

Machine Controls Training

Engineering and Maintenance Support of Integrated Control Systems for the Roll Forming Industry



Controller Hardware

- Page 8



XL200 Series Hardware

- Rugged industrial controller
- 10.4" extended temperature range LCD and touch-screen
- Full optical isolation for outstanding noise immunity
- High speed DSP coprocessor for motion control algorithms
- 24 digital outputs with 3.5 amp continuous current
- 24 digital inputs
- 4 incremental encoder inputs
- 2 12-bit analog outputs
- SERCOS digital servo drive support
- 4 high-speed communication ports



XL200 Series Hardware

- No LCD Hardware with remote display
- Sinking and Sourcing I/O
- Bar Code Scanner port for connecting a Serial Based Bar Code Scanner
- DVI Port for Remote Display
- VGA, Mouse, and Keyboard Port for External Devices
- 10mb/s Ethernet Port for Eclipse



Additional Controllers

- MP465



- MP300



XL200 Series Hardware

Single Remote Display Overview

Main XL200 w/ LCD



DVI Cable
20 meter max



12.1" Remote Display



Or
Main XL200 wo/
LCD



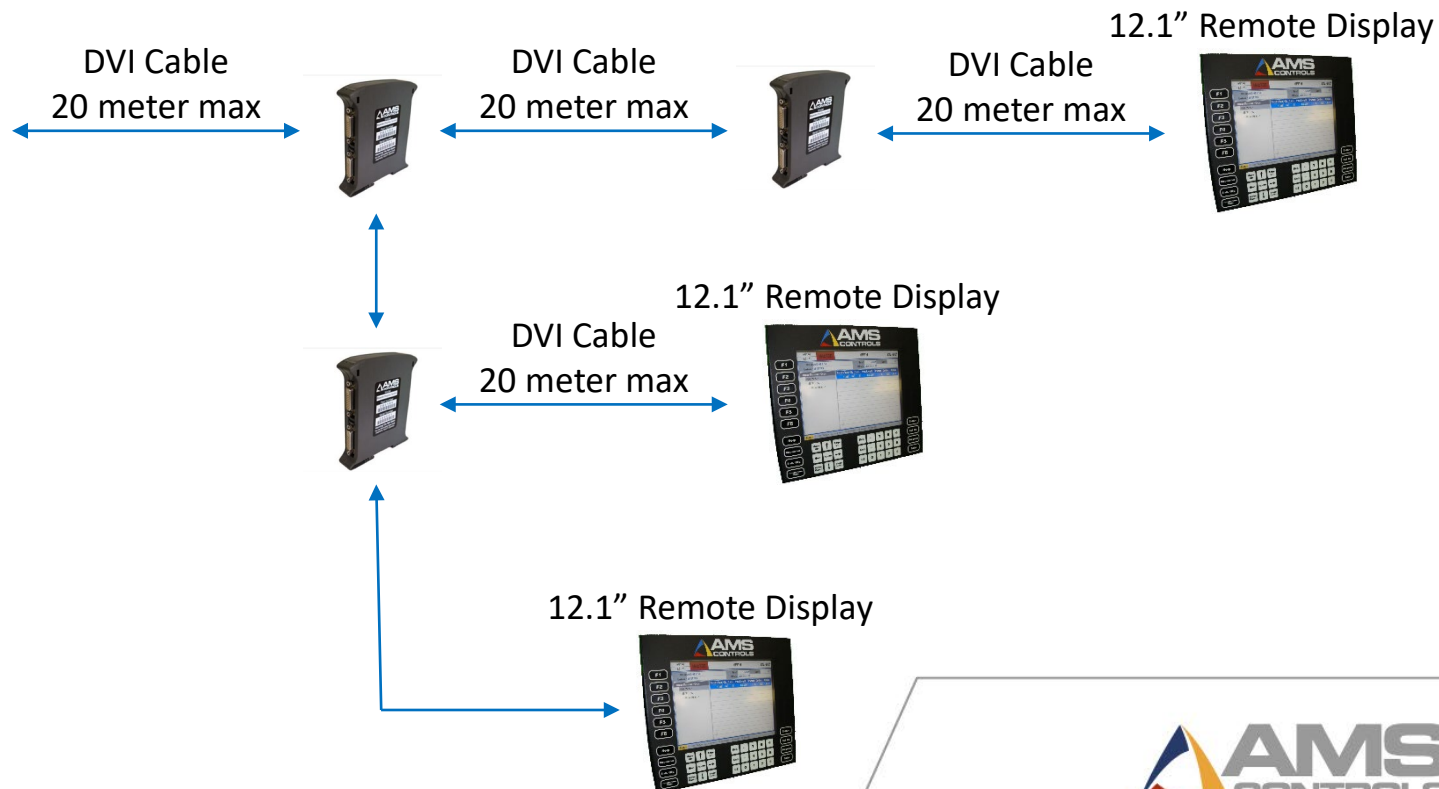
XL200 Series Hardware

Multiple Remote Display Overview

Main XL200 w/ LCD



Or
Main XL200 wo/
LCD



System Information

Ams PEG Development Window

11/06/23 7:17 PM **HALTED** 0FPM 0.000"

| Diagnostics Menu | System Information | |
|--------------------|--------------------|--------------------------|
| System Information | Model: XL206 | Version: 5.89.02 |
| Manual Operations | Switch: 17 | Created: 3/29/23 4:44 PM |
| High Speed Bus | Serial #: IBM PC | CPU ID: DEAD |
| Press Information | Boot: IBM PC | Created: 3/29/23 4:44 PM |
| Message Log | Rts: 1.65 | ARM: |
| Input/Output | Keyboard: | RS232 Port Scanner |
| | Sys Mem: 1.000MB | Used: 0.588MB (58.85%) |
| | Rec Mem: 2.000MB | Used: 0.008MB (0.38%) |
| | Total Mem: 3.272MB | Used: 0.869MB (26.54%) |
| | Board1: 5386 G | Serial #: IBM PC |
| | Board2: 5387 C | Serial #: IBM PC |
| | IO Type: Sink | IO M. Power: Good |
| | IN Power: Good | OUT Power: Good |
| | UART Pwr: Good | Analog Pwr: Good |
| | ARM Temp: 32.0F | |

Diagnostics F1-None F2-Memory Test F3-Set Defaults F4-Calibrate Touch-Screen

Configuring the Controller

- Not a PLC
 - Controllers are customizable for each machine
-
1. Choose Software
 2. Configure Dip Switches
 3. Set Up Parameters

Flash Programming the XL200

- Obtain Firmware from AMS Controls
- Use Flash Wizard to “Flash Program” the controller



Set the “Configuration” switches

- Press the “Setup” key as the controller powers up
- Set “Configuration” switches according to the machine configuration

XL200 Series Standard Open Loop Switch Settings Version 2.00 & 3.00

Updated: January 10, 2018

Models: XL200, XL200H

| Switch # | OFF | ON |
|----------|------------------------|------------------------|
| 1 | Feed-to-Stop Shear | Non-Stop Shear |
| 2 | Shear Die Boost Output | Shear Up Output |
| 3 | Single-Speed Shear | Two-Speed Shear |
| 4 | Disable Auto Crop | Enable Auto Crop |
| 5 | Feed-to-Stop Punch | Non-Stop Punch |
| 6 | Punch Die Boost Output | Punch Up Output |
| 7 | Single-Speed Punch | Two-Speed Punch |
| 8 | NOT USED – MUST BE OFF | NOT USED – MUST BE OFF |
| 9 | CRT Disabled | CRT Enabled |
| 10 | NOT USED – MUST BE OFF | NOT USED – MUST BE OFF |

