

A German manufacturer of high-speed tray sortation systems goes to great lengths to ensure the reliability of its machines. The sensors used to detect the contents of the trays as they speed by on the conveyor have a critical role to play, so the company was keen to test the market in its bid to choose the right components

Detection in the *fast lane*

Beumer Maschinenfabrik is a 75 year old, family owned firm, based near Hannover in Northern Germany that specialises in the design and manufacture of tray sortation machines. These efficient, high-speed sorting and distribution systems are commonly seen in parcel handling facilities, at airports or retail distribution centres. For several decades tray sortation systems have also been called tilt tray sorters, because the systems use individual carriages on a continuous closed loop, with a tilting tray mounted on each carriage.

Beumer's high-speed sorters use a conveyor running at more than two metres per second, to carry these trays with their contents. A control system tracks the tray until it reaches the correct output portal, where the tilt tray mechanism deposits the contents sideways towards the target chute - a mailbag, for example, if the contents happens to be a letter sorted for a particular destination.

Detecting whether a tray is occupied or not, requires a powerful and reliable sensor arrangement. In fact Beumer uses four sensors mounted side by side above the conveyor to check if each tray is occupied, even by small goods down to a minimum volume of 50 x 50mm. Detecting small items poses a challenge to the sensor arrangement because the speed of the conveyor means that small objects interrupt the sensor light beam only for a very short time - around three tenths of a second, in fact.

The targets are reflective strips integrated into the tilt trays, and these present another challenge to the sensors because they are covered with perspex for their protection. In selection trials Beumer tested sensors and reflectors from various suppliers using perspex sheet that was abraded with sandpaper to simulate wear. Leuze electronic's PRK 25B retro-reflective photoelectric sensor performed best in these trials, and was subsequently chosen.



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An example of a tilt tray sorter used to divert packages and letters into specific mailbags



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The sensors face yet another challenge from a pattern of ridges on the tilt tray, which are needed to prevent the static charging of goods wrapped in plastic film. This could cause the item to adhere momentarily to the tray and not tip into the correct output chute as it speeds by. The size and power of the light spot projected by the PRK 25B prevent unintended switching, and thus overcome any potential

problem posed by the ridges.

Additional features such as 'brightVision' make Leuze's sensors easier and faster to align, which is especially important to Beumer, because depending on the sortation system's size, it can use several hundred sensors.

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