



Pathfinder™

Operator's Manual

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Chapter 1: Introduction

The Pathfinder™ control system is designed to make even novice folding machine operators look like experts. From its intuitive, easy-to-use interface to advanced features like SmartPath™ automatic bend sequencing, Pathfinder makes creating profiles and running parts easy.

Some of Pathfinder's innovative features include:

- Intuitive touch screen profile sketching
- Graphical profile library with virtually unlimited profile storage
- Powerful search tools to find the profile you need quickly and easily
- Easy-to-use profile drawing interface for even the most complex profiles
- SmartPath technology can take a profile and automatically generate the best bending sequence based on your machine tooling
- Large graphical icons indicate when material handling is required
- Consolidate tedious material handling operations by utilizing Batch Stops
- Built-in help messages and diagnostics
- Easy to follow wizards to guide users through the machine referencing and calibration processes
- Easy backup and restore via USB flash drives
- Ethernet connection for network or internet access
- Remote diagnostics and assistance via the internet

Getting Familiar with the User Interface

The Pathfinder control system uses the following system components to interact with folding machine operators:

- **LCD (Liquid Crystal Display) Touch Screen** – The Pathfinder operator's console employs a familiar windowed interface including graphical images and simple, industry-standard text to convey information to the machine operator. Users enter data into Pathfinder via on-screen buttons, text boxes and drop-down selection lists. A numeric keypad and/or a full QWERTY keyboard will appear on-screen whenever numeric or alpha-numeric data entry is required.
- **On-Screen Status Indicators** – Graphical images appear on-screen during the automatic mode to indicate when clamping pressure is reached, or when a profile in progress must be rotated, flipped, or turned over.

- **Foot Pedals** – Foot pedals are used to initiate machine actions such as raising or lowering the clamping beam, or starting a bending cycle.

 **Note:** An optional USB keyboard or mouse can also be connected to the system for data entry and navigation.

Starting Pathfinder

The Pathfinder software starts automatically when the system power is turned on. The first screen that appears is the **Operator Log In** screen.

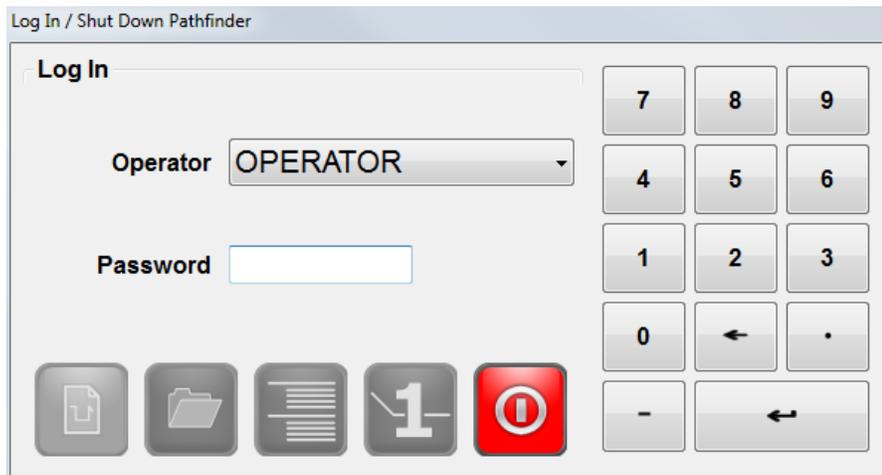


Figure 1: Operator Log In Screen

In the **Operator** field, choose the appropriate user type from the drop-down selection list.

Use the numeric keypad to enter the correct password for the selected user type. (See your Supervisor for the appropriate passwords.)

Touch the button for your starting screen. The list below describes each choice.



Opens New Profile screen.



Opens Profile Library.



Opens Jobs screen.



Opens One-Step.



Logs out the current user.

The default screen's button will be green. Pathfinder remembers the last selection made at log in, and will highlight that choice the next time Pathfinder opens. To accept the default, enter your password and press Enter. To change the default, simply press the button of the option you prefer and it will default to that choice the next time you start Pathfinder.

The same screen appears when logging out or shutting down Pathfinder.

 **Note:** Shutting down the Pathfinder software while logged in as an **Operator** causes a complete system shutdown. Users must be logged in with **Administrator** credentials or higher to exit Pathfinder and access the Windows operating system.

Understanding the Display

Pathfinder's screen is divided into three major areas: the **Main Toolbar**, the **Status Bar**, and the **View Pane**. While the Main Toolbar and Status Bar remain static, the View Pane will change depending on what part of the application is being used.

The View Pane

After logging in to Pathfinder, the screen appears as shown below:

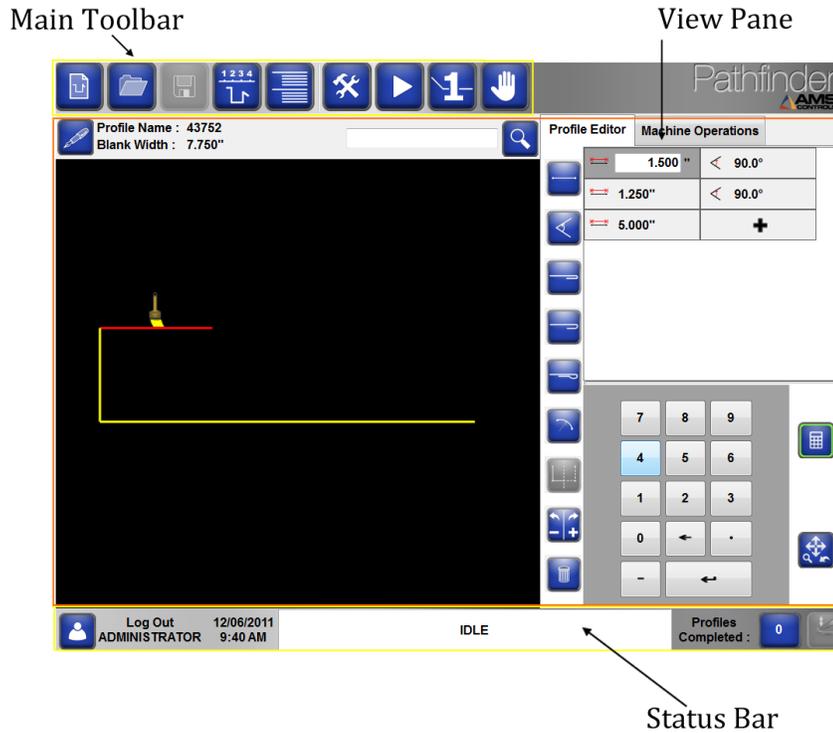


Figure 2: View Pane – Profile Editor View

The left side of the view pane is composed of the Graphical Profile Drawing Area. This is where your profile will appear as you sketch it or as you enter features on the right side of the View Pane.

