

Subject: Application Overview	Product: MP940/SMC	Doc#: eng.MCD.05.025
Title: Rotary Knife		

## Rotary Knife

### Application Overview

The rotary knife is a common application in the packaging industry where many products are packaged using a seal-and-cut technique. Packaging is fed from a continuous roll and is formed into a tube around the product and the package is then sealed and cut by a rotating knife. Rotary knives are also used in other applications where the process involves matching speed with a conveyor mechanism at consistent product spacing, such as stamping a package.

### Application Challenges:

- Matching Conveyor Speed – Tangential speed of the rotary knife must match the conveyor speed during the cut to insure proper cut and eliminate product damage
- Cutting to Registration – The knife must make any necessary adjustments to cut product according to registration marks.
- Slippage Correction – Provide consistent cut lengths by minimizing creep in the cut due to product slippage or drift.
- Smooth Mechanics – The solution must yield smooth motion to reduce machine wear produced by jerky accelerations, resulting in increased machine life and lower maintenance (more uptime).
- Increased Throughput – Higher productivity should result from the addition of this motion control solution due to higher speeds and lower downtime.

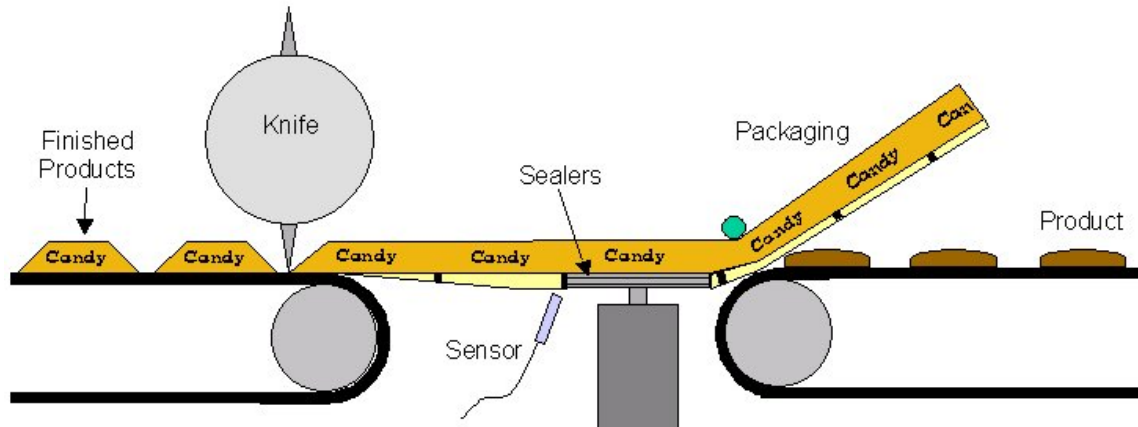
### Yaskawa Products:

Products	Product Features and Benefits
MP940 with Sigma II	<ul style="list-style-type: none"> <li>- Electronic camming with cam shifting for registration adjustment</li> <li>- Easy-to-use Icon Based programming environment</li> </ul>
Legend MC with the Legend Amplifier	<ul style="list-style-type: none"> <li>- Electronic gearing with superimposed moves for adjustment to registration marks</li> <li>- Text-based programming language with simple command language for instant operation</li> </ul>

Subject: Application Overview	Product: MP940/SMC	Doc#: eng.MCD.05.025
Title: Rotary Knife		

### Application Solutions and Benefits:

A sensor reads small marks on the package (called “registration marks”) that determine where the knife is to make its cut. It is almost always important in a rotary cam application that the knife-speed matches the line-speed during the cut. This is defined as the *cut region* and is consistent on each cycle. The built-in linear cam shifting and linear interpolation of the controller handle all required adjustments. By utilizing the camming function of the Yaskawa controllers, accurate and smooth mechanics can be achieved. Zero drift occurs over time because registration is used on each product, guaranteeing consistent cut lengths each cycle.



Gearing is also a suitable solution for a rotary knife application when working with product cycles of consistent length. The knife is required to match speed with the conveyor during the cut region and this can be accomplished by properly calculating the diameter of the knife and the correct gear ratio. To eliminate creep due to slippage or inexact calculations, registration can still be used and relative moves can be superimposed on the gearing to provide accurate cuts and smooth mechanics.

Incorporating the Yaskawa Sigma II and Legend lines of amplifiers and servomotors introduces the highest quality servo equipment in the industry to increase performance and reduce downtime. In addition, Yaskawa motion controllers can be integrated into larger control systems using Yaskawa machine controllers as well as a variety of communication capabilities, to provide ultimate connectivity and complete Yaskawa solutions.