XL200 Series Software Models

XL200

- Open Loop Controller
- Capable of Controlling a Single Shear and Single Punch
- Feed to Stop or Flying Presses

XL200CL

- Closed Loop Controller
- Capable of Controlling a Single Shear and Single Punch
- Feed to Stop can control 2 Presses in CL
- Flying Press mode can only control 1 Press in CL, the other Press will be OL



XL200 Series Software Models

XL202

- Open Loop Controller
- Capable of Controlling a Single Press with 1 Gag
- Feed to Stop or Flying Presses

XL202CL

- Closed Loop Controller
- Capable of Controlling a Single Press with 1 Gag
- Feed to Stop Only



XL200 Series Software Models

XL202CLF

- Closed Loop Controller
- Capable of Controlling a Single Press with 1 Gag
- Flying Press Only



XL200 Series Software Models

XL206

- Open Loop Controller
- Capable of Controlling a Single Press with 5 Gags, or Six Presses, or any combination thereof
- Feed to Stop or Flying Presses

XL206CL

- Closed Loop Controller
- Capable of Controlling a Single Press with 5 Gags, or Six Presses, or any combination thereof
- Feed to Stop Only



XL200 Series Software Models

XL206CLF

- Closed Loop Controller
- Capable of Controlling a Single Press with 5 Gags, or Six Presses, or any combination thereof
- Flying Press Only



XL200 Series Software Models

XL212

- Open Loop Controller
- Capable of Controlling a Single Press with 11 Gags, or 12 Presses, or any combination thereof
- Feed to Stop or Flying Presses

XL212CL

- Closed Loop Controller
- Capable of Controlling a Single Press with 11 Gags, or 12 Presses, or any combination thereof
- Feed to Stop Only



XL200 Series Software Models

XL212CLF

- Closed Loop Controller
- Capable of Controlling a Single Press with 11 Gags, or 12 Presses, or any combination thereof
- Flying Press Only



XL200 Series Software Models

XL266

- Open Loop Controller
- Originally Designed for the Schlebach Quadro Machine
- Includes Special Programming for Press Up Complete Switches
- Capable of Controlling 5 presses
- Feed to Stop only



XL200 Series Software Models

XL270

- Open Loop Controller
- Special Parameterizations for a Tile Machine
- Capable of Controlling a Single Shear and 2 Forming Presses
- Feed to Stop only

XL270CL

- Closed Loop Controller
- Special Parameterizations for a Tile Machine
- Capable of Controlling a Single Shear and 2 Forming Presses
- Feed to Stop only



XL200 Series Software Models

XL244CL

- Closed Loop Controller
- Capable of operating one press with four gags, five presses with no gags, or any combination of presses and gags totaling five.
- Two of the presses can be Closed Loop.
- Flying Press Only



XL200 Series Software Models

XL200CL-RE

- Closed Loop Controller
- Capable of Controlling a Single Press axis of the following type:
 - Linear Die Accelerator
 - Eccentric Press
 - Rotary Press
- Flying Press Only



XL200 Series Software Models

XL200CL-MDA2

- Closed Loop Controller
- Dual Closed Loop Linear Die Accelerator Controller
- Flying Press Only

XL200CL-MRE2

- Closed Loop Controller
- Capable of Controlling 2 Press Axis of the following type:
 - Linear Die Accelerator
 - Eccentric Press
 - Rotary Press
- Flying Presses Only



XL200 Series Software Models

XL212CL-MHA

- Closed Loop Controller
- Single Axis Die Accelerator Controller
- Supports a Closed Loop Flying Die line that can fire on multiple targets during die stroke without returning home between targets.

XL212CL-MHA2

- Closed Loop Controller
- Dual Axis Die Accelerator Controller
- Supports a Closed Loop Flying Die line that can fire on multiple targets during die stroke without returning home between targets.



XL200 Series Software Models

XL212CL-SGF

- Closed Loop Controller
- Designed to Operate a Machine that is Stick Fed Pre-Cut Blanks of Material
- Grip Feed or Feed Roll Driven
- Part Optimization based on Stick Length
- Auto Measurement of Stick Length Using Sensors
- Feed to Stop Only



XL200 Series Software Models

XL200-SPD

- Open Loop Controller
- Designed to Operate a Machine that Produces Round Spiral Duct
- Feed to Stop Only



XL200 Series Software Options

Print on Part (P)

- Ability to Integrate with a Print-on-Part Printer
 - Ink Jet
 - Label Applicator
 - Label Printer
- Standard Message from the Controller
- Fully Customizable Message when Eclipse is used.
- Integration Kit must be purchased from AMS Controls for Support Printers
- Full List of Support Printer Models can be found at www.AMSControls.com



XL200 Series Software Options

Bundle Ticket Printer (B)

- Ability to Integrate with a Bundle Label Printer for Labelling Bundles or Printing Coil Tags
- Standard Label Format from the Controller
- Fully Customizable Label when Eclipse is used
- Integration Kit must be purchased from AMS Controls for Support Printers
- Full List of Support Printer Models can be found at www.AMSControls.com



XL200 Series Software Options

Extended Macro (M)

- Extends the Range in which Macro Patterns can be created from 50 to 350 available Macros.



XL200 Series Software Options

Auxiliary/Slave Controller (S)

- Ability to Communicate with a Downstream Set of Controllers called “Slave” Controllers
- Can be used for Multi-Axis Slaves (SL325), Additional Closed Loop Die Accelerator Slaves (SL301HCL), or Additional Open Loop Axis Slaves (SL301H)



XL200 Series Software Options

Analog (AA)

- This option allows the operator to vary line speeds automatically depending on the length of the part being produced.
- Analog output is proportional to part length for flying die lines.
- Allows full control of speed and direction for open loop feed-to-stop lines.



XL200 Series Software Options

Alternating Press (L)

- Allows two presses to be defined as one press. The controller will automatically distribute press targets between the two presses.
- Often used on stud lines that run at high speeds to avoid overlapping punches.



XL200 Series Software Options

Brake and Hump (U)

- Special outputs for controlling machines that form a hump of material between the feed rolls and the shear.



XL200 Series Software Options

Hydraulic (Y)

- Special Parameters for controlling machines that utilize servo valve driven hydraulic cylinders for flying cutoff presses.
- Dither and Deadband Parameters



XL200 Series Software Options

Multi-Axis (X)

- Support for Punches that operate in both the X and Y Axis
- Support for Machine Setup Axis controlled via a Product Code (Machine Setup) or Punch Pattern (Punch Tooling)
- Y-Axis Movements can be controlled via:
 - Sercos via Servo Drives (up to 7 Only)
 - PLC Controlled via Modbus
 - SL325 Slave Controllers either Open Loop or Closed Loop



XL200 Series Software Options

PLC Interface (I)

- PLC integration using Modbus Protocol. Most I/O can be memory mapped to PLC, high level data can be published from controller to PLC.
- Data Available Types:
 - Inputs/Outputs
 - Additional Gags (Unlimited)
 - High Level Data
 - Current and Next Order, Material, Product Code
 - Qty, Length, Pattern



XL200 Series Software Options

PLC Interface (I)

- Messaging and E-stop Conditions from the PLC
- Delay and Scrap Code Publishing
- Full Y-Axis Control including Jogging
- Die Accelerator Position Control for Die Changeovers
- Remote PLC Tool Select for Manual Operations
- Speed Control of a Closed Loop Feed to Stop System



XL200 Series Software Options

Continuous Press (C)

- Support for a press that runs continuously often used in Stamping Operations
- Ability to position the material based on the Stroke Rate of the Press and Feed Angle
- Continuous on Demand will switch to Single Stroke on the fly for long moves



XL200 Series Software Options

Sercos (O)

- Ability to control a servo drive via the Sercos II.
- Digital control of the drive. No analog signals and electrical noise to deal with



XL200 Series Software Options

Hole Detect (H)

- Provides hole detect functionality. The controller will detect the leading edge of a piece of material, detect a single hole, or detect and count a series of holes.



