



Preventing defeat of protective equipment by providing easy-to-use protective devices - Drawing-in point on rollers -

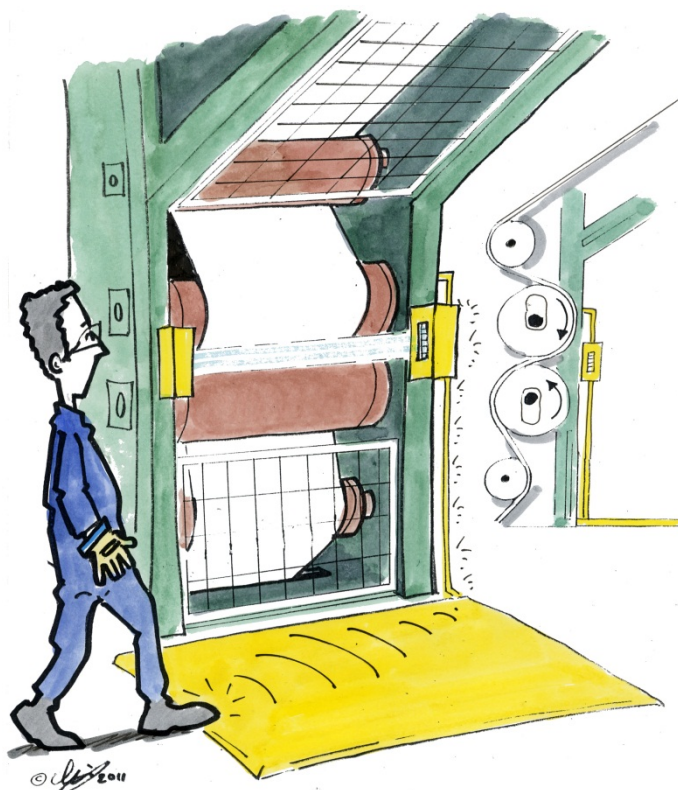
Problem:

Rollers rotating in opposite directions present the hazard of drawing in parts of the human body. Therefore, the drawing-in point must be appropriately safeguarded. Some standards provide fixed guards for this purpose. However, these often are contradictory to the users' production-related necessities and operational constraints, respectively. Particularly starting up the facility is considerably more difficult due to these guards. Furthermore, it must be possible to manually remove caked material on the rollers while the machine is running.

Measures:

Protective equipment automatically tripped by persons approaching the danger zone ensures a good safeguarding, while preventing machine operation from being hindered. A combination of pressure-sensitive mat and light barrier, or cover in front of the drawing-in point has shown to be a well-tryed solution. For other modes of operation, such as setting-up and starting, other protective measures are required (e.g. inching, acknowledgment, movements possible only with rollers apart).

Example: Safeguarding the drawing-in point on rotating rollers



a.) Guarding by light barriers

This safety concept provides a light barrier positioned as close as possible in front of the drawing-in point. It may be

- permanently active, or
- activated only by a pressure-sensitive floor (fig. 1)

Fig. 1: Light barrier tripped by a person stepping on the pressure-sensitive floor

The latter solution should be given preference as it avoids, to a large extent, unintended false tripping of the safety function by the material being processed. The light barrier must initiate a fast parting movement of the rollers (see fig. 2).



Fig. 2: The rollers are moved apart when the light beam is interrupted

As production speeds are high, it is not possible to decelerate the rollers quickly. In order to avoid an erroneous tripping of the safety function by inadvertently reaching into the light barrier, a visible marking located close to the light barrier should indicate the detection zone (e.g. by laser beam marking on the roller circumference). Where severe material evaporation occurs, light barriers should not be used as this might cause erroneous tripping as well. Here, solution b.) with a movable cover should be preferred.

b.) Safeguarding with pressure-sensitive floor and power-operated cover

The basic element of this protective concept is a movable cover which, when swivelled away, does not hinder the production process (e.g. avoiding heat build-up) and allows a good view to the process. When a person steps on the pressure-sensitive floor, the cover (guard) is automatically swivelled into position in front of the drawing-in point (see fig. 3).

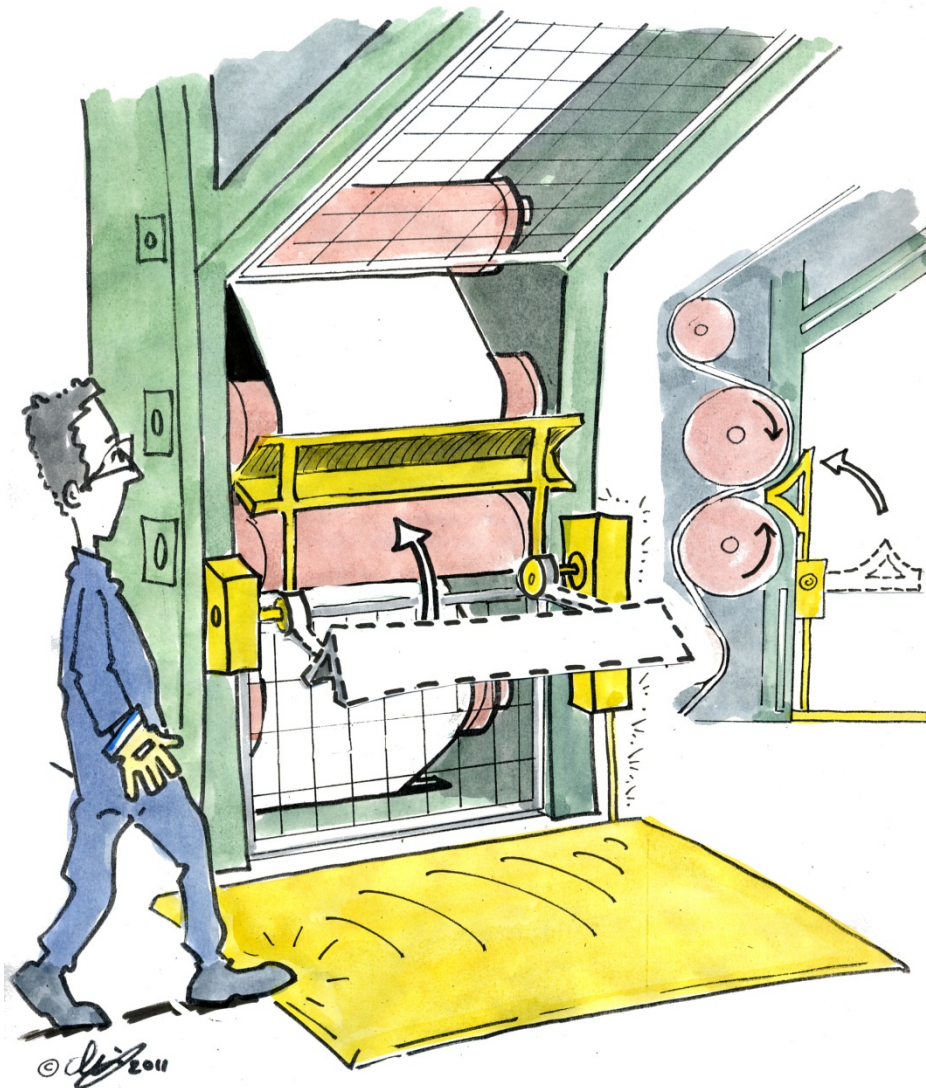


Fig. 3: When a person steps on the pressure-sensitive floor, the cover is swivelled into position in front of the drawing-in point

This allows safe cleaning of the rollers. In case of broad calenders, the mechanical strength of the cover may be critical. The cover must be safely swivelled into position, e.g. by using force limiting measures.