



## Simplified Motion Control Can Increase the Agility of Pouch/Pillow Packaging Machines

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WHITEPAPER

### Abstract

Snack and confection packagers face the challenge of producing an even greater variety of portion sizes using a single machine, most recently fueled by the explosive demand for snacks in 100-calorie packs. The rush to market built a strong case for machine controls that integrate easily, offer agility to adapt quickly to new trends and offer a scaled range of capabilities well suited for motion control and sealing tasks. Proven motion control techniques for pouch and pillow packaging help achieve a measure of success, but recent advances in motion controllers and servos made it possible to do so without high-cost hardware and complex integration, programming and operation.

## Introduction

Coming off years of developing new packaging sizes to meet the growing demand from different retail channels—from warehouse clubs and convenience stores to grocery stores and airlines—snack and confection packagers were ready for a challenge.

In July 2004, Nabisco launched the first line of popular cookies and crackers reformulated and packaged to meet the magic 100-calorie limit approved by doctors and nutritionists for a snack. Consumers like them so well, these 100-calorie snack packs generated more than \$100 million in sales within a year. Other companies have followed to claim a piece of this boom.

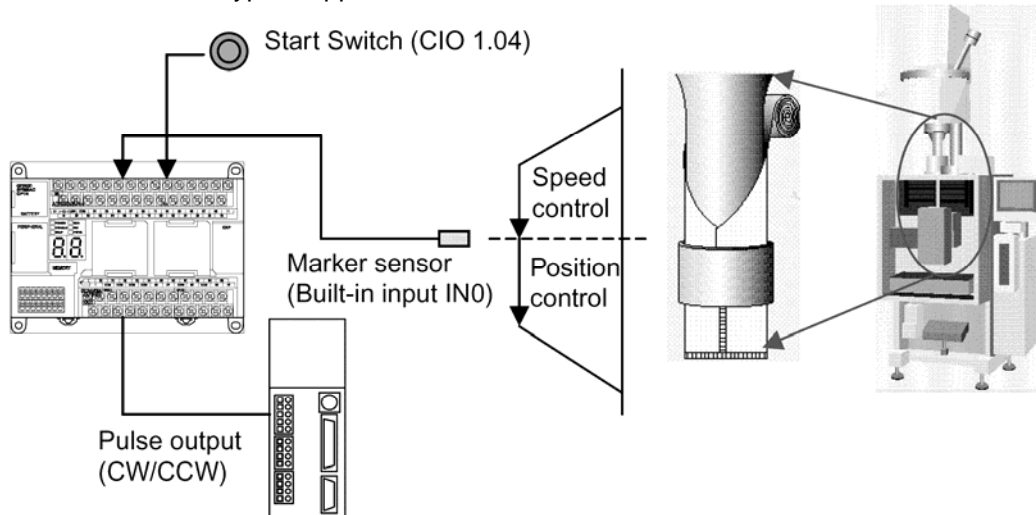
The challenge was how to get more packaging capacity with the responsiveness to handle these smaller packages in time to catch the wave of popularity and be able to change back to established sizes quickly and easily.

## A Winning Combination Reduces Waste and Increases Production Speed

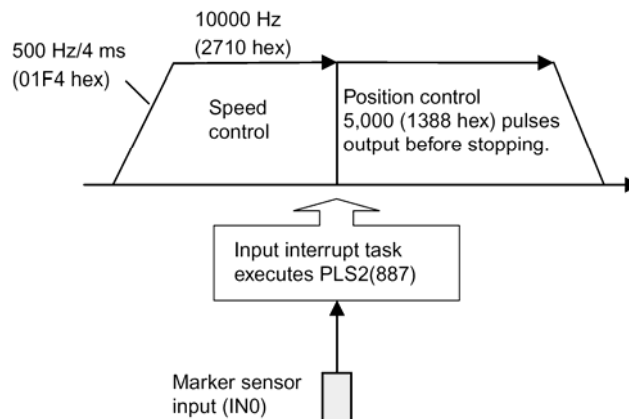
Pouch and pillow packaging machines use speed control of the film in-feed to form a tube for filling and to create the desired package length with bottom and top seals. For example, the same packaging machine can make both small and large versions used in snack vending machines by adjusting the length of time between seals.

