# Free sensors in vertical form fill seal (vffs) packaging machines essay sample

Design, Photography

One end application of sensors is in the food manufacturing industry. Modern packaging of consumer foods frequently uses Vertical Form Fill Seal (VFFS) packaging technology. A continuous flexible film with registration marks is used as packaging material. The packaging film is pulled through a collared tube and then filled with the product. These are the vertical forming and filling steps. It is then sealed and cut at the same time to produce finished goods in pouches. This is the sealing step.

Proper sequencing is needed in this application. This is facilitated with the use of sensors. A combination of inductive and photo sensors are utilized in this packaging machine setup. There are several VFFS setups offered by different packaging companies. One example of a VFFS machine is the FW 7700 by Fuji Machinery Inc. of Japan. It is commonly setup in pairs (twin-tube) and is linked to an Ishida Multihead weigher. It has a simple graphical user interface which incorporates easy to understand-setting of control parameters such as set speed, fill delay, seal delay, etc. FW 7700 machines run at 50-60 pouch per minute rated capacity.

Two of the most important sensors used in a Fuji FW 7700 machine are the inductive and photo sensors. Specifically, the sensors used in this application are the Omron #TL-W5MCI flat inductive proximity sensor, and the Sun-X #LX-23 photo-eye beam sensor.

The Omron inductive sensor (TL-W5MCI) measures electromagnetic activity. It has an oscillator which generates a magnetic field. When a metallic target is sensed, the induced current form an additional load to stop the oscillation. In the packaging application discussed, it is placed at the back such that it detects the Aluminum dancing roller being pulled from time to time. Once, it

senses the metallic dancing roller, it then sends signal to the servomotor and vacuum pump to rotate the drawdown belt with corresponding vacuum pressure to move the film down.

Another sensor used is the Sun-X photo-eye beam sensor (LX-23) which measures light contrast. It is placed just before the forming collar. It combines a light source and a light receiver. Detection happens when the light beam is broken (Dark-On). The light beam is broken when the registration mark of the packaging material is detected. This registration mark is placed at equal intervals along the film, and determines the pouch length of the product. When this mark is detected, the servomotor of the drawdown belt stops to allow the cutting and sealing by the sealing jaws.

These sensors are quite expensive. The Omron TL-W5MCI proximity sensor costs 35 USD while the Sun-X LX23 photosensor costs 265 USD. The prices are based on true inventory cost of a certain food manufacturing companys. In terms of price comparison, photosensors are more expensive than inductive sensors due to the higher accuracy needed in registration mark detecting.

The use of inductive and photosensors is a growing area for both food manufacturers and sensor manufacturers. For the food manufacturing industry: as higher population demand for quality consumer foods, capacity and efficiency will play a big role. As much as possible, production line downtimes need to be limited. This is the area where sensor manufacturers need to take charge. They need to take account quality in the design and manufacture of sensors. Product reliability is crucial in this application.

# Reference:

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