Status—Current Date/Time, Machine Status, Line Speed, Length Past Shear

Remaining Footage

Order Number

Tooling

Navigation

Menu-based Function Keys

Duplicates hotkey functions

Functions change based on current menu selection.

[illegible]

Bundle
Quantity
Length
Status

Machine Controller Basics

Production Flows

| | | | | | | | | | |
|--------------------------|--------|-------------------|-------------------------------------|--------|------|-------------|---------|--------|--------|
| 11/13/13 | HALTED | 0FPM | | 0.000" | | | | | |
| 1:49 PM | | | | | | | | | |
| Order: Order 5670 | | Total: 4185Ft | | Done: | | | | | |
| Material: 22 Gauge Steel | | PCode: Cee Purlin | | | | | | | |
| Order-Material-PCode | | Bundle | Stg | Qty | Done | Part Length | Pattern | Option | Status |
| [-] Order 5672 | | 1 | <input type="checkbox"/> | 50 | 0 | 240.000" | 0 | Rgt | Ready |
| 18 Gauge Steel | | 2 | <input type="checkbox"/> | 250 | 0 | 120.000" | 0 | Rgt | Ready |
| Cee Purlin | | 3 | <input checked="" type="checkbox"/> | 125 | 0 | 60.000" | 0 | Rgt | Next |
| [-] Order 5671 | | 4 | <input type="checkbox"/> | 12 | 0 | 48.000" | 0 | Rgt | Ready |
| 18 Gauge Steel | | 5 | <input type="checkbox"/> | 6 | 0 | 24.000" | 0 | Rgt | Ready |
| Cee Purlin | | | | | | | | | |
| [-] Order 5670 | | | | | | | | | |
| 22 Gauge Steel | | | | | | | | | |
| Cee Purlin | | | | | | | | | |
| [-] Order 5669 | | | | | | | | | |
| + Order 5631 | | | | | | | | | |
| + Order 5629 | | | | | | | | | |
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Length Calibration

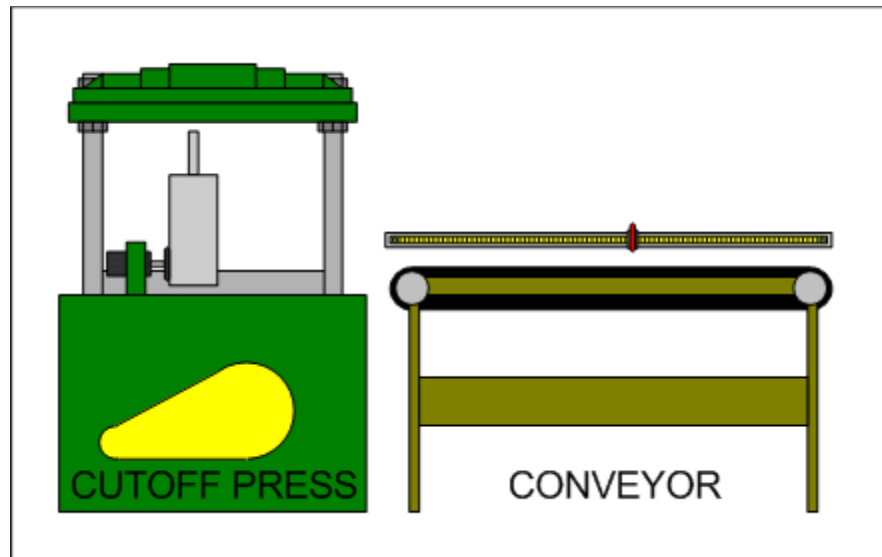
On-board Length Calibration

- Calibration corrects consistent error, *not* variance.
- Calibration is required due to encoder wheel measuring error.
- Operators enter length measured.
- Mind the queue!

| | | | | |
|--|---------------|-------------------------------------|------------------------|------------------|
| 11/13/13 | HALTED | 0FPM | | 13.395" |
| 2:32 PM | | | | |
| Model: XL200 | | Created: 0/00/0012:00 AM Switch: 51 | | Version: 4.12.03 |
| Setup Menu | | ID | Name | Value |
| + Machine Parameters | | 775 | Last Programmed Length | 60.000" |
| - Configurations | | 776 | Last Measured Length | 59.935" |
| - Tool Data | | ↑ 777 | Correction Factor | 100.108% |
| - Trim Correction | | 778 | Parts in Queue (Auto) | 2 |
| + Controller Settings | | | | |
| - License | | | | |
| - QuickSet Data | | | | |
| - Setup Libraries | | | | |
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| During a Trim Calibration, enter the actual measured part length produced by the AMS controller. | | | | |
| SetUp F1-Next Window F2-Add to Config. F3-Remove From Config. F4-Set Lock F5-Clear Lock F6-Add QuickSet | | | | |

The Part Queue

Allows on-the-fly changes without stopping the machine or producing scrap parts.



WAY BACK – in the “bad old days”

- Extremely precise lengths
- Lower production rates
- Inherent downtime and scrap

The Part Queue

Shear-only Part Queue

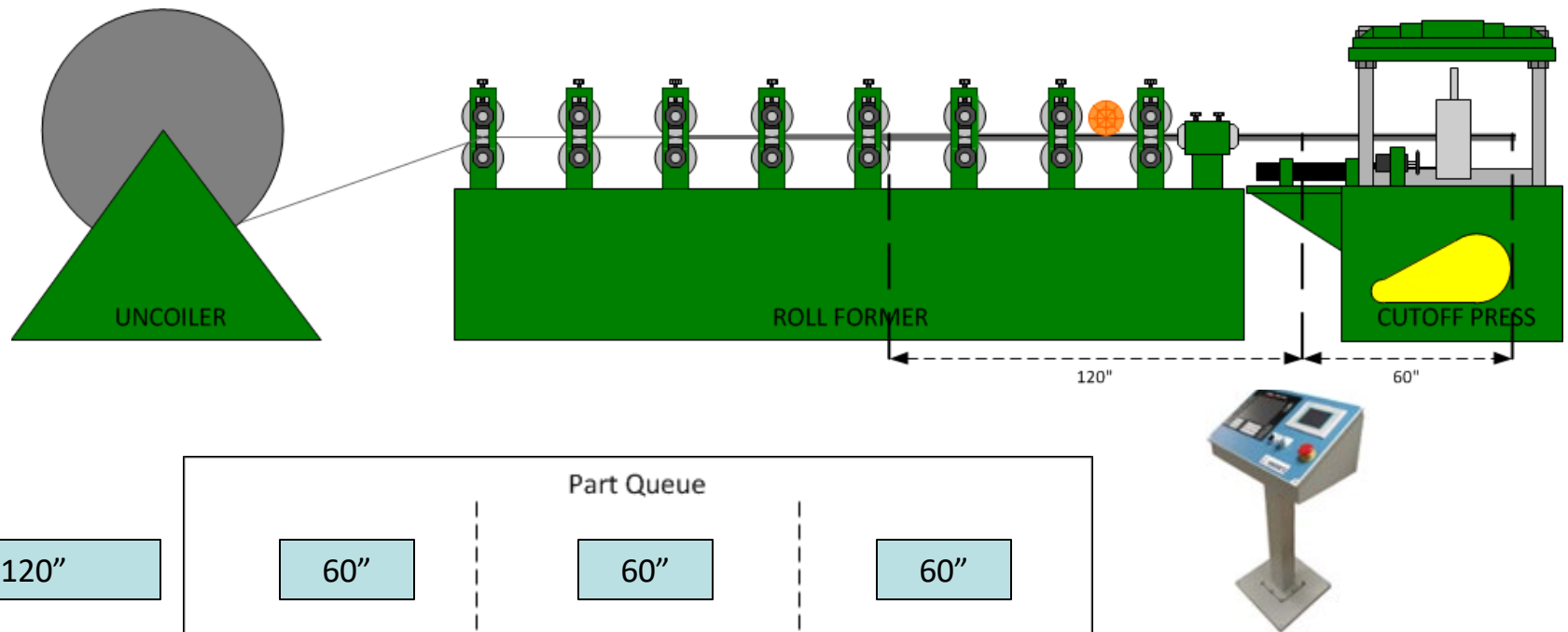
Two versions of the Part Queue: Shear-only and Punching

