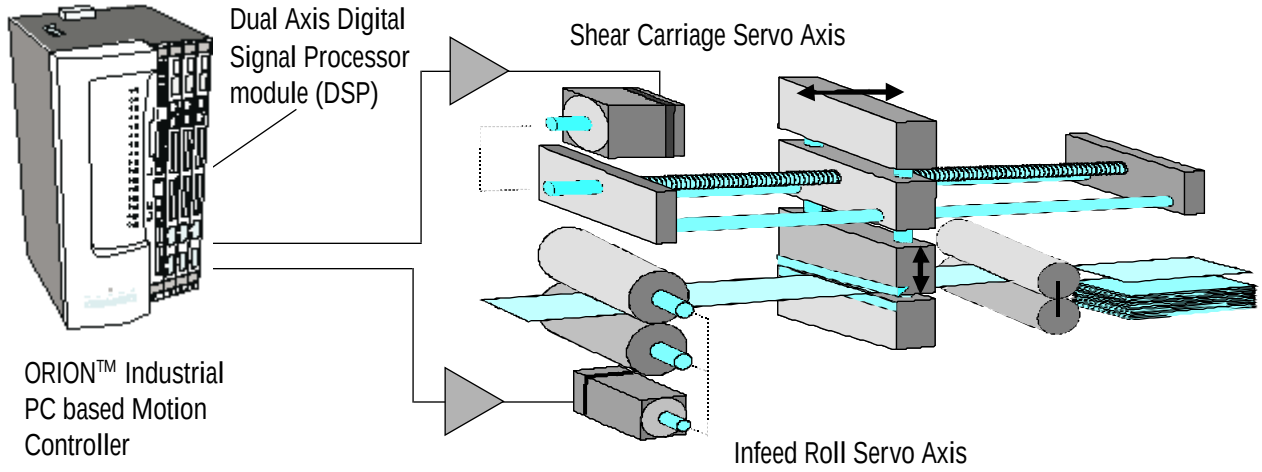
RECIPROCATING FLYING SHEAR



APPLICATION FEATURES AND BENEFITS

- **Precise shear points** --- all digital servo system utilizing multi-axis electronic gearing capabilities make synchronizing shear tooling accurate and repeatable, increasing product quality and decreasing mechanical wear.
- **Registration capability** --- when cutting non-uniform material needing registration to a position mark, ORION™ controllers provide convenient and direct interfacing to the DSP position capture registers.
- **Error reporting** --- product information given by the operator can be checked against machine capability and cut rates can be determined. Built-in servodrive error reporting and handling make the programming job quick and effective.
- **Integral & flexible axis control** --- provides versatility in machine control by allowing flexibility to be designed into the user's application software programs.
- **On-the-fly cut-length adjustments** --- are possible by using the ability of DSP queue management. Motion commands loaded as repeat blocks are interrupted and changed without the loss of continuity
- **Programmable Limit Switches** --- output transitions, directly controlled by the DSP, provide gating operations at precise points of the machine cycle.
- **Fast product changes** --- versatile operator interface touchscreens and mass data storage capabilities of the ORION™ controller allow product recipes to be stored on-line providing a simple product changeover process.
- **Batch processing** --- full job control can be programmed into an ORION™ controller increasing the ability of the user to manufacture products with minimum operator intervention.
- **Quick retract reaction** --- ORION™ servo control algorithm techniques bring stable control and agility to fast moving transport mechanisms to expand machine throughput.