Notice the two notebook tabs on the upper right-hand side of the screen. Selecting one of these tabs switches the view pane between one of two views, the **Profile Editor** view and the **Machine Operations** view. The **Profile Editor** view is used for programming and modifying profiles while the **Machine Operations** view is used when running profiles on the machine. When the Main Toolbar is used to change functions, the View Pane will change as well.

The Main Toolbar

The buttons on Pathfinder's main toolbar are used to open various other screens or to control the folding machine's operation.

Pathfinder's main toolbar buttons are described below:



Create New Profile/Category - This button opens the **New Profile Information** screen where the user can enter general information for a new profile or create new categories for organizing profiles.



Profile Library - This button opens the **Profile Library** screen where the user can select a profile to edit or run on the machine, copy profiles or delete profiles from the library.



Save Profile - This button saves the current profile to the **Profile Library**.



Bending Sequence – This button opens the **Bending Sequence** screen where the user can review a list of possible bending sequences for the current profile or create new custom bending sequences.



Job Management – This button accesses jobs created in **Order Desk**.

Tools - This button opens the **Tools** screen where the user can:



- Adjust controller settings
- Perform system diagnostics
- Create material definitions
- View lists of machine parameters
- Reference the machine
- Calibrate the machine
- View system information
- Perform administrative functions



Auto Mode Start - This button causes the machine to enter **Automatic** mode and run the current selected profile.



Auto Mode Stop – This button causes the machine to exit **Automatic** mode.



One-Step Production – This button allows the operator to skip profile creation and start creating parts by entering material type, thickness, backgauge position and clamp open position.



Manual Jog Mode - This button opens the **Manual Jog** mode dialog window where the user can jog the machine's clamping beam, bending beam and backgauge axes.

The Status Bar



Figure 3: Pathfinder Status Bar

The Status Bar appears across the bottom of Pathfinder's display and provides the following information and functionality:

- **Log Out Button** – This field displays the user type for the currently logged-in user and provides a button to access the **Log In/Shutdown** window.
- **Time/Date** – This field displays the current time and date settings for the Pathfinder PC.
- **Machine Status** – This field displays the current operational state of the embedded motion controller (Idle, Automatic, Jog, etc.) and/or a communication status for the control system. See **Understanding Machine Statuses** on page 11 for more information.
- **Profile Counter** – This field displays the number of pieces in the current batch and provides a button to access the **Profile Counting – Batching** window.
-  **Stamping Mode Indicator** – This button indicates whether the machine is currently in **Stamping Mode**. This mode determines how radius bends are made while in Automatic. See **Radius and Stamping Mode**, page 31.
-  **Power Mode Indicator** – This button indicates whether the **Power Mode** is active and allows the user to turn this mode on or off. The Power Mode indicator is visible only on electric folding machines. When Power Mode is enabled, the bending beam is slowed to the speed set by the **Parameter 206 - Power Mode Speed**.

Understanding Machine Statuses

The **Machine Status** indicator at the bottom of the Pathfinder screen provides useful information about the current status of your system. Different colors signify different operational states or communication problems. The complete list of statuses is included below:

AUTOMATIC – Pathfinder is connected to the motion controller and ready to run profiles.

IDLE – Pathfinder is connected to the motion controller and is waiting.

HALT – The machine has been stopped. This is a transition state between AUTOMATIC/JOG and IDLE.

ERROR – There is a problem connecting to the motion controller.

CONFIGURATION – The machine must be configured before you can continue.

CALIBRATION – The machine must be calibrated before you can continue.

JOG – The machine is being manually jogged.

OFFLINE – Communication to the motion controller has been lost.

Chapter 2: Using the Profile Library

Introduction to the Profile Library

Pathfinder makes it easy to build, use and share a large library of profiles. Tens of thousands of profiles can be shared among many Pathfinder machines on a network. This means that once you've created a profile, you can use it on any of your networked machines within seconds.

The **Profile Library** can be sorted and filtered in many ways and has a powerful search function that makes locating a specific profile easy. This chapter will explain how to use the **Profile Library** and its many features.

Selecting Existing Profiles

To create an existing profile or create a new profile by modifying an existing profile, you must first find the necessary profile in the **Profile Library**. To select a profile,

On Pathfinder's Main Toolbar, select the **Profile Library**  button. The **Profile Library** screen appears as shown below.

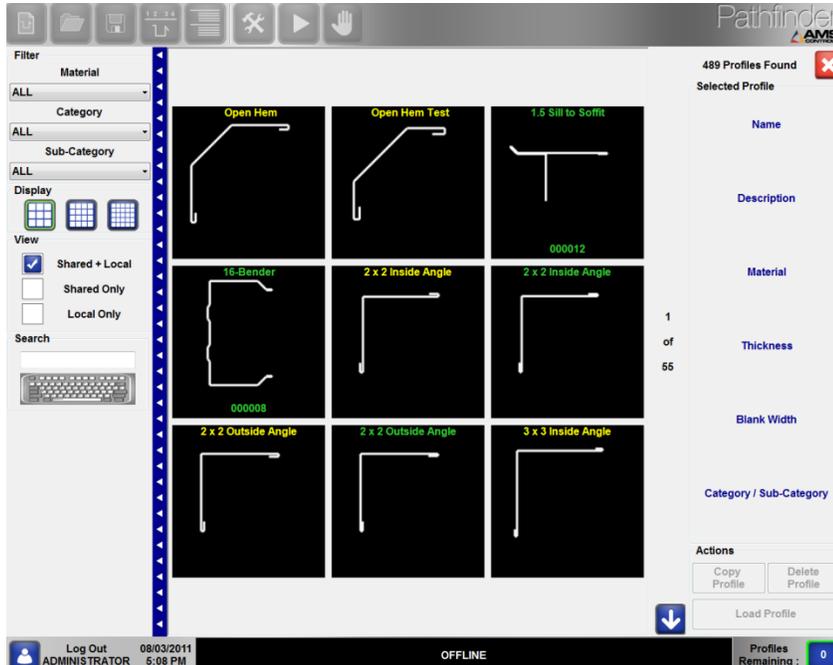


Figure 4: Profile Library Screen

A thumbnail image of each profile in the library is displayed by default. If there are more profiles in the library that can be shown on one screen, the images will be divided into multiple pages.

