

Comprehensive Library of Move Types

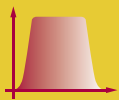
Mint provides a comprehensive library of motion types to suit a vast arena of application requirements. Even the most complex moves types are easily accessible through simple keywords. All of these move types can be initiated from a Mint program, via ActiveX or from within an embedded C application. NextMove motion controllers support single and multiple coordinate groups or alternatively, all axes can operate independently.

A library of application notes are available for download from www.baldormotion.com.

Library of Moves



Speed Control



Positional (index) Moves



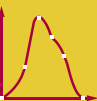
Interpolated Moves



Helical Interpolation



Tangential Knife



Splining



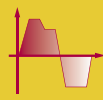
Electronic Gearbox & Clutch



Registration on the Fly



Electronic CAM



Flying Shear



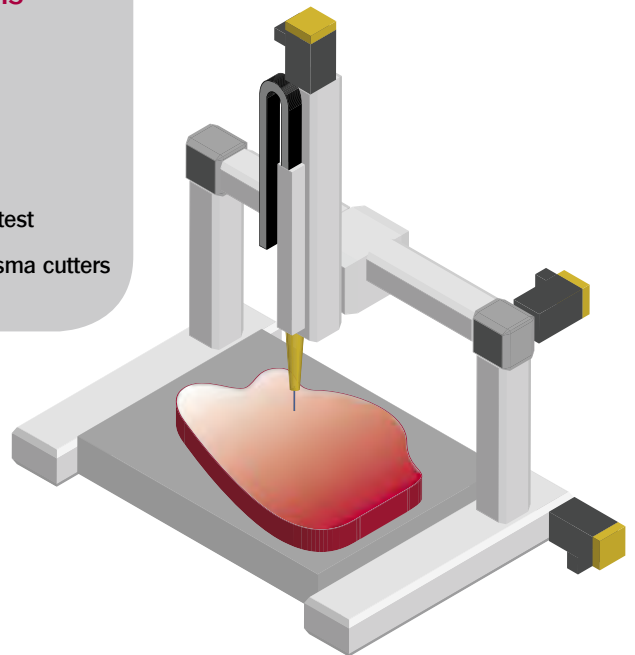
Virtual Axes

Multi Axis Interpolated Moves

Mint supports linear interpolation across all supported axes, circular interpolation across two and helical Interpolation across three axes. Circular and linear moves can be blended together to achieve a smooth continuous motion along a complex path. Inter-vector angle control allows Mint to make decisions about sharp corners, i.e. whether to slow down or stop. An axis can even be configured as a tangential knife, following the outline profile of a shape. Baldor's MintNC and HPGL products make extensive use of Mint's move buffer and linear interpolation capabilities.

Applications

- › Sign cutting
- › Wood routing
- › Glue laying
- › Pick & Place
- › Inspection & test
- › Water jet/plasma cutters



Teach & Replay

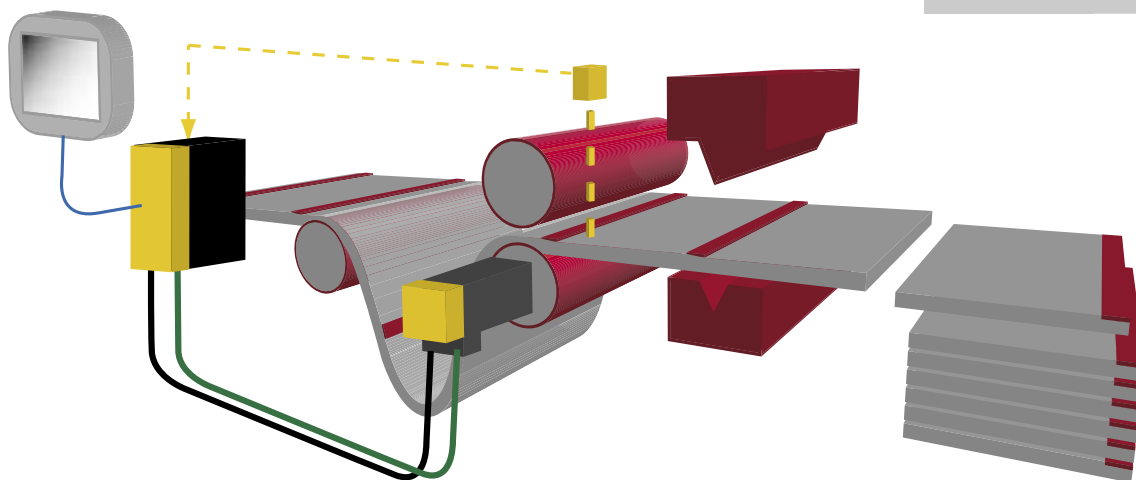
Mint's data array capabilities are ideal for teaching and replaying the positions of a pick and place robot. Axis positions can be numerically programmed from Baldor's HMI panel or manually taught by jogging each axis to the desired position. Arrays provide an efficient way of storing a large number of position points and they offer the flexibility of editing, deleting or replaying a small segment of the data.

