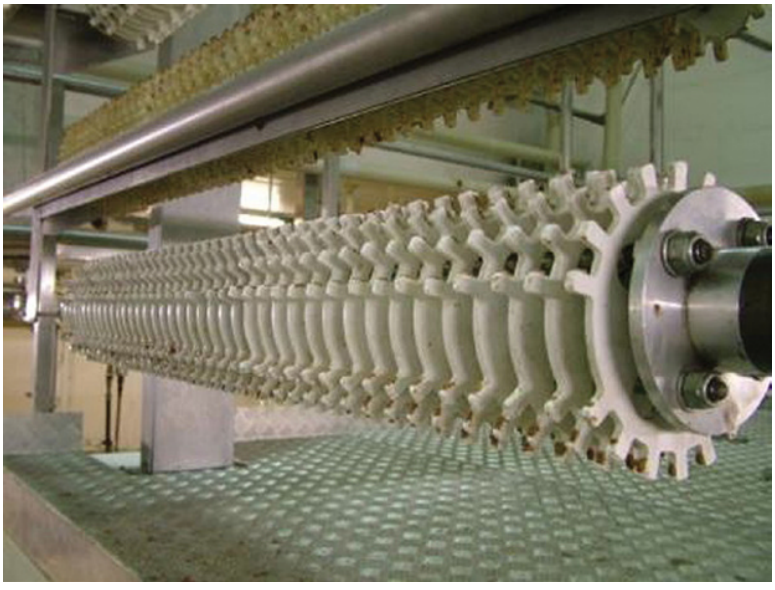

Figure 14.10 Sticker detector.

14.2.12 Troubleshooting demoulding problems

Poor demoulding should be tackled at once, as stickers can go back round the plant and cause further trouble. Check all the plant operations that might affect contraction in a sequential manner confirming that each is working within its defined limits. The following hints can help troubleshooting.

14.2.12.1 Twister and hammer

Incorrect setting or functioning of the twister and/or hammer at the end of the cooler can cause poor demoulding. Using hammers on the back of the mould at a high setting can shorten the mould life. Hammers can be replaced in some cases by vibrators which are quieter and use less energy (can be timed to coincide with a filled mould being present in the demould area).

14.2.12.2 Static

The product can be held in place by electrostatic charge, which is more of a problem with light or small units than moulded bars. A static discharge device can help in releasing the chocolate from the mould.

14.2.12.3 Mould condition

Mould surfaces will roughen with use and washing, particularly if the products being moulded contain abrasive inclusions or centres such as wafer or grated hard boiled sugar. A lip can also form at the edge of the cavities if a scraper or knife is of the wrong material or if too much pressure is being applied.

14.2.12.4 Proportions

Very thin shells can result in less contraction, making good temper and optimised cooling essential to give good demoulding. Poor mixing with other ingredients can also result in increased sticking (see Section 14.2.5).

14.2.12.5 Contraction

As cocoa butter crystallises, its volume decreases slightly, resulting in contraction of items made using it. The presence of butterfat, or other soft fats or oils (e.g. nut oils) will reduce contraction.

To obtain good release from the mould, the degree of contraction needs to be maximised. This requires the degree of temper, the mould conditioning temperature and the rate of cooling to be optimised. Not enough cooling as well as excessive cooling will both result in improper crystallisation and insufficient contraction. Compounds made using vegetable fats rely much more on contraction mainly due to cooling, but the choice of the correct fat system will affect release. Lauric fat systems, for example, require very sharp initial cooling to get sufficient contraction to release.

Typical values for contraction of chocolate:

Milk	0.3%
Dark	0.8%
Compound fats	<0.6%

For filled items, under-tempering will result in more contraction and give better de-moulding. Better flow from under-tempered masse (lower viscosity) helps distribution within the mould and will result in a more uniform wall thickness. Too warm centre in a filled item can also de-temper the chocolate coating and affect contraction.

14.2.12.6 Humidity

Another cause of poor demoulding may be residual wetness due to either improper drying after washing or condensation that collects in cavities. The relative humidity (RH) during mould conditioning has a subsequent effect on the demoulding step (Keijbets *et al.*, 2010). The adhesion of the chocolate to the mould increases initially with increasing RH. At approximately 25% RH the adhesion force stabilises to a constant plateau until about 50% RH. Above 50% RH the adhesion force decreases sharply, but the high humidity present at the mould–chocolate interface can have a detrimental effect on the gloss of the chocolate (i.e. may dissolve some of the sugar crystals and give rise to sugar bloom). Therefore, minimum surface adhesion (best demoulding) and maximum chocolate quality (best gloss) is achieved at <25% RH. In an industrial environment, however, such conditions may be difficult to achieve and it will depend on the particular circumstances of each line. The pragmatic approach is to achieve as much control over the process as possible to minimise deterioration in product quality. High humidity is generally accepted to cause product deterioration