Use the **Images**    buttons to display either 9, 16 or 25 thumbnails per page.

Use the **Down Arrow**  or **Up Arrow**  buttons to move from one page to the next until the desired profile's image appears.

When you find the profile you want, touch the image of the profile **once** to select it and view its general information on the right side of the screen. Touch the profile **twice** to display the profile on the view pane, where you can then edit the profile.

Using Profile Library Search

Pathfinder's Profile Library has a powerful search function that allows you to search both Name and Description fields of all profiles within the library. To use the **Search** function,

Touch the Show Keyboard  button to access the profile search function. An on-screen keyboard appears allowing you to type the Profile Name or Description for the profile you are seeking. With each key press, Pathfinder refines its search and displays only profiles whose name or description contains those characters. The on-screen keyboard can be disabled by touching the Hide Keyboard  button.

The profile search can be even further refined by using a filter. Use the drop-down lists for **Material**, **Category** and **Sub-Category** to filter results to include only those items with the specified Material, Category or Sub-Category.

You can also select checkboxes for libraries **Shared + Local**, **Shared Only** and **Local Only**. The profiles library will only display profiles whose characteristics match the criteria specified by the filter.

 **Note:** **Shared** profiles are those shared between multiple Pathfinder-controlled machines through a network. If a network is not available, you will only see **Local** profiles stored on the Pathfinder PC itself. Shared profiles are shown in green text and local profiles are in yellow text for easy differentiation.

Once you've narrowed the list, use the **Down Arrow**  or **Up Arrow**  buttons to page through the remaining thumbnails and select a profile.

Verifying Profile Validity

Pathfinder now provides instant feedback on whether a profile can be validly sequenced. If the profile is invalid and cannot be sequenced, the **Sequence Button**, normally blue, will become red.



Valid Profile



Invalid Profile

Until a New Profile has at least three features, the **Sequence Button** will be disabled. After three features have been added, it will activate and display blue for valid sequences and red for invalid sequences. Clicking the red **Sequence Button** will prompt Pathfinder to provide the reason the profile is invalid.

It is important to remember that valid profiles must:

- Contain three or more features.
 - Ex. Segment – Angle – Segment is a valid sequence. Segment – Angle is not a valid sequence.
- Not contain two of the same features in a row.
 - Ex. Segment – Angle – Angle is an invalid sequence. Segment – Angle – Segment is a valid sequence.
- Begin and end with a segment.
 - Ex. Angle – Segment – Angle – Segment is an invalid profile. Segment – Angle – Segment – Hem – Segment is a valid profile.
- Contain angles, hems or radius parts that are preceded and followed by a segment.

Ex. Segment – Radius – Segment is a valid profile. Segment – Hem – Hem is not a valid profile.

Chapter 3: Editing Existing Profiles

Since many profiles have very similar shapes, it is often easier to create a new profile by making a copy of an existing profile and then modifying a few dimensions, rather than creating a new profile from scratch. This can be done easily once a profile has been saved in Pathfinder's **Profile Library**.

Making a Copy of a Library Profile

The first step is to locate a profile in the **Profile Library** to use as a starting point.

Select the profile that will be copied from the **Profile Library**.

Touch the **Copy Profile** button, the **Copy Profile** dialog window appears.

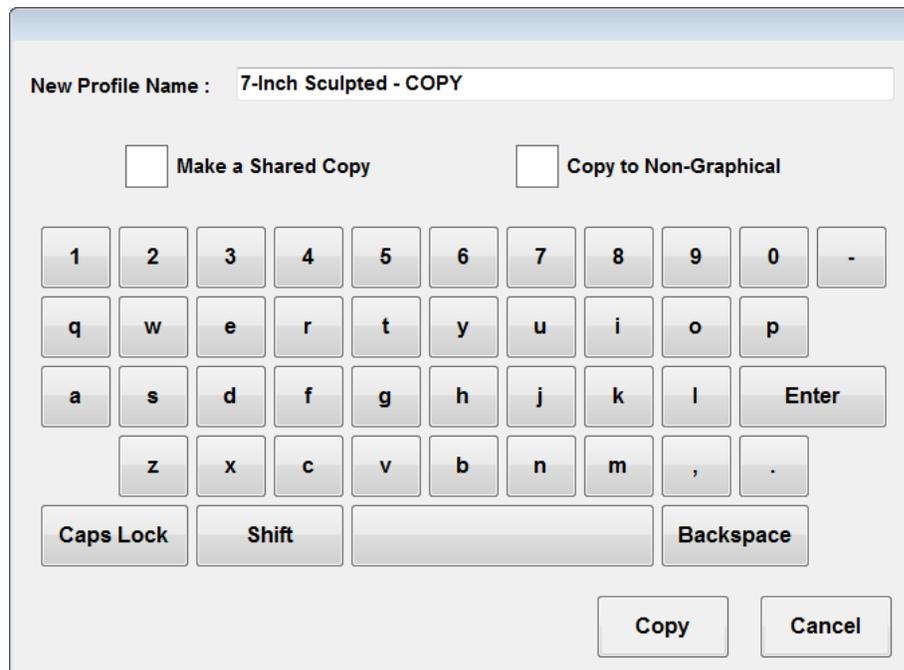


Figure 5: Copy Profile Dialog Window

Enter a **Profile Name** for the new profile then touch the **Copy** button to add it to the library. All of the data for the copied profile will be transferred to the new profile, including the geometric features and any saved custom bending sequences. If the original profile was non-graphical, all of the machine operations and properties will be transferred to the new profile.