Indexing

Many applications require rapid incremental moves with minimal mechanical jerk, and control of processes such as cut, crimp, or seal. Mint can position an axis fast and accurately, using smooth velocity profile with precise jerk limitation. Mint's move buffers allow multiple moves to be loaded with different feedrates. Digital outputs can be loaded into the move buffer to ensure highly accurate synchronization of the move with the I/O logic. Final target position can be changed on the fly, for example on the basis of an input signal.

Applications

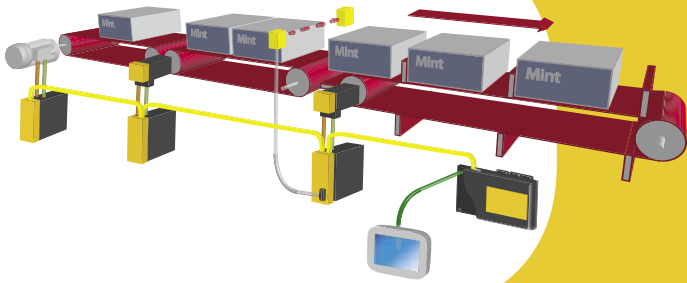
- › Press feeders
- › Wrapping machines
- › Cut to length
- › Labeling
- › Component alignment
- › Paper converting



Cut to Registration Example

Cut to length, press feeders, and label feeding are typical applications requiring a change in target position during the move without stopping and based on some form of reference signal. An example would be cutting pre-printed material to length, so that the printed information is always in the same location on the sheet of material. This is often referred to as "cut registration". In this example, nip rollers, controlled by Baldor's programmable controllers, feed printed material into the jaws of a cutter, which is also controlled by an output signal.

A sensor detects the pre-printed registration mark. This sensor is connected to the high speed *Fast Input* of Baldor's controller. This automatically latches the position of the Nip Roll axis in $<1\mu\text{s}$ and triggers a section of code within a pre-defined Mint event. The captured position is used to calculate a new target position for the Nip Roll axis. In this case the new desired position will be set so that the material will always be cut in the correct place relative to the printed registration mark.

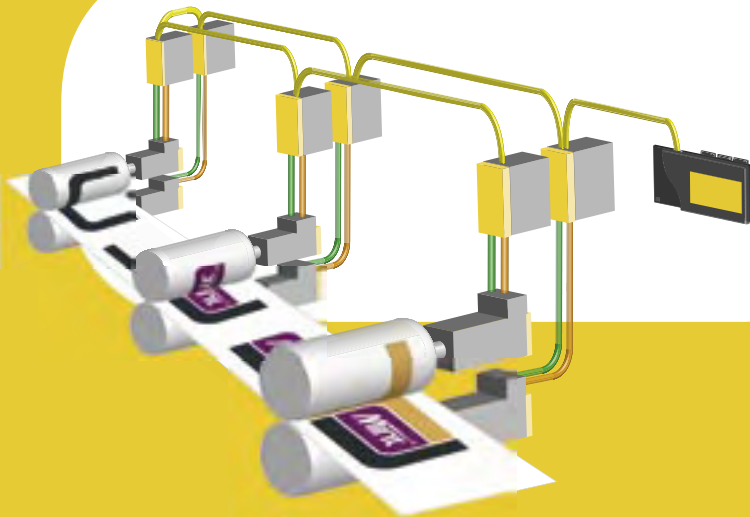


Packaging Example

Packages arrive at irregular intervals from an input conveyor and must be aligned to the next part of the process. The packages are transferred to a *correction* conveyor which advances or retards the position of the package so that it enters a flight on the output conveyor. In the illustration, the position of the next available flight on the output conveyor is captured as the next package passes the sensor. Correction is calculated and initiated to ensure the package arrives in the flight accurately.