One widely adopted solution has been to use two kinds of control on the in-feed material to ensure precise seal placement. At the start of the pouch forming process, speed control is used to feed wrapping material to the initial position. When a mark-detecting sensor signals the controller, an input interrupt task command is executed and fixed-distance positioning is performed before stopping to apply the seal.

The illustration below shows a typical application.



The pulse output from a motion controller advances a servomotor the required number of counts until stopping to allow filling, sealing and separation operations to take place.



## Smaller, Focused Controllers Simplify These Tasks

By 2005, a trend toward making every aspect of these control tasks easier was well under way: easier to program, integrate, operate and change over. Omron delivered a cost-effective solution scaled for individual machine control that could be integrated quickly into any pouch or pillow packaging line. It combined R7D-B series servos with the new CP1H-Y micro size controller with built-in high-speed pulse outputs and encoder inputs, in addition to discrete input and outputs. The R7D-B series servos provide a focused set of capabilities



CP1H controller with built-in high-speed pulse outputs



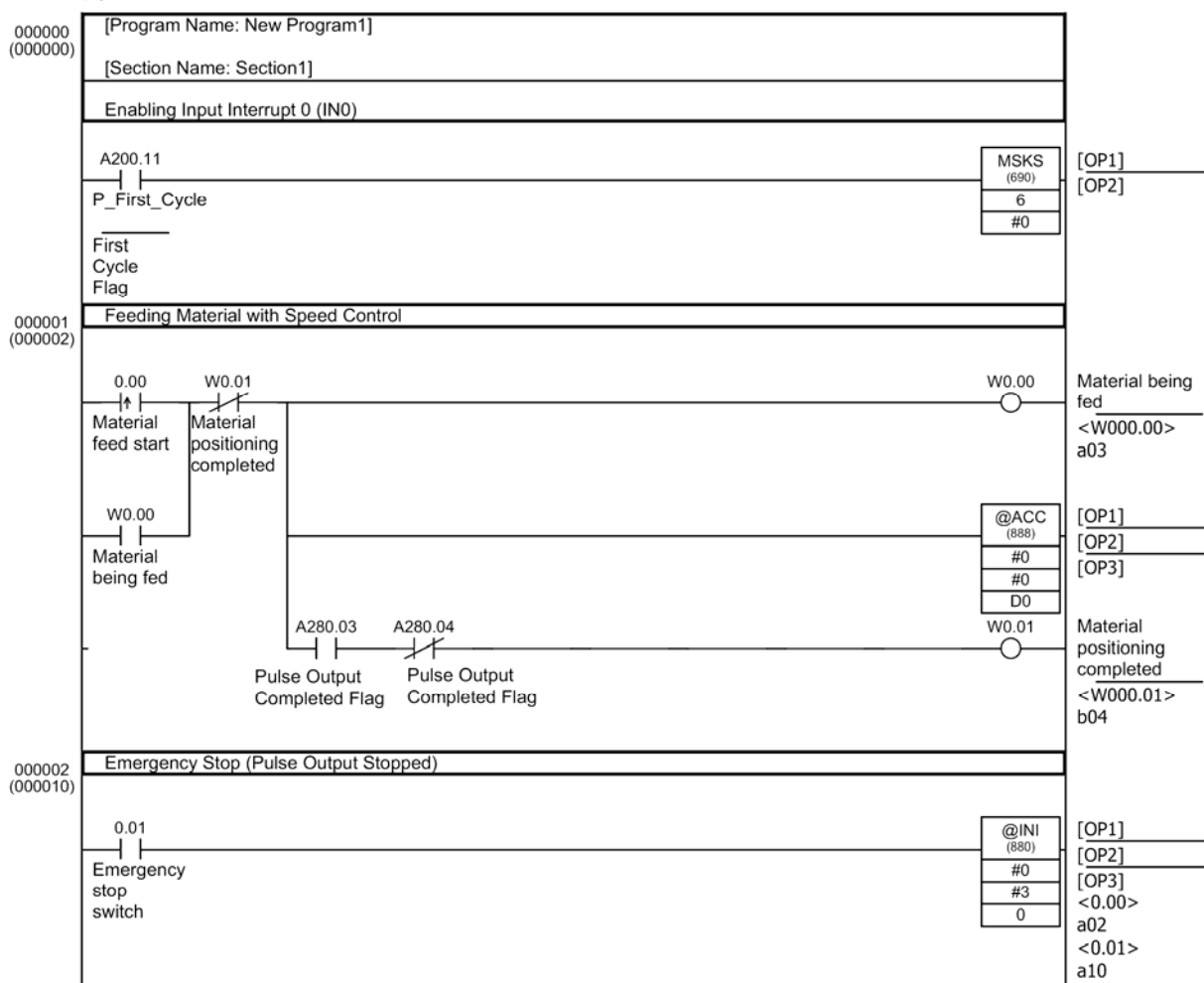
R7D-B series servomotor and servodriver

suited for packaging machines: precision of servo positioning that can be set up with simplicity of stepper drivers. The CP1H micro size controller delivers fast processing speeds for sensors on high-speed lines, and capabilities comparable to the mid-size programmable controllers of only a few years before.