Optionally, select **Make a Shared Copy** to add this new profile to the shared network profile library.

Optionally, if the profile being copied is graphical and has been saved with a preferred bending sequence, a checkbox is included on the **Copy Dialog Window** that allows you to convert the graphical profile to a non-graphical profile. This option uses the dimensions in the profile's geometric profile and the properties in the preferred bending sequence to create the machine operations for a new non-graphical profile.

Once the new profile's image appears, touch the image again or touch the **Load Profile** button to load the profile into the view pane.

Editing the General Profile Information

The general profile information that was entered whenever the new profile was created can also be edited at any time from within the view pane.

Touch the **Edit Profile Details**  button to display the **Profile/Category Definition** dialog window.

Figure 6: Profile/Category Definition Dialog

Use the on-screen keyboard to change any of the properties for the profile then touch the **OK** button.

 **Note:** Changes to the general profile information are not saved to the **Profile Library** until the profile is saved via the **Save**  button.

Changing a Graphical Profile

Once a graphical profile has been recalled from the **Profile Library** and loaded in to the **Profile Editor**, it can be easily modified by changing the properties of any geometric feature, or by adding or removing geometric features.

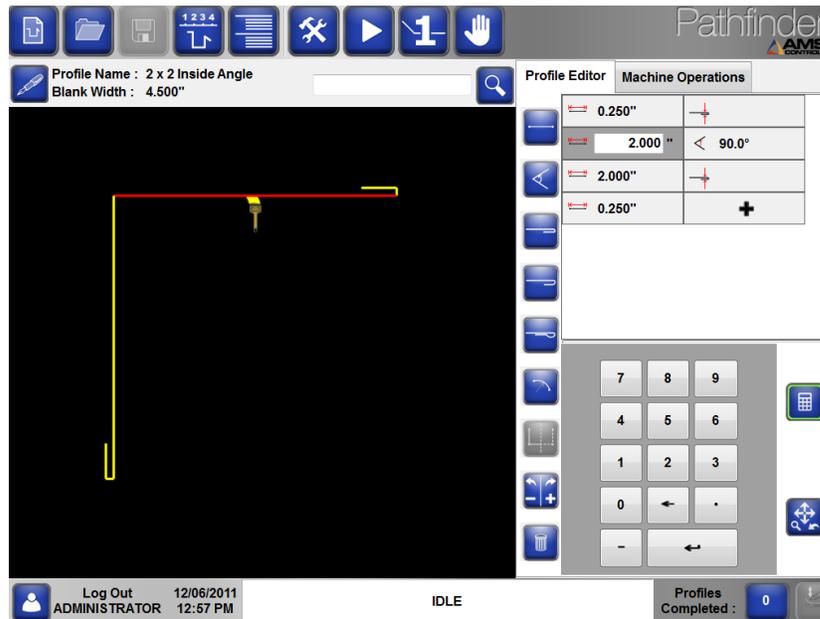


Figure 7: Editing a Profile

To change the value of a property for any existing **Segment**, **Angle**, **Hem** or **Radius** feature:

Select the desired feature by touching the textbox for the property you want to edit. Note that selected line segments will change to the color red and selected vertices will change to the color green.

Type the new value into the textbox by using the numeric keypad.

To add a new geometric feature to the *end* of the profile:

1. Touch the  button and press the button of the next Geometric Feature;
or
2. Touch the  button twice to automatically enter the top-most Geometric Feature; or
3. Touch the  button and select the shortcut key for the next Geometric Feature and press **Enter**.

To insert a new geometric feature *anywhere* in the profile,

1. Select an existing geometric feature in the table by touching it; then
2. Touch any one of the **Geometric Feature** buttons to insert that feature into the table **above** the currently selected feature.

To *delete* a geometric feature from anywhere in the profile,

1. Select an existing geometric feature in the table by touching it, then touch the **Delete**



button.

 **Note:** All custom bending sequences for the profile will be lost if geometric features are added to or deleted from the profile. However, if **Parameter 708 – Keep Favorite Sequences on Profile Change** is set to YES, the bending sequences will not be lost if changes are made to the properties of existing geometric features. It is the user's responsibility to ensure that any previously created custom bending sequence is still valid after a segment length, angle or any other geometric feature's property has been changed.

Changing a Non-Graphical Profile

Once a non-graphical profile has been recalled from the **Profile Library** and loaded into the **Non-Graphical Machine Operations screen**, it can be easily modified by changing the properties of any existing machine operation, or by adding or removing operations.

To change the value of a property for any existing **Bend, Hem** or **Radius**:

1. Select the desired machine operation by touching the textbox for the property you want to edit.
2. Type the new value into the textbox by using the numeric keypad.

To add a new machine operation to the *end* of the program,

1. Select a machine operation type from the drop-down list, then touch the **Enter** button;
or
2. Select the **New Machine Operation** drop-down list by touching it. Use the numeric keypad to make a selection from the drop-down list then touch the **Enter** button.

To insert a new machine operation *anywhere* in the program,

1. Select an existing machine operation in the table by touching it; then

2. Touch any one of the **Machine Operation** buttons to insert that type of operation into the table **above** the currently selected operation.

To delete a machine operation from anywhere in the program,

1. Select an existing machine operation in the table by touching it; then touch the **Delete**  button.

 **Note:** Changes to the non-graphical profile's machine operations are not saved to the **Profile Library** until the profile is saved via the **Save**  button. If you don't save, Pathfinder will prompt you to either **Save Changes** or **Ignore Changes** when you leave the Profile Editor screen.