| | | | |
|---|---------------|------------------------|----------|
| 11/15/13 | HALTED | 0FPM | 25.793" |
| 3:10 PM | | | |
| Model: XL200 Created: 0/00/0012:00 AM Switch: 3 Version: 4.12.03 | | | |
| Setup Menu | ID | Name | Value |
| + Machine Parameters | 775 | Last Programmed Length | 60.000" |
| Configurations | 776 | Last Measured Length | 0.000" |
| Tool Data | ↑ 777 | Correction Factor | 100.000% |
| Trim Correction | 778 | Parts in Queue (Auto) | 0 |
| + Controller Settings | | | |
| License | | | |
| QuickSet Data | | | |
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| Automatically computes a new Correction Factor based on programmed part length and actual measured part length. Use this feature to calibrate the machine only when actual part lengths are CONSISTENTLY long or CONSISTENTLY short by the same | | | |
| SetUp F1-Next Window F2-Add to Config. F3-Remove From Config. F4-Set Lock F5-Clear Lock F6-Add QuickSet | | | |

The Part Queue is “dumped” when the line is halted

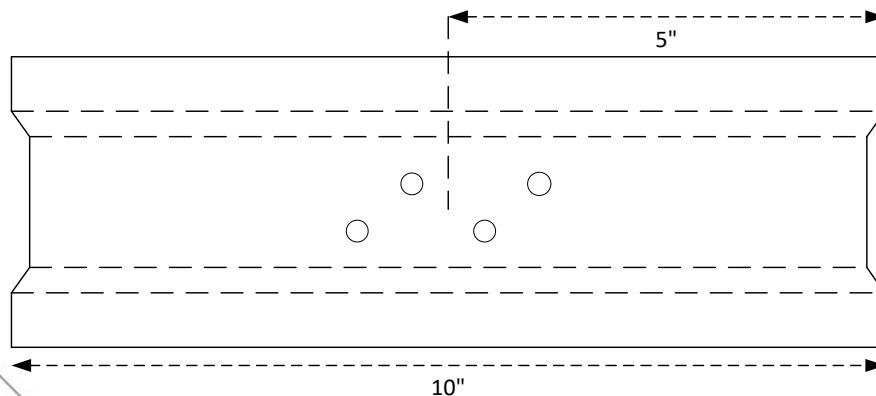
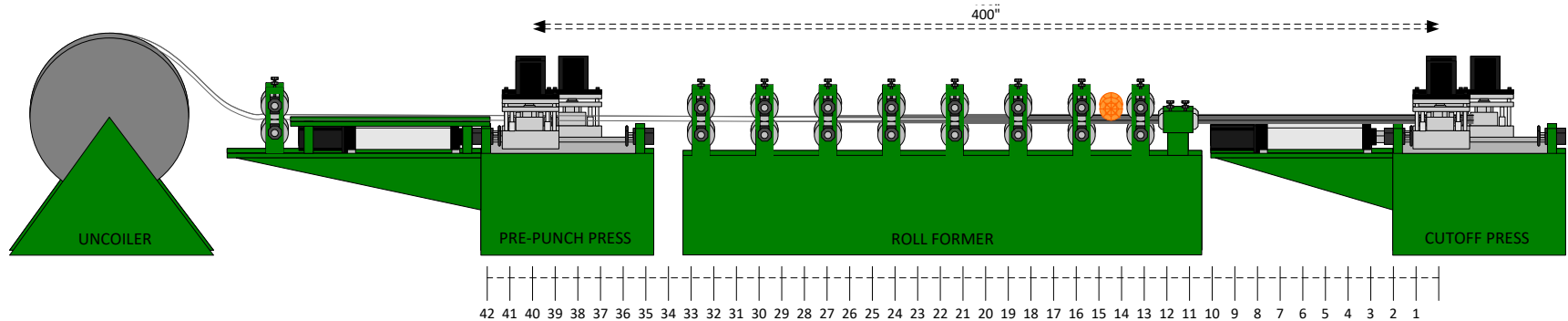
The Part Queue

Shear-only Part Queue



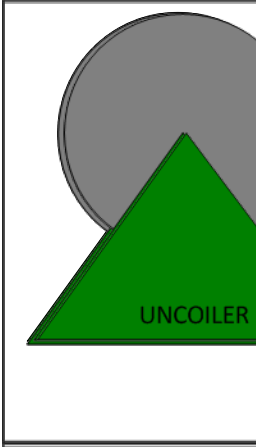
The Part Queue

Punching Part Queue



Coil Change

Decrease Quantity is used to recover good product from something previously counted as scrap. It subtracts from the Scrap total and adds length back to the Good total.



UNCOILER

11/18/13
HALTED
0EPM
0.000"

Wrong Coil Loaded

Order: Order 5669

Material: 22

Order-Ma

- ☐ Order 5670
- 22 Gauge S
- Cee Purli
- ☐ Order 5669
- 22 Gauge S
- Cee Purli
- ☐ Order 5631
- ☐ Order 5629

Current Order's Material **22 Gauge Steel**

Current Coil's Material **18 Gauge Steel**

Don't run this order with the current coil.

Cancel

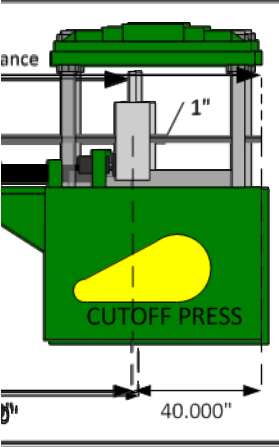
Run this order with the current coil.

Override

The material assigned to the current coil is incorrect. Reassign the current order's material to the current coil.