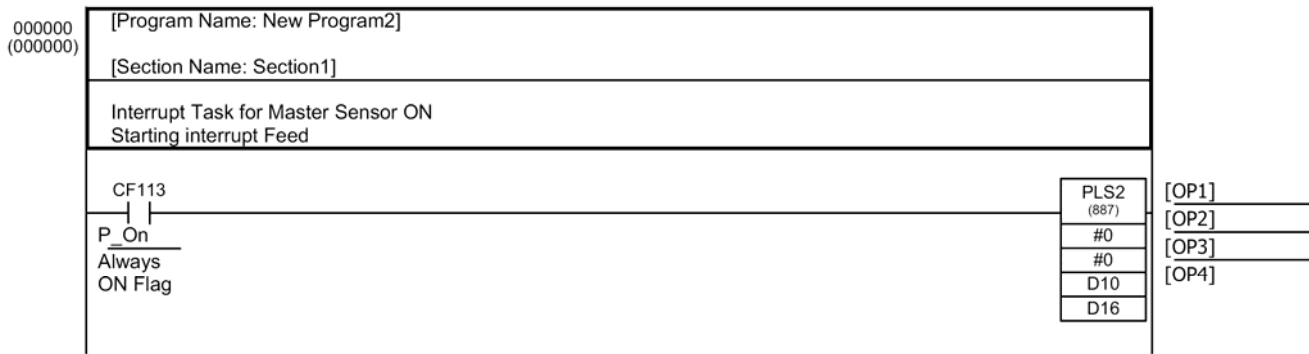
## Advantages Hidden in the Programming

The machine builder and end user who have this Omron solution installed reported a faster time-to-delivery of the packaging machine in put due to advantages in the programming used for CP1H. The user has found that change over between runs and necessary adjustments made on-the-fly can be done more simply with this combination than with other machines on the plant floor. What sets this solution apart from others involves the simplicity of programming and modifying the critical parameters.

The Function Blocks that enable speed control, task interruption and start/stop shorten the programming to a few lines. With Sequential Function Chart programming, operational actions can be encapsulated for quick access without slowing down the cyclic scan. The example below shows a sample Cyclic Task Program executed at startup in Ladder diagram.



The setup of the interrupt task has been simplified due to Omron's pre-built command to invoke a change in program based on a sensor input pulse. The function block requires only a few parameters with options for comments.



Omron's CX-One software enables complete programming and setup of servos, programmable controllers, HMIs and temperature controllers from a common environment.

The snack packager using this machine was able to expand capacity to handle 100-calorie size snacks quickly while the trend is still rising. The controls allow the flexibility to change over to vending sizes with minimal downtime providing the agility to handle demand for all the popular package sizes.



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