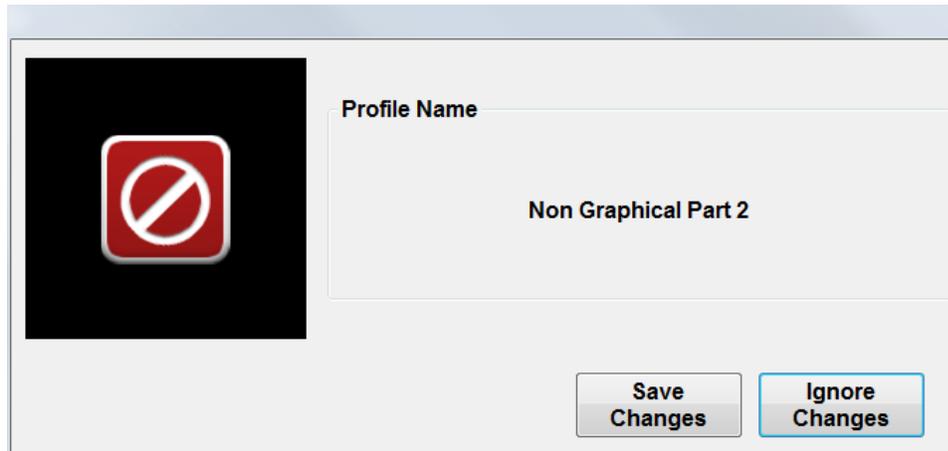


Figure 8: Save or Ignore Changes to a Non-Graphical Profile

Chapter 4: Running Profiles on the Machine

Once a profile has been designed and a bending sequence has been created or chosen for it, Pathfinder automatically creates the **Machine Operations** required by the folding machine to produce this profile. The operations are represented in a table on Pathfinder's view pane while the **Machine Operations** notebook tab is selected.

 **Note:** Most of the information covered in this section pertains to graphical profiles. Running non-graphical profiles on the machine is covered in **Running a Non-Graphical Profile in the Automatic Mode** on page 34.

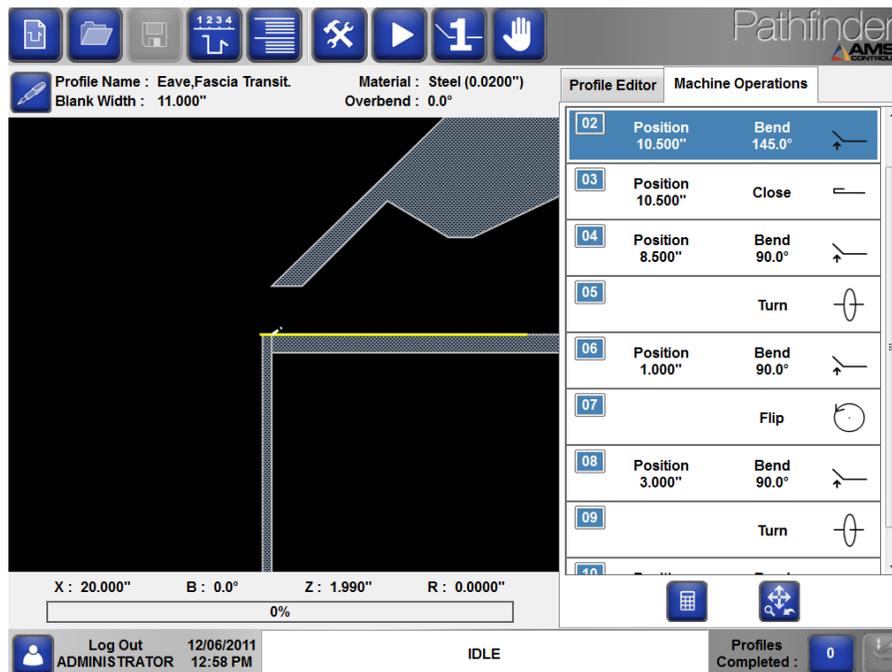


Figure 9: View Pane - Machine Operations View

Adjusting the Machine Operations

The machine operations for bending the profile, closing a hem or creating a radius have several properties that can be modified by the user before running the profile on the machine. The data can be accessed by touching a machine operation on the screen, causing the operation to expand and the properties to become visible. The values for each property can be edited by selecting the textbox for the desired property, then using the on-screen numeric keypad to enter the new value. A description for each available property is provided below.

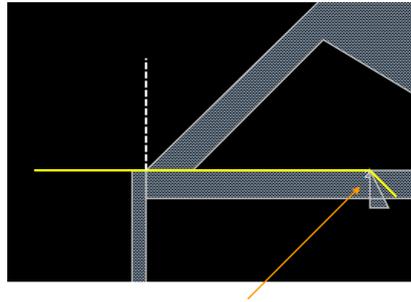
Bend

01	Position 10.500"	Bend 145.0°	
			Batch Stop <input type="checkbox"/>
	Overbend Angle	<input type="text" value="0.0"/>	°
	Backgauge Offset	<input type="text" value="0.000"/>	"
	Clamp Closed Position	<input type="text" value="0.000"/>	"
	Pressure	<input type="text" value="0"/>	%
	Clamp Open Position	<input type="text" value="0.000"/>	"
	Backgauge Position	<input type="text" value="10.500"/>	"
	Bend Angle	<input type="text" value="145.0"/>	°

Figure 10: Machine Operation – Normal Bend

The **Overbend Angle** property specifies an additional bend angle used by the motion controller to compensate for material springback while performing a bend. The motion controller will rotate the bending beam to the sum of the nominal **Bending Angle**, the machine operation's **Overbend Angle** and any overbend angles defined in the material table for the current profile's material thickness. The Overbend Angle will not exceed the maximum bending angle defined in **Parameter 202 - Maximum Bending Angle**.

The **Backgauge Offset** property specifies a distance to adjust the **Backgauge Position** for this operation. The **Backgauge Offset** is required for bends where an already bent segment must be inserted into the machine, and there is not a “clean surface” to gauge the backgauge against as demonstrated in the figure below. It may require trial and error to get the correct offset amount. This property directly affects the **Backgauge Position**.



Backgauge Offset Needed

Figure 11: Backgauge Offset Example

The **Clamp Closed Position** property specifies the height the clamping beam will close to while clamping the profile before it is bent, or while closing a hem. A **Clamp Closed Position** of zero (0.000”) causes the motion controller to lower the clamping beam to the default closing height specified in the material table for the current profile’s material type and thickness.

The **Clamping Pressure** property specifies the percentage of the machine’s maximum clamping pressure which must be achieved to perform the bend or hem operation. A **Pressure** of zero (0%) causes the motion controller to use the clamping pressure defined in the material table for the current profile’s material type and thickness. This property applies only to machines equipped with pressure feedback transducers.