Correct

| Status |
|--------|
| Next |
| Ready |
| Ready |
| Ready |
| Ready |



CUTOFF PRESS

Status F1-Next Window F2-Set to Next F3-Skip/Ready F4-Remake F5-Dec Qty

Navigating the Controller

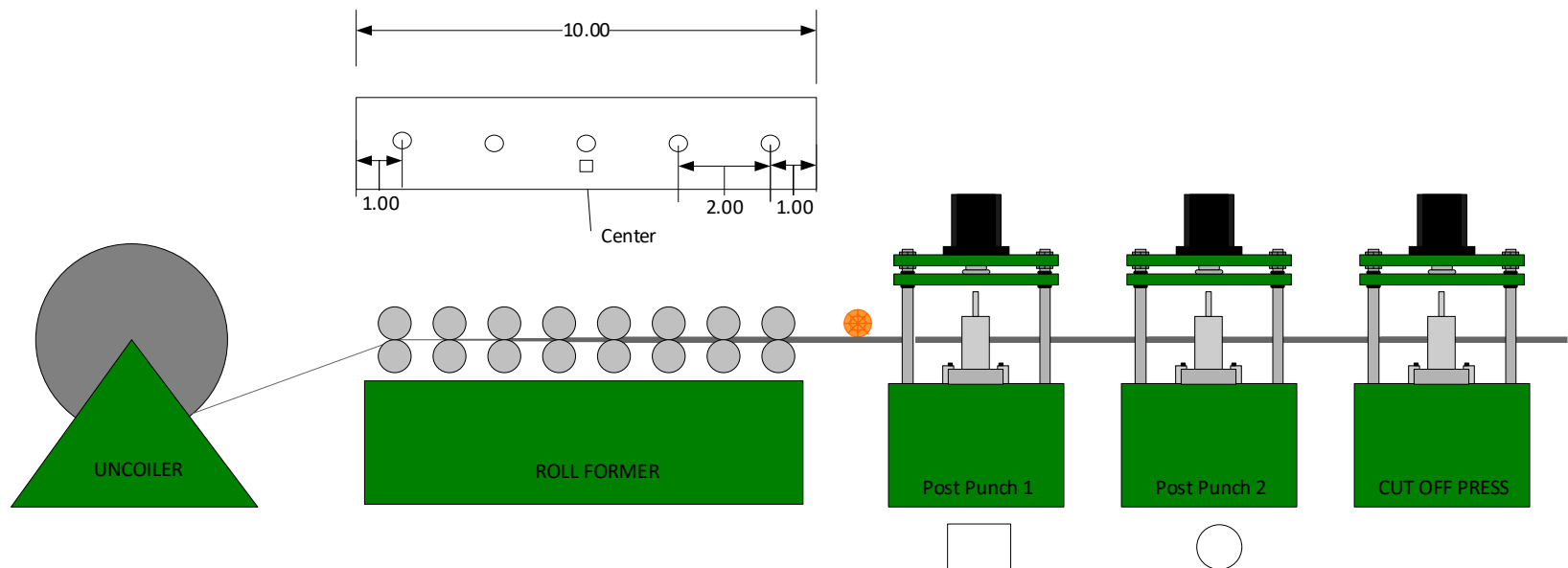
- Pages 20-24
- Program an Order
- Edit an Existing Order or Item
- Change the Sequence of Items Within an Order
- Remake an Item
- Delete a New or Done Order or Item
- Set the Next Line to Run
- Delete a Partially Completed Order or Item
- Increment Quantity During Run Mode

Navigating the Controller (Cont.)

- Pages 20-24
- Decrement Quantity (Identifying Scrapped Parts as Good Parts)
- Skip an Item to be Run
- View Coil Inventory
- View Inputs and Outputs
- Set the Time Clock
- Create a Pattern (Punching Only)
- Edit a Pattern (Punching Only)

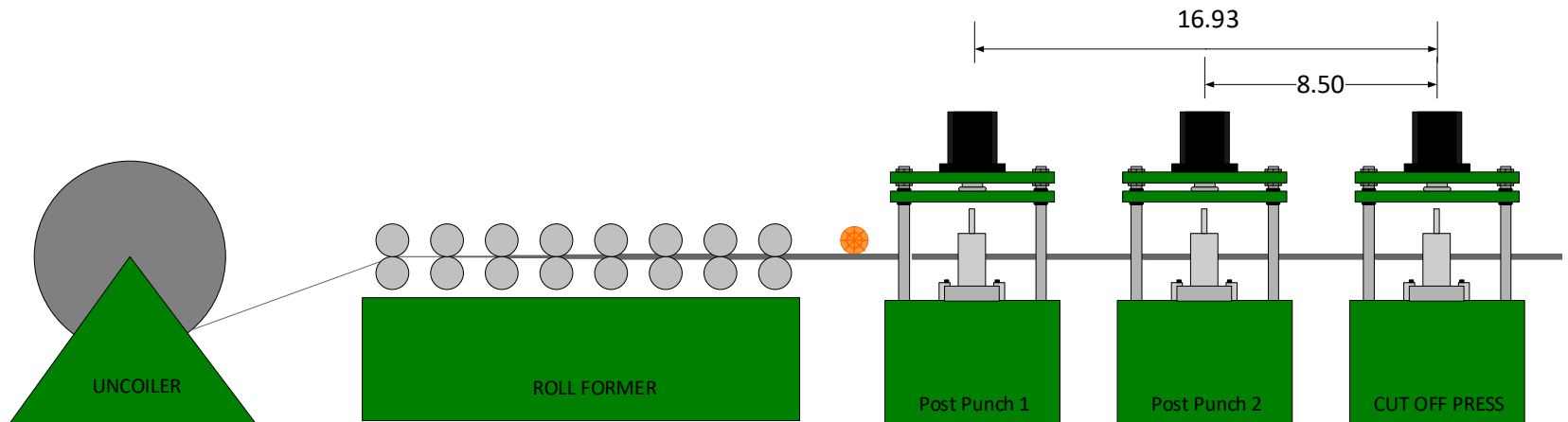
Punching Systems Overview

- Parts Programmed in Finished Dimensions
- Smart Punch Referencing for Expandable Patterns



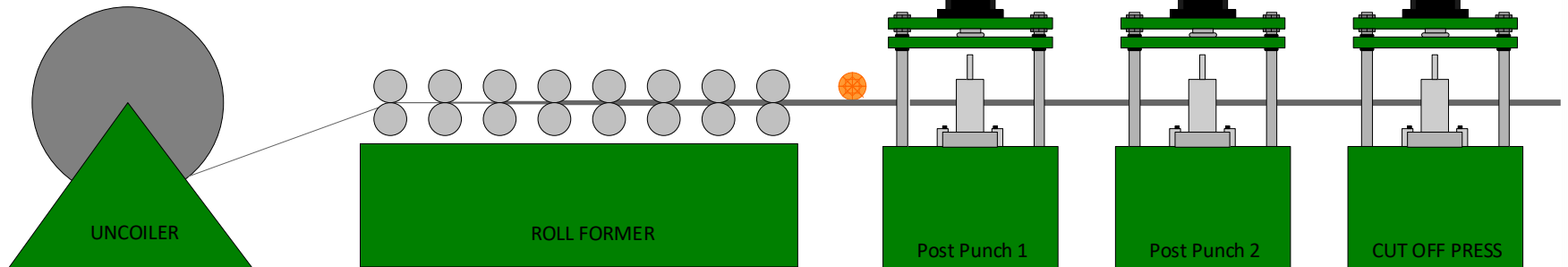
Tool Set Up - Steps

1. Measure accurate tool positions
2. Enter "Tool Data" into the controller



Tool Set Up – Step 1

1. Load Material up to the Shear
2. Manually Fire the Shear
3. Manually Fire Each Press
4. Jog all holes past the shear
5. Measure each hole location