Applications

- › Line shaft replacement
- › Packaging machines
- › Printing machines
- › Paper and plastics
- › Steel processing
- › Bag making



Printing Example

Multi-color printing applications require precise synchronized lock of numerous roller axes, including, ink, impression and chiller rolls. Each print tower must lay down ink in accurate registration to the previous color. Mint's software gearbox features, fast position capture and position correction features provide an elegant solution to this type of application.

Software Gearbox

Advanced software gearbox and clutch functions enable two or more axes to be linked together in precise synchronization. Replacing traditional mechanical linkages such as pulleys, belts, gearboxes and line shafts with precise but flexible electronic ratios. Ratio configurations can be changed in an instant for rapid production changes increasing productivity by reducing set-up time. There is less mechanical wear, and hence maintenance requirements. Transmission errors of mechanical linkages are removed resulting in higher precision and production quality.

Single or multiple axes can be position locked to a master axis in much the same way as a mechanical linkage would be used. The input shaft (Master) can be any position feedback encoder or a Mint virtual axis, which would eliminate variations in the master axis affecting all the follower axes.

Software Clutch

Software clutches can be used to accelerate a following axis from standstill to match the speed of the Master speed at the defined gear ratio. The acceleration can be controlled over a defined distance on the Master machine to maintain precise position registration, eliminating the need for mechanical clutch systems.

Position Advance and Retard

In many applications it is necessary to correct for irregularities in processed materials or mechanical deficiencies: plastic film webs used for wrap packaging stretch and distort; cartons exiting a filling machine do so in random orientations and spacings; worn mechanical elements introduce backlash or slip into a line process; product slip and slide on a continuous conveyor line.

Such irregularities can be compensated by advancing or retarding the position of a controlled axis in relation to a measured product or axis position. Mint can be used to introduce a positive or negative positional adjustment, on top of the current speed of an axis, with controlled acceleration and differential speed. Speed reversal during correction can also be prevented.

Fast Position Registration

Mint products have multiple fast inputs which can latch axis positions to within 1µs. Software events for each input can be automatically executed in response to perform calculations and initiate any determined corrective motion, based on this sensed information. This is widely used in applications such as printing, packaging, labeling, inspection and test machines.

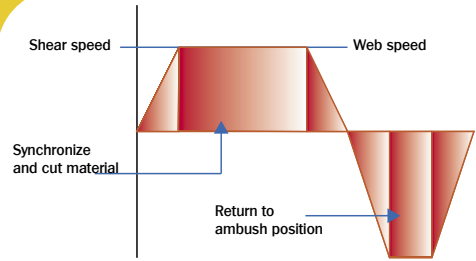
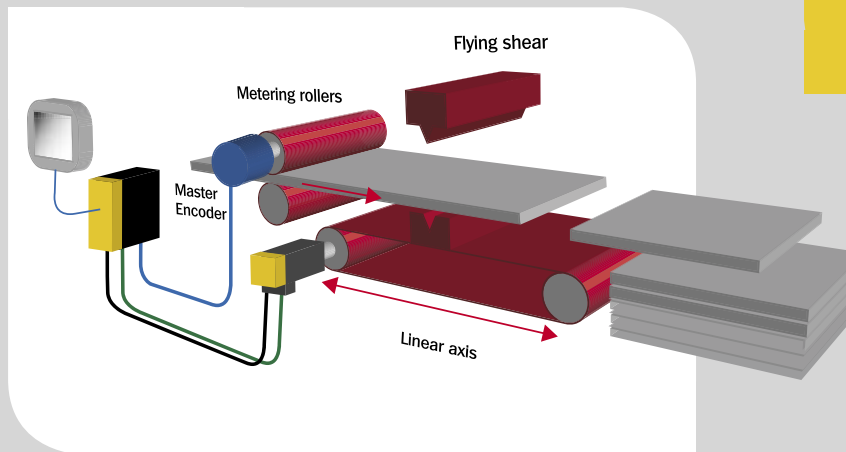
Electronic CAMS

Software CAM emulation is flexible and more dynamic than mechanical versions. They do not suffer from CAM bounce, or mechanical wear. CAM profiles can be calculated in software or downloaded from CAD software packages as numeric data. Multiple CAM profiles can be stored and used as required. CAM stroke can be scaled dynamically, allowing a machine operator to adjust on the fly.