The **Clamp Open Position** property specifies the height the clamping beam will open to after the current machine operation is completed. The motion controller will open the clamping beam to the position specified in the machine operation’s **Clamp Open Position** property or the position specified by the machine setup **Parameter 312 - Minimum Opening Height**, whichever is larger.

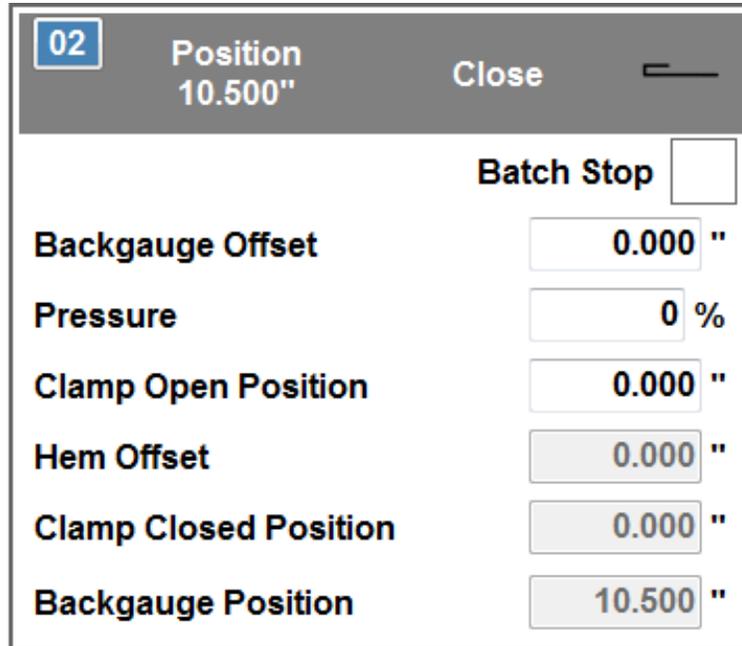
The **Backgauge Position** is the location that the backgauge will move to, relative to the machine’s reference point, before the bend is performed. It is a read-only field that cannot be changed in this screen. **Backgauge Position** is directly affected by **Blank Width** and previous bends.

The **Bend Angle** is the nominal angle the bending beam will rotate to while forming the bend for this operation. The motion controller will position the bending beam to the sum of the nominal **Bend Angle** and any **Overbend** angles specified while performing this operation. The **Bend**

Angle is a read-only field that cannot be changed in this screen. **Bend Angle** can be changed by changing the operation's **Angle**.

The **Batch Stop** property represented by a checkbox designates whether or not this machine operation will be treated as a batch stop while running this profile. See the section titled **Using Batch Stops** on page 36 for more information.

Hem



02		Position	Close
		10.500"	
	Batch Stop	<input type="checkbox"/>	
Backgauge Offset		0.000"	
Pressure		0 %	
Clamp Open Position		0.000"	
Hem Offset		0.000"	
Clamp Closed Position		0.000"	
Backgauge Position		10.500"	

Figure 12: Machine Operation – Hem

A **Hem** machine operation contains many of the same properties as a **Bend**. The following additional **Hem-Closing** properties are described below:

The **Hem Offset** property specifies a distance to adjust the **Backgauge Position** for a hem operation. It is not editable in **Machine Operations** for hem closes, but is visible and greyed out. The **Hem Offset** is only used to create a “tear-drop” style hem, and is entered into the **Tear-Drop Hem** geometric feature when creating a profile.

Radius

01	Position 9.949"	Radius Step 1 / 24	
			Batch Stop <input type="checkbox"/>
Overbend Angle		0.0 °	
Backgauge Offset		0.000 "	
Clamp Closed Position		0.000 "	
Pressure		0 %	
Clamp Open Position		0.000 "	
Radius		1.500 "	
Arc		115.0 °	
Quality		Medium ▾	
Backgauge Position		9.949 "	
Number of Steps		24	
Bend Angle		4.8 °	

Figure 13: Machine Operation – Radius

A curved segment (**Radius**) is formed on the machine by executing a series of incremental bend sub-steps. Each sub-step consists of a relatively small backgauge movement and a small bending angle. A **Radius** machine operation contains many of the same properties as a **Bend**. The following additional properties for **Radius** sub-steps are described below:

The **Radius** property specifies the distance from the center of the partial circle to its perimeter. This is a read-only field that cannot be changed by the user.

The **Arc** property specifies the number of degrees within a circle that the curved segment will be formed to. This is a read-only field that cannot be changed by the user.

The **Quality** property indirectly specifies the number of incremental bends, and the relative backgauge movement between each bend, required by the machine to produce the desired curved segment. **Parameters 153-155 Radius Adjustment – Fine, Medium and Coarse**

determine the incremental backgauge movement for **Fine**, **Medium** and **Coarse** radius quality settings. The **Coarse** quality setting typically requires fewer sub-steps while **Fine** quality typically requires more sub-steps.

The **Backgauge Position** property for a **Radius** machine operation specifies the starting backgauge position for the first sub-step. Each sub-step requires the backgauge to move closer to the clamping beam by a small distance determined by the **Quality** property.

The **Number of Steps** property specifies the number of sub-steps required for the machine to produce the curved radius segment. This is determined automatically by Pathfinder, based on the curved segment's **Radius**, **Arc Angle** and **Quality** properties.

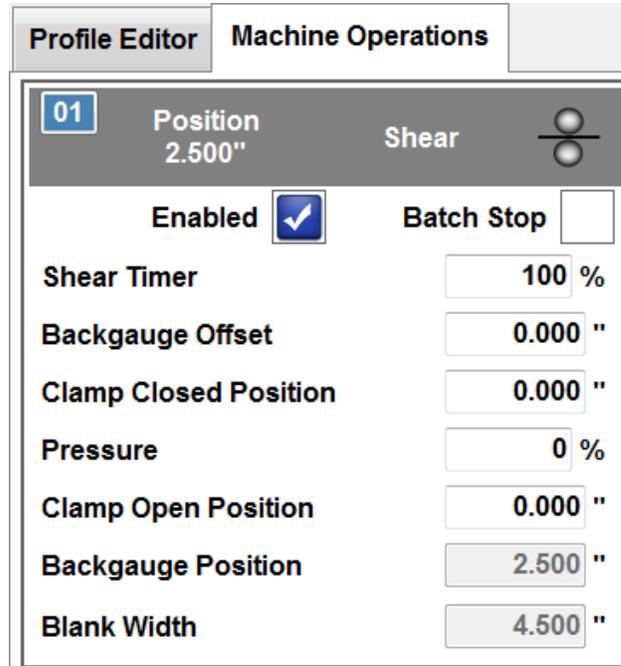
The **Bend Angle** property for a Radius machine operation specifies the incremental bending angle used by the motion controller for each sub-step required to form the curved segment.