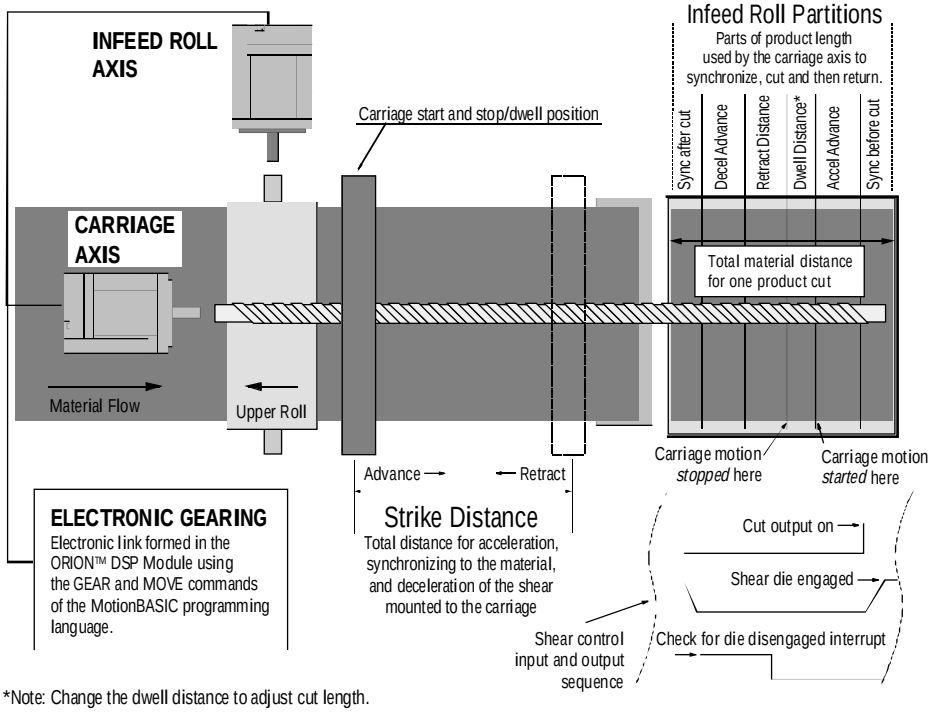
INDUSTRY FIT

- Sheet metal cutting
- Rubber gasket cutoff
- Metal forming process
- Paper tube cutoff saw
- Plastic bag sealing
- Form and Fill packaging
- Rubber tire belting cutoff
- Perforating metal
- Notching support beams
- Ceramic extrusion cutoff

OVERVIEW

Reciprocating movement that is synchronized between two parallel axes can be accomplished with accuracy and speed.

Designs utilizing digital servo systems and high speed parallel processing of the ORION PC based motion controllers, allow rapid moves of the roll feed and the carriage transport with precise gearing for repeatable and accurate cutting, punching, notching or forming operations.



*Note: Change the dwell distance to adjust cut length.

TECHNICAL BRIEF

Reciprocating Flying Shear

When designing a machine, three elements are considered. The minimum length of the product to be cut or ***cut distance***, the travel distance of the tooling or the ***strike distance***, and the throughput goal of the machine in terms of the ***cut rate*** (distance per second).

For every ***cut distance*** delivered by the infeed roll, the carriage must cycle by travelling the ***strike distance*** twice -- once to advance the carriage and once to return it. During the advance portion of the cycle the tooling on the carriage synchronizes to the material from the infeed a long enough time for it to perform the cutting operation. The reaction time of the tooling (in this case the shear) along with the ***cut rate*** determine that portion of cut distance needed for synchronizing the carriage to the material (*see infeed roll partitions above*). Next, the cut distance used by the accel and decel portions of the advance cycle are determined by sizing the servomotors to meet the throughput goal. The total distance needed for the advance portion is:

advance.dist = accel + sync + decel

To program the ORION™ the following MotionBASIC® GEAR FOR instruction is used:

GEAR carriage FOR *strike.dist* IN advance.dist,accel,decel

The above GEAR FOR statement starts an electronic link between the carriage and the infeed roll axis advancing the carriage one strike distance for each cut distance. The accel distance parameter assures gearing at matched speed for the same point for a consistent cut. The return distance calculation is:

return.dist = ***cut distance*** **- advance.dist**

GEAR carriage FOR -(*strike.dist*) IN return.dist,return.accel

Preforms the carriage return where the return.accel is a distance set for the best servomotor performance based on the throughput goal. Adding a dwell distance using a GEAR FOR allows the length of the product to vary keeping the advance and return cycles optimum and consistent.

GEAR carriage FOR 0.00 in dwell.dist

The gear statements are placed into the DSP command queue as a REPEAT block and repeated for the batch count entered by an operator.

MOVE infeed AT feed.rate -- will now start the infeed roll to move material into the machine.

The tooling is controlled by the DSP PLS outputs and monitored by general inputs. GEAR commands can also be triggered by a sensor for registration control.

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