Flying Shear Motion

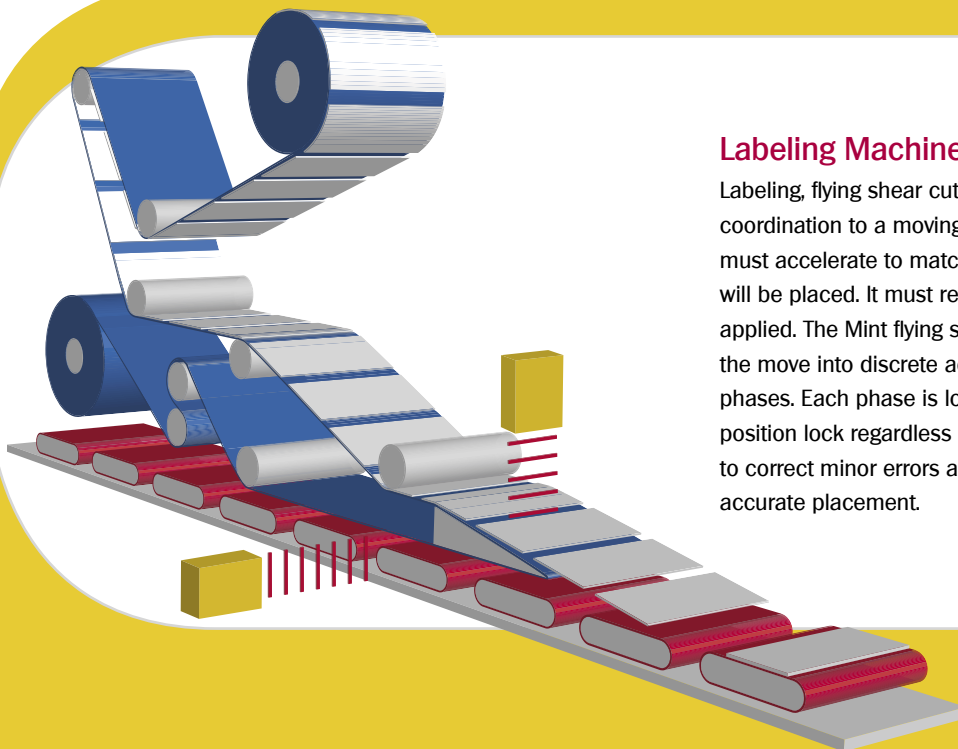
There are numerous applications where the motion of one axis must be either speed or position locked with another axis. In some instances the axis must perform incremental or absolute moves in position lock i.e. synchronous to the product or process. For example cutting lengths from a continuous moving material. Mint encompasses a host of motion functions to provide this capability.

Flying shear functions perform operations at accurate intervals on a moving product tracked by feedback from a measuring encoder. In a typical application, the cutter is mounted on a linear reciprocating stage, and is synchronized with the moving product for each cut. The acceleration, synchronization and deceleration phases can be specified and linked by software to the movement of the product, so accurate position reference is always maintained.



Applications

- › Flying shears
- › Electronic clutch simulation
- › Labeling on the fly
- › Press feeding
- › Pick & place from a moving conveyor
- › Packaging applications



Labeling Machine Example

Labeling, flying shear cutters and flow wrapper applications require axis coordination to a moving web. In a labeling example, the label strip must accelerate to match the speed of the product onto which the label will be placed. It must remain locked at this speed while the label is applied. The Mint flying shear command achieves this by breaking down the move into discrete acceleration, constant speed and deceleration phases. Each phase is locked to the master position and will maintain position lock regardless of machine speed. Label position is registered to correct minor errors and product position is also registered to ensure accurate placement.