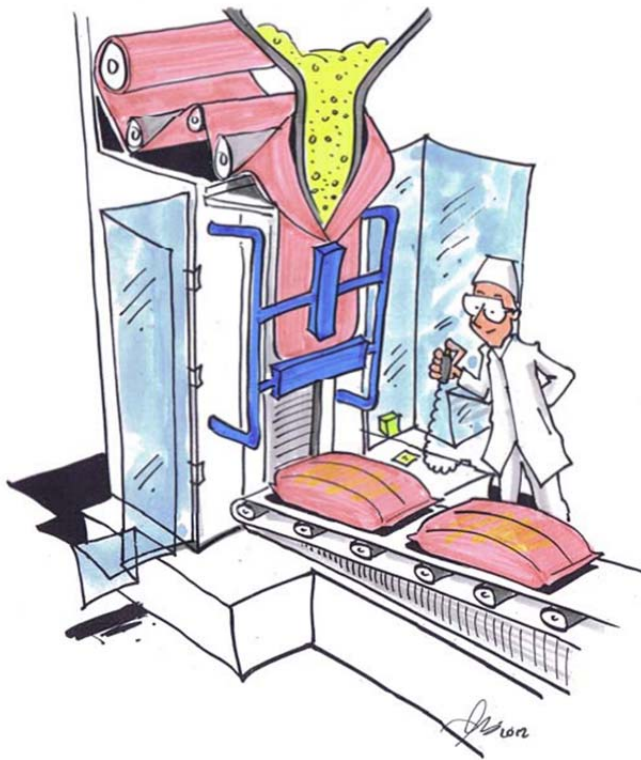
Positive examples

1. Transparent movable guards (interlocked with the drive) fitted to food processing and packaging machines

In the food processing industry, food processing and packaging machines are frequently equipped with transparent guards which allow the operator to observe the process. Mirrors or cameras installed in the interior of the machine enhance visibility of the process even further.

Where, e.g. for setup operations or trouble-shooting, access to the machine with the guards open is still necessary, compensation measures are to be taken.





As a rule, these consist of a safe inching mode, with safely limited speed or force where the process allows this.

Often it is possible to design the guards at manual intervention points such that access is possible. However, the accessible danger points are then to be safeguarded individually; in this case, it shall not be possible to reach the other danger points.

A mode of operation permitting the machine to be operated with the guards open and without any compensation measures such as e.g. safe inching mode taken is not necessary and not permitted in the food processing industry.

2. Modes of operation on machine tools

Setup operations are carried out with the guards open; they shall always be performed using an enabling device, with maximum admissible speeds being observed and minimum requirements relating to braking capacity fulfilled. In the event of a hazard occurring, this device allows the hazardous movement to be stopped ergonomically and very quickly. All movements that are not required for setup are safely stopped. Only appropriately qualified personnel are authorized to carry out setup operations.



Where, due to technological reasons, higher speeds are required for setup, other technical measures shall be additionally provided in the interior of the machine to adequately protect the operator against hazards (normally of mechanical nature). Here, additional guards as well as defined locations are employed from which the setup operation can be observed in an ergonomically practical way. Cameras and similar equipment shall be installed to allow an overview over inaccessible areas.

Where the whole manufacturing process has to be observed, the protective measures for setup at high speeds shall be effective; furthermore, care shall be taken to ensure that both the internal and external protective devices are dimensioned to cope with the now higher energies. As special attention has to be paid to the correct organization of the setup operation, only persons who have been authorized in writing should be allowed to carry out the above-mentioned works. Via access control systems, these employees “identify” themselves to the machine. In practice, RFID systems are employed as access control; if the machine does not receive the correct access chip, it will block the respective mode of operation.

In normative terms, the above procedure is treated in DIN EN ISO 11161 „Integrated manufacturing systems“ as well as in the standards dealing with machining centres (DIN EN 12417) and milling machines (DIN EN 13128).

Standards EN 12417 and EN 13128 describe exceptions for the obligation to use enabling devices. However, these apply only if, a.o.

- the market does not offer any technical measures to meet the obligation to observe using an enabling device
- additional technical protective measures have been incorporated into the machine that are adapted to this case of application.

This clearly restricts the setting mode without enabling device to an absolute exception and, as a rule, it is not necessary.

Further literature:

- [1] Directive 2006/42/EC of the European Parliament and of the Council of 17 May 2006 on machinery, and amending Directive 95/16/EG (recast) with Corrigendum to Directive 2006/42/EC of the European Parliament and of the Council of 17 May 2006 on machinery, and amending Directive 95/16/EC
<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:157:0024:0086:EN:PDF>
<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2007:076:0035:0035:EN:PDF>
- [2] Hauke, M. et al: Funktionale Sicherheit von Maschinensteuerungen. BGIA-Report 2/2008. Hrsg.: Deutsche Gesetzliche Unfallversicherung (DGUV), Sankt Augustin 2008 <http://www.dguv.de/dguv/ifa/Publikationen/Reports-Download/BGIA-Reports-2007-bis-2008/BGIA-Report-2-2008/index.jsp>
- [3] Apfeld, R., Köhler, B., Zilligen, H.: Sichere Antriebssteuerungen mit Frequenzumrichtern. IFA Report 7/2013. Hrsg.: Deutsche Gesetzliche Unfallversicherung (DGUV), Sankt Augustin 2013 <http://www.dguv.de/ifa/Publikationen/Reports-Download/Reports-2013/IFA-Report-7-2013/index.jsp>