 **Note:** Profile Sketching is not yet compatible with Radius profiles. Once a Radius feature has been added to a profile, sketching will become disabled. We anticipate adding radius profile sketching to a future Pathfinder release.

Shear

Some folding machines are equipped with a shear. If the shear is enabled, it will appear as the first operation when producing a graphical profile. This operation is disabled by default, so the machine operation for the shear will be black.

To enable the **Shear**, expand the Shear and select the Enabled checkbox. After the shear has been enabled, the machine operation will turn from black to grey, as seen below.



Profile Editor		Machine Operations	
01	Position 2.500"	Shear	
	Enabled <input checked="" type="checkbox"/>	Batch Stop	<input type="checkbox"/>
Shear Timer			100 %
Backgauge Offset			0.000 "
Clamp Closed Position			0.000 "
Pressure			0 %
Clamp Open Position			0.000 "
Backgauge Position			2.500 "
Blank Width			4.500 "

Figure 14: Shear Enabled for a Graphical Profile

The **Batch Stop** property, represented by a checkbox, designates whether or not this machine operation should be treated as the last operation for a set number of profiles so that a material handling operation can be performed on multiple profiles at once. See the section on **Using Batch Stops** on page 36 for more information.

The **Shear Timer** property is specified as a percentage of the maximum forward time that the shear should move when performing a shear, as set in **Parameter 452 - Forward Max Time**. 100% would move the shear for the full amount of time specified in that parameter. 50% would move the shear only half of that time.

The **Backgauge Offset** property specifies a distance to adjust the **Backgauge Position** for this operation. The **Backgauge Offset** is required for operations where an already bent segment must be inserted into the machine and there is no "clean surface" to gauge the backgauge against.

The **Clamp Closed Position** specifies the height the clamping beam will close to while clamping the profile before the shear activates. A **Clamp Closed Position** of zero (0.000") causes the motion controller to lower the clamping beam to the default closing height specified in the material table for the current profile's material type and thickness.

The **Pressure** property specifies the percentage of the machine's maximum clamping pressure which must be achieved to perform the shear. A **Pressure** of zero (0%) causes the motion controller to use the clamping pressure defined in the material table for the current profile's material type and thickness. This property applies only to machines equipped with pressure feedback transducers.

The **Clamp Open Position** specifies the height the clamping beam will open to after the shear is completed. The motion controller will open the clamping beam to the value of the machine operation **Clamp Open Position** or the value of the machine setup **Parameter 312 - Minimum Opening Height**, whichever is larger.

The **Backgauge Position** is the location that the backgauge will move to, relative to the machine's reference point, before the shear is performed. This position is calculated based on **Blank Width** and the **Shear Offset Distance** and is read-only on this screen.

The **Blank Width** property is calculated by Pathfinder based on the graphical profile and is read-only.

Material Handling Operations – Flips, Rotates and Turns

Material handling machine operations have no additional properties and therefore cannot be expanded. These operations simply serve as place-holders in the list of machine operations to inform the machine operator that the profile must be removed from the machine and repositioned between consecutive **Bending, Hem-closing** or **Radii**.

Some trial and error may be required to fine-tune the properties for each machine operation. Once the desired values are found and entered for this profile, the user should save the profile. All machine operation properties will be saved along with the current preferred bending sequence so that the next time the same profile is loaded from the library, the preferred sequence and all machine operation properties will be retained.

 **Note:** The machine operation controls may not be expanded and the properties may not be changed while the machine is in the **Automatic** mode. Press **Stop** to make any necessary changes to machine operations.

Running a Graphical Profile in the Automatic Mode

Once a new profile has been created or an existing profile has been loaded from the **Profile Library**, the user can set the folding machine into the **Automatic** mode by pressing the

Automatic mode  button on the main toolbar.

 **Note:** Entering the **Automatic** mode should only be performed by trained machine operators familiar with the operation of automatic folding machinery.

While in the **Automatic** mode, Pathfinder will display its view pane with the **Machine Operations** notebook tab selected, as shown below.

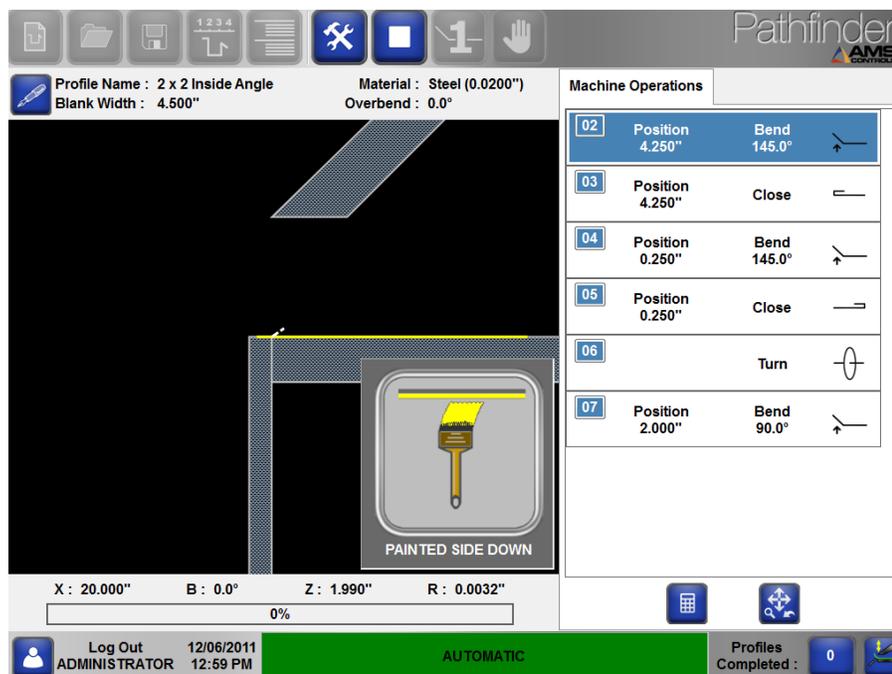


Figure 15: Graphical Machine Operations View – Automatic Mode

While in this screen, an image of the profile will always be shown as it would appear during the currently selected machine operation, along with a side view of the folding machine. Each moving axis of the folding machine will be shown as of its current actual position, being reported by the embedded motion controller.

