

Subject: Application Overview	Products: MP940/2300, SMC, MP2000iec	Doc#: AO.MCD.05.110
Title: Linear Flying Shear		

## Linear Flying Shear

### Application Overview

Linear flying shears are used in a variety of applications ranging from cutting material on the fly, filling bottles as they are fed on a conveyor, to forming soft material in a mold while being transferred along the process. This particular overview describes the flying shear (cutting) application, but can be used for any process that requires speed matching to a given axis. Linear flying shear applications can be used to solve both random in-feed and constant feed applications. This application controls the linear axis of the saw to ensure accurate cutting as well as a digital output for providing management of the cutting mechanism.

### Application Challenges

- Multiple Cut Modes – Controller must be able to accurately cut product for cut-to-length as well as cut-to-registration on the registration mark of the material.
- Matching Conveyor Speed – As product is being cut, speed matching is critical to prevent product damage and yield smooth, straight cuts.
- Increased throughput – Higher productivity should result from the addition of this motion control solution due to higher speeds and lower downtime
- Smooth Motion – The solution must yield smooth motion to reduce machine wear produced by jerky accelerations, resulting in increased machine life and lower maintenance (more uptime).

### Yaskawa Products

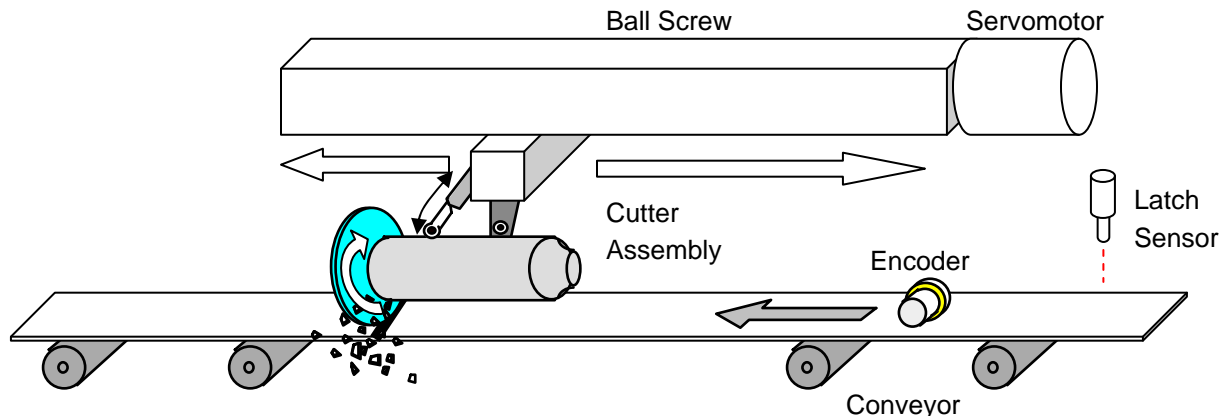
Products	Product Features and Benefits
MP2000iec with Sigma-5	<ul style="list-style-type: none"> <li>- Pre-developed cam function blocks in addition to firmware camming functionality that can be customized to specific machine requirements</li> <li>- High-performance on the fly changes possible with MECHATROLINK -II determinism</li> </ul>
MP2300 with Sigma II or Sigma III	<ul style="list-style-type: none"> <li>- Pre-developed Linear Flying Shear Solution Package that can be customized to a specific machine</li> <li>- High-performance Mechatrolink-II motion control network</li> </ul>
SMC4000 with Sigma II or Legend	<ul style="list-style-type: none"> <li>- Electronic camming with over 1024 defined cam points for highly accurate cam profiles</li> <li>- Text-based programming language with simple command language for instant operation in the user-friendly YTerm software environment</li> </ul>

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## Application Solution and Benefits

A solution package template was created for the MP2300, and example code generated for the SMC and MP2000iec product families. With these resources, implementation of a Linear Flying Shear machine is made simple.

The shear accelerates and synchronizes to cut point on the product based on the encoder signal that measures the feed length of the product. After the cut is completed, the shear returns to the home position.



Two cut modes can be implemented, cut-to-length and cut-to-registration. The operator can select the mode in the HMI. Cut-to-length cuts the product regularly based upon a set cut length. Cut-to-registration uses the registration mark as the cut point. In both modes, the controller utilizes electronic an electronic cam profile to ramp up to speed and speed match the material by utilizing a 1:1 cam profile in the cut region. The electronic cam profile creates a smooth acceleration in order to minimize jerk, reducing wear and tear on the machine in order to increase uptime.

Incorporating the Yaskawa line 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.