Random Timing Application Highlight

Random Timing Infeed

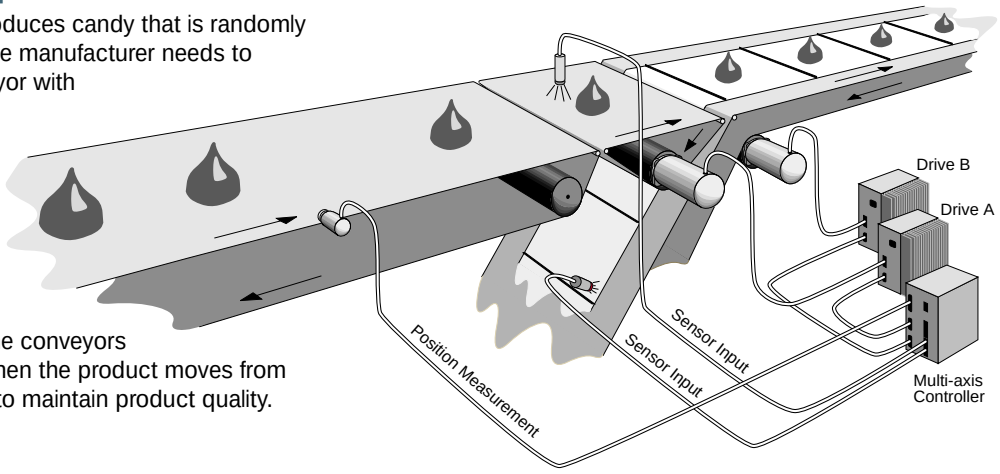
Random timing infeed refers to operations in which a product, at a particular point in a process, enters a conveyor with non-repeatable, or random timing, yet must leave the conveyor with perfect spacing. Typically, there is an infeed conveyor on which products are randomly spaced, a short conveyor on which the correction is made, and an exit conveyor with dividers on which the product must be placed. Line speed is critical when the product moves from one conveyor to another.

Two sensors, one located on the junction between the infeed conveyor and correction conveyor, and the other sensor on the exit conveyor must have a fixed phase relationship. The first sensor senses the product and the other sensor detects the locations of the dividers. The phase relationship is simply the distance the correction conveyor has traveled between the activation of the sensor on the exit conveyor and the activation of the product sensor.

The goal of the correction conveyor is to correct for variations in this phase relationship. Both the correction and exit conveyors are normally moving, or slaving, at a 1:1 relationship with the infeed conveyor, or master axis. When the product enters the correction conveyor, the 6000 controller can determine how much correction is needed by looking a the phase relationship between sensors. After the product has completely left the infeed conveyor, the 6000 controller adds an advance to the correction conveyor so that the calculated adjustment is made in time for the product to be placed on the exit conveyor. The controller can also be programmed to adapt to changes in mechanical alignment of the conveyors.

Random Timing Infeed Application: Problem

A food products manufacturer produces candy that is randomly spaced on an infeed conveyor. The manufacturer needs to place this candy on an exit conveyor with perfect spacing so that the candy can be wrapped and packaged accurately. The candy must be transferred and spaced properly without stopping the conveyor so that the throughput of the process can be maximized. The line speed of the infeed conveyor fluctuates, but the line speed of the conveyors must match each other exactly when the product moves from one conveyor to another in order to maintain product quality.



I/O Requirements

- 2 high-speed sensor inputs
- encoder feedback from the infeed conveyor

Solution

The solution of this application uses the Following and Random Timing Infeed functionality of the 6000 controller to control a short correction conveyor as well as the exit conveyor onto which the product is placed. Two sensors, one located on the junction between the infeed conveyor and the correction conveyor and the other on the exit conveyor, are placed with a fixed phase relationship. The first sensor recognizes the product and the other sensor detects the locations of the dividers between which the product must be placed. The purpose of the correction conveyor is to correct for variations in this phase relationship. The phase relationship is simply the distance the correction conveyor has traveled between activation of the exit conveyor sensor and activation of the product sensor. Both the correction and exit conveyors are moving, or slaving, at a 1:1 relationship with the infeed conveyor, or master axis. The conveyors are following the feedback from the encoder on the infeed conveyor.

When the product enters the correction conveyor, the 6000 controller can determine how much correction is needed by looking at the phase relationship between sensors. After the product has completely left the infeed conveyor, the correction conveyor makes the required shift and then matches the speed of the exit conveyor for a smooth transfer. The result is a quality product that is perfectly spaced on the exit conveyor.