Also, the current actual position for each moving axis will be displayed numerically where,

X – Represents the actual backgauge position relative to the machine's zero reference point, the point where the clamping beam and bending beam meet.

B – Represents the actual angle for the bending beam, where zero degrees corresponds to the bending surface being horizontal, and 90 degrees corresponds to the bending surface being completely vertical.

Z – Represents the actual opening height of the clamping beam, zero being fully closed.

R – Represents the actual position of the automatic radius adjustment (if the machine is equipped with this optional feature).

The bar graph represents the current percentage of the machine's maximum clamping pressure (for hydraulic machines equipped with pressure transducer feedback).

Each machine operation of the current bending sequence will be executed on the machine in the order they are displayed on the screen, with the current operation highlighted in blue.

 **Note:** To change the current machine operation prior to entering the **Automatic** mode, the user can simply touch the operation number highlighted in blue. The entire operation will become blue to show it is now the current operation.

Painted Side Indicator

When the first machine operation of a program is executed during the **Automatic** mode, Pathfinder automatically reminds the machine operator whether to load the sheet metal into the machine with the painted surface up or down. The painted side indicator momentarily appears on the screen until the profile is clamped prior to performing the first operation.



Indicates the sheet metal should be loaded into the machine with the painted side up.



Indicates the sheet metal should be loaded into the machine with the painted side down.

 **Note:** The painted surface orientation of a graphical profile during its first machine operation depends on which bending sequence was selected. Some bending sequences may require the sheet to be loaded with the painted side up while other sequences may require the sheet to be loaded with the painted side down. Also the painted side indicator will not appear if the profile was designated as “not painted” in the general information.

Clamping Beam Closed Indicator

When running parts, Pathfinder will automatically inform the operator that the Clamping Beam has been fully closed by displaying the indicator below. Once the Clamping Beam is fully closed, the operator may move to the next operation.



Indicates the clamping beam is fully closed.

Entering Automatic Mode

Upon entering the **Automatic** mode, the following actions may occur on the machine:

- The bending beam will be automatically lowered to its home position if it is not already there.
- The automatic radius adjustment will be positioned properly for the current profile's material thickness.
- The clamping beam will be opened to allow the operator to insert the profile into the machine.
- The backgauge automatically moves to the current **Backgauge Position**.

For each operation in the current program, the machine will take the following actions depending on what type of operation is being performed:

Bends

 **Note:** These bends may vary depending on whether the machine is in **One-Man or Two-Man Operation Mode**, set by **Parameter 702 - Operator Mode**. Two-Man Operation Mode requires a second foot pedal. For safety purposes, both operators must press the foot pedals within five seconds of one another for the Clamping Beam to lower. The Clamping Beam operation times out after five seconds if both pedals are not pressed.

The operator inserts the profile into the machine and pushes it firmly against the backgauge fingers.

The operator lowers the clamping beam by pressing the **Clamping Beam Down** foot pedal. If the clamping beam had been raised higher than the machine's "safety stop" position, the motion controller will automatically stop its downward motion whenever the safety stop position is

reached. The operator should release the **Clamping Beam Down** foot pedal then press it again until the clamping beam is fully closed.

 **DANGER: Use caution when operating the folding machine. Take care to keep hands away from moving parts.**

Once Pathfinder indicates that the clamping beam is fully closed,  the operator initiates the bending cycle by pressing on the **Bending Cycle Start** foot pedal. The bending beam automatically rotates to the angle specified by the current machine operation (including any additional overbend angles). After reaching the programmed angle, the bending beam automatically lowers to its home position.

 **Note:** On some folding machines, it is necessary for the operator to keep a foot on the pedal throughout the complete bending cycle.

The clamping beam rises to its programmed **Clamp Open Position** (or the machine **Parameter 312 - Minimum Opening Height**, whichever is greater) to release the profile.

Hem Operations

This operation functions identically to a normal bend except that there is no bending beam motion. After the clamping beam is fully closed, the operator may step on the **Bending Cycle Start** foot pedal to complete the operation as set in the **Require Pedal to Finish Hem Close** parameter in Advanced Settings, or the motion controller will time-out after ½-second and complete the operation on its own.

Radius and Stamping Mode

Radius profiles can be created in two different ways, with **Stamping Mode** enabled or disabled. Stamping the profile is faster than individually clamping and bending each segment, but does not always yield the same results.

Stamping Mode is enabled using **Parameter 703 - Allow Stamping Mode** in **Operator Preferences**. After enabling Stamping Mode, Pathfinder must restart for the mode to become active. The Stamping Mode button  will appear on the Status Bar if the **Allow Stamping Mode** parameter is set to YES. If **Stamping Mode** is active, the button will appear highlighted in green.

 **Note:** When **Stamping Mode** is activated, all profiles with radius bends are run using the stamping mode.

A radius machine operation starts out the same as a normal bend by moving the backgauge to the correct starting **Backgauge Position**, and requiring the machine operator to fully close the

clamping beam to clamp the profile. However, once he steps on the **Bending Cycle Start** foot pedal, one of two actions may occur depending on Pathfinder's current **Stamping Mode** setting:

- With **Stamping Mode** disabled, the motion controller raises the bending beam to the incremental **Bending Angle** (including all overbend adjustments), then lowers the bending beam back to home. The clamping beam opens to the machine operation's **Minimum Opening Height**, and the backgauge moves forward by the incremental backgauge step distance (determined by the radius **Quality** setting), just like a normal bend.
- With **Stamping Mode** enabled, the motion controller raises the bending beam to the