Tool Set Up – Step 2

1. Assign a Tool Number
2. Identify the associated Press and Gag output
3. What is a Gag?

AMS PEG Development Window

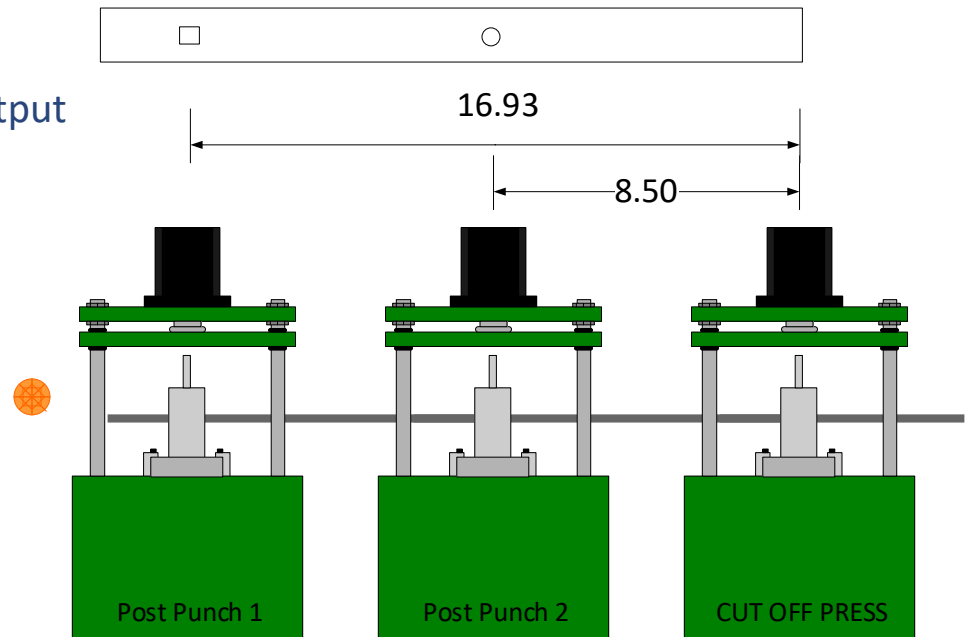
11/06/23 9:00 AM **HALTED** 0FPM 0.000"

Model: XL206 Created: 3/29/23 4:44 PM Switch: 17 Serial #: IBM PC Version: 6.89.02

| Setup Menu | ID | Press | Gag | X-Offset | Y-Offset | Axis | Name |
|----------------------|----|-------|-----|----------|----------|------|-------|
| Machine Parameters | 0 | 0 | 0 | 0.0000" | 0.0000" | | Shear |
| Setup Configurations | 1 | 1 | 0 | 8.5000" | 0.0000" | | PP1 |
| Tool Configurations | 2 | 2 | 0 | 16.9300" | 0.0000" | | PP2 |
| Tool Data | | | | | | | |
| Trim Correction | | | | | | | |
| Controller Settings | | | | | | | |
| License | | | | | | | |
| QuickSet Data | | | | | | | |

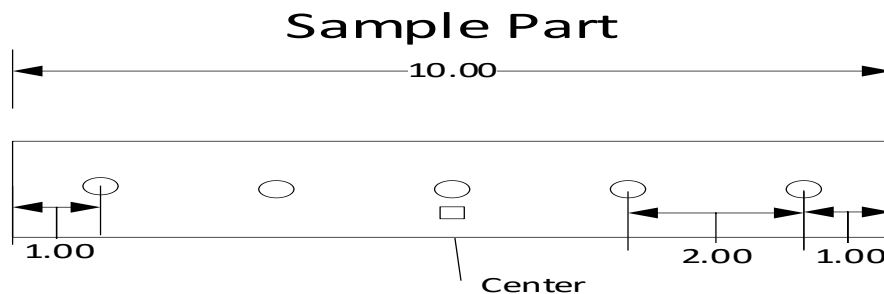
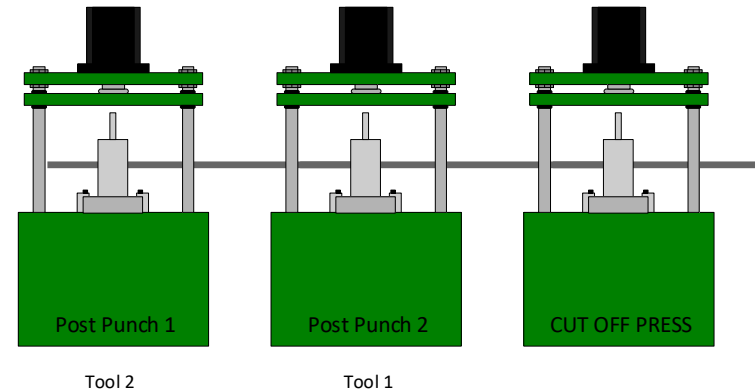
Lists all tools defined for the controller. A TOOL definition assigns an identifier to a specific PRESS (and GAG) output. Each TOOL definition also includes an OFFSET distance that defines the tool's location relative to the machine's designated reference point.

Setup F1-Next Window F2-Tool Correction



Creating a Punch Pattern– Overview

- Punch Patterns are Independent of Part Length

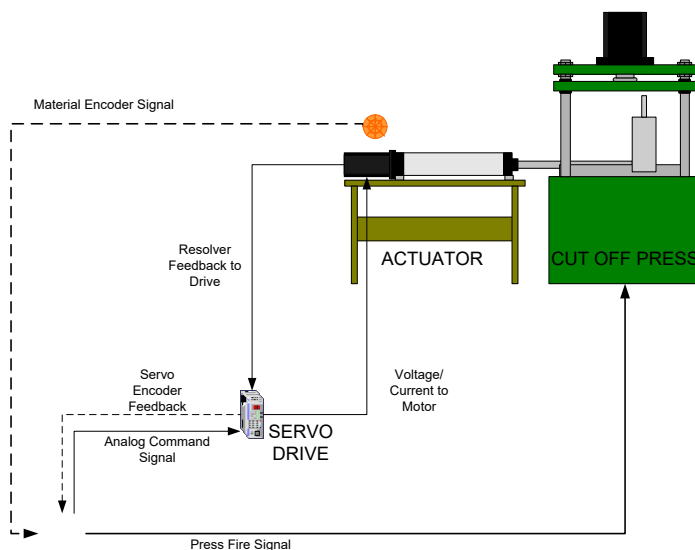
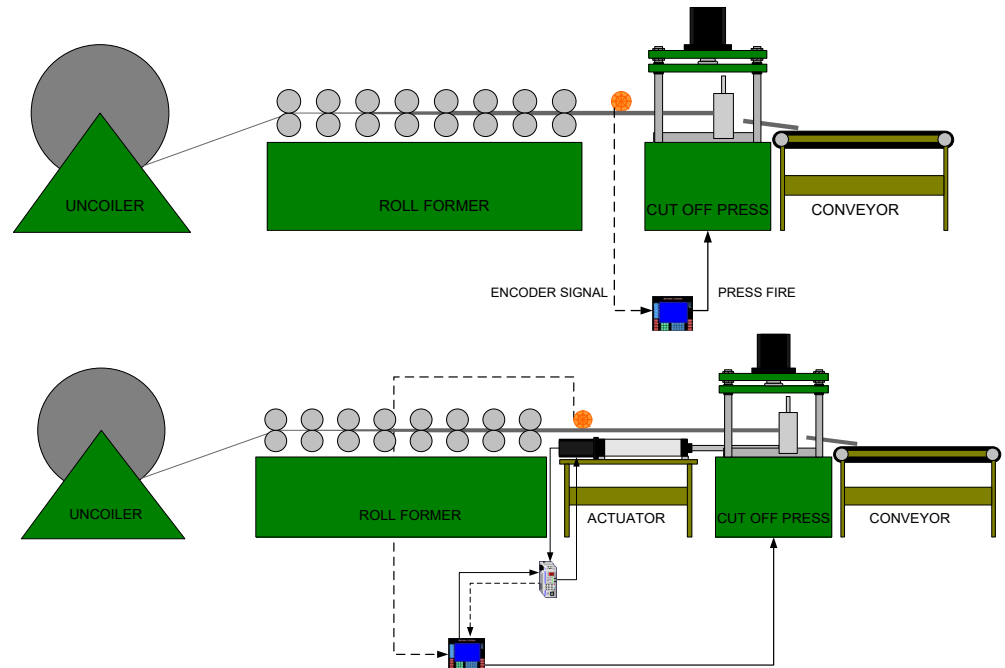


Creating a Punch Pattern– Punch References

- Leading Edge
- Training Edge
- Leading Center
- Trailing Center
- Even Space
- Spacing Limit
- Kerf Adjust
- Independent
- Proportional Min
- Proportional Max
- Proportional Limit

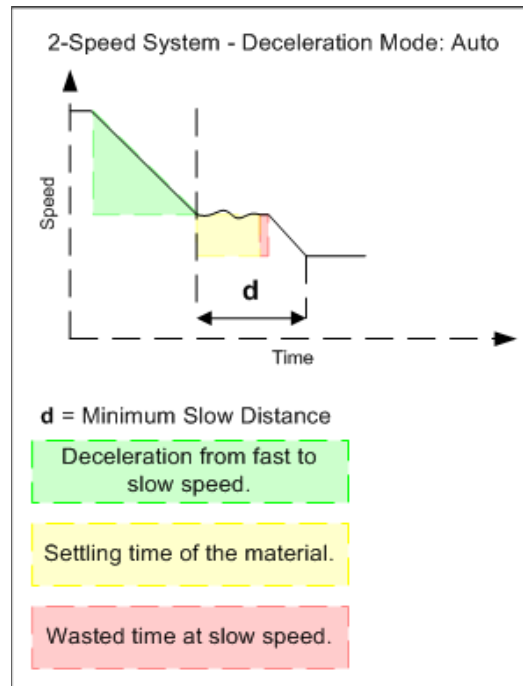
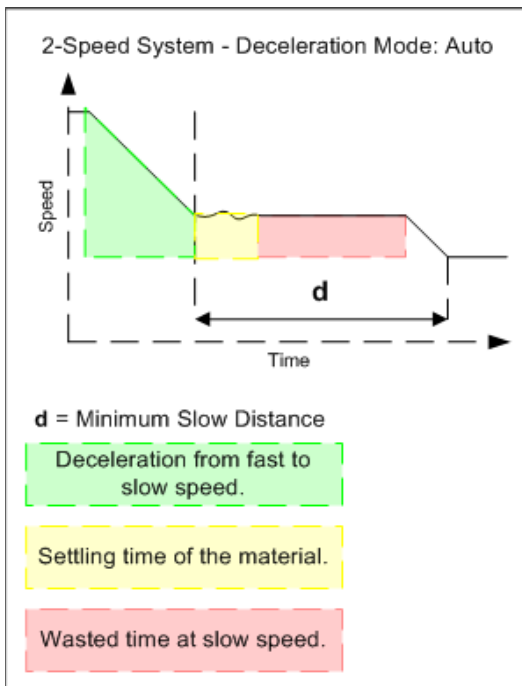
Machine Types

- Open Loop Feed-to-Stop
- Open Loop Flying Cut
- Closed Loop Feed-to-Stop
- Closed Loop Flying Cut



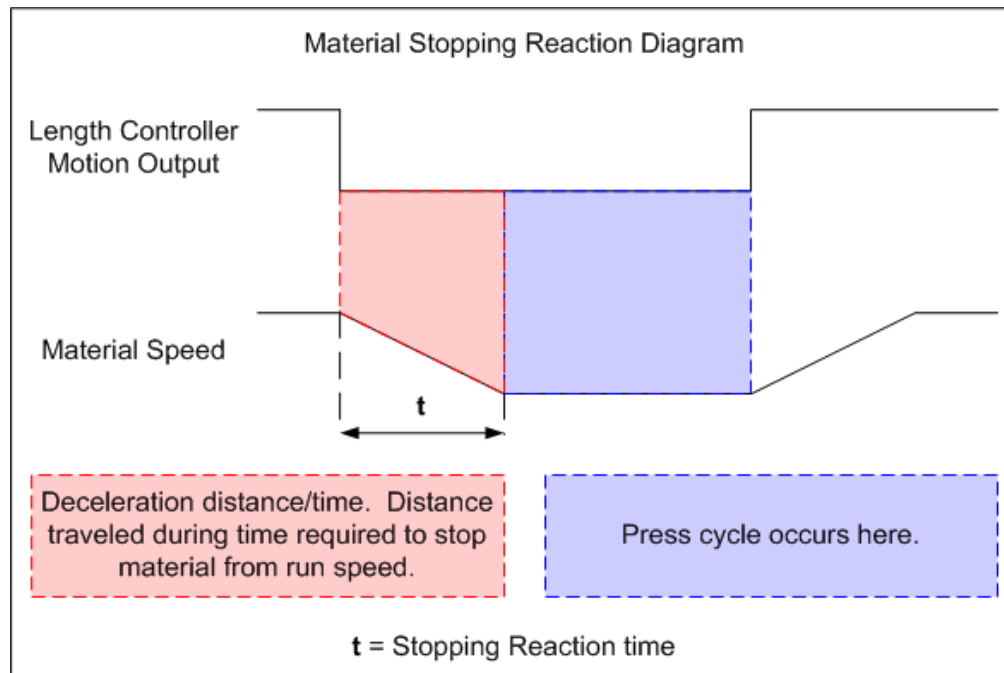
Open Loop Feed-to-Stop

- Pages 67-79
- Minimum Slow Distance



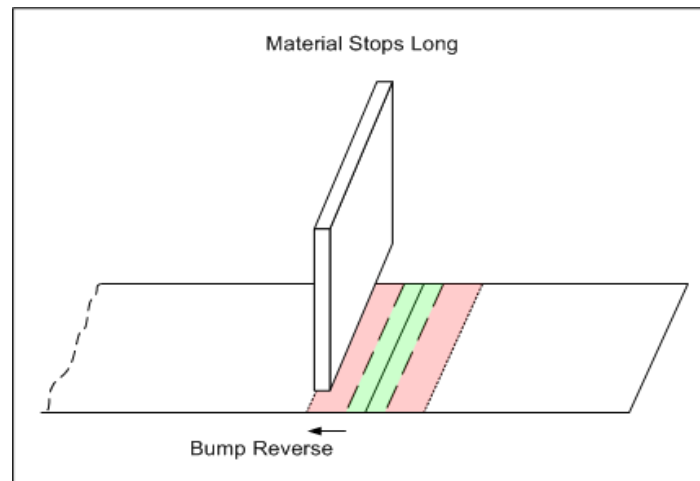
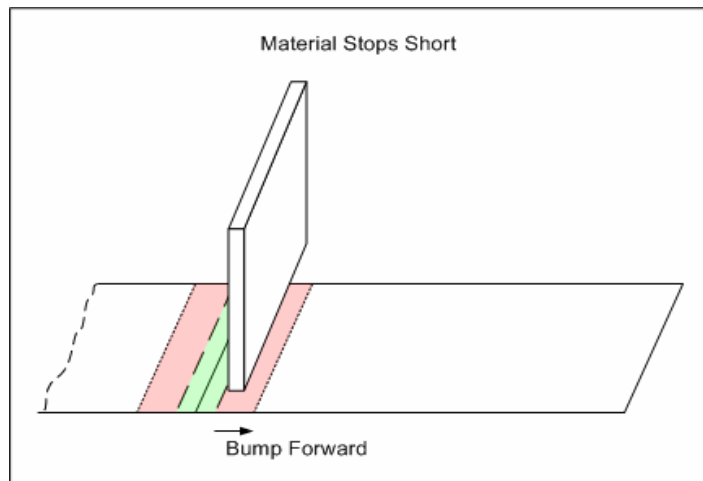
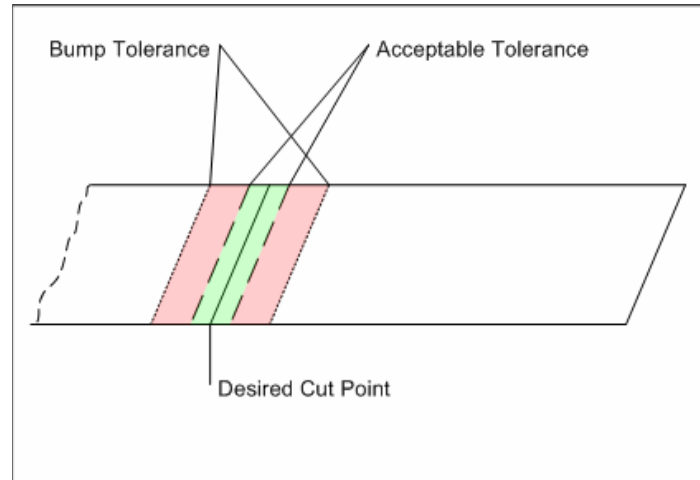
Open Loop Feed-to-Stop (Cont.)

- Pages 67-79
- Stopping Reaction Time
- Stopping Reaction Mode



Open Loop Feed-to-Stop (Cont.)

- Pages 67-79
- Bump Tolerance
- Bump Time



Open Loop Flying Cut

AMS XL200 Series

5/07/07

8:09 PM

RUN

410FPM

5' 7-49/64"

Order: 69

Total:

57670Ft

Done:

50350Ft

Material:

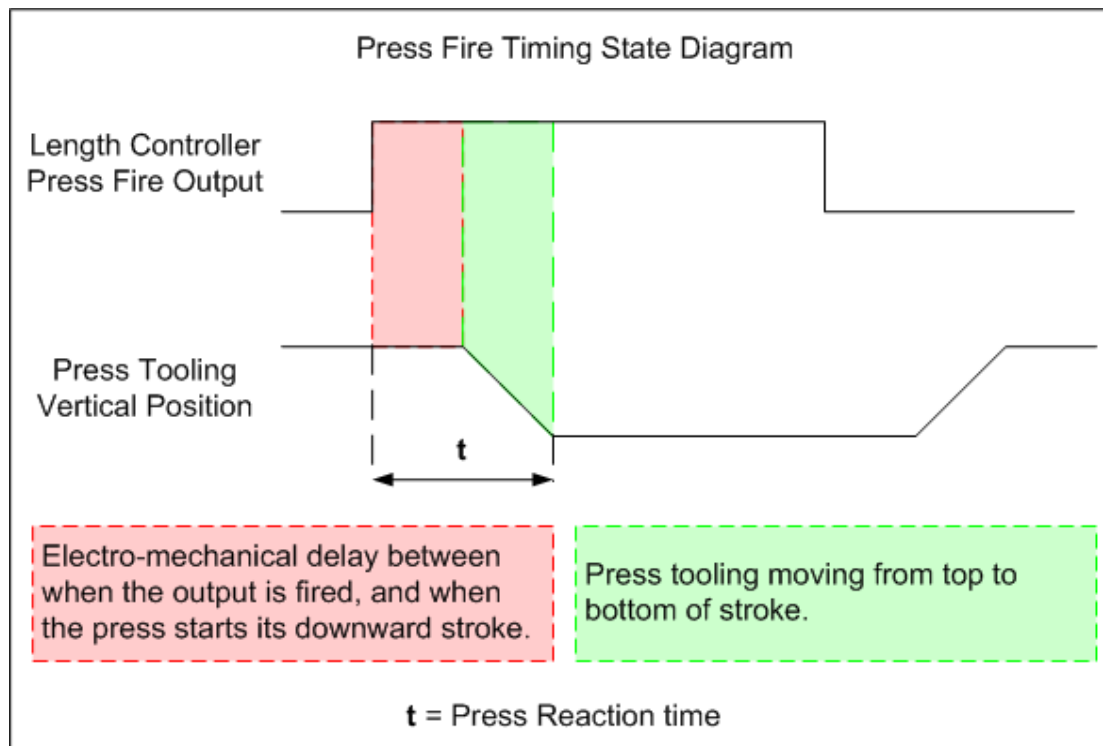
PCode:

Order-Material-PCode

| Bundle | Qty | Done | Part Length | Pattern | Option | Status |
|--------|------|------|-------------|---------|--------|--------|
| 1 | 420 | 75 | 12' 0" | 1 | Rgt | Ready |
| 1 | 520 | 520 | 14' 0" | 1 | Rgt | Done |
| 1 | 840 | 840 | 12' 0" | 1 | Rgt | Done |
| 1 | 840 | 840 | 12' 0" | 1 | Rgt | Done |
| 1 | 1250 | 982 | 10' 0" | 1 | Rgt | Work |
| 1 | 20 | 0 | 20' 0" | 1 | Rgt | Next |

Open Loop Flying Cut

- Pages 80-98
- Shear Reaction



Open Loop Flying Cut (Cont.)

- Pages 80-98
- Shear Boost Dwell
- Shear Boost Reaction

Shear Dwell Down: 0.100 s

Shear Boost Dwell: 0.200 s

Shear Reaction: 0.050 s

Shear Boost Reaction: 0.100 s

Shear
Output



Boost
Output



Open Loop Flying Cut (Cont.)

- Pages 80-98
- Shear Boost Enable Velocity
- Shear Boost Compensation
- Velocity at Max Analog Voltage

Closed Loop Feed-to-Stop



Closed Loop Feed-to-Stop

- Pages 99-120
- Line Resolution
- Motor Resolution
- Loop Gain
- Offset Integral
- Offset Voltage (Auto)
- Traction % Threshold
- Traction % Hysteresis
- Jog Velocity
- Slow Run Velocity
- Maximum Velocity
- Acceleration
- Retract After Cut

Closed Loop Flying Cut

- Pages 99-120
- Tolerance Mode
- Minimum Die Distance
- Maximum Die Distance
- Shear Die Distance
- Reference Die on Manual Shear
- Die Resolution
- Lag Integral
- Lag Compensation (Auto)
- Lag Integration Limit
- Jog Select Mode
- Minimum Die Return Velocity
- Maximum Die Return Velocity

Closed Loop Flying Cut (Cont.)

- Pages 99-120
- Acceleration
- Return Acceleration
- Advance After Cut
- Die Reference

Troubleshooting

- Encoder 10-turn Test
- I/O Testing
- Noise
 - Power Supply Connections
 - Servo Drive Connections
 - Shielding
 - Analog Runs
 - Communication Runs
 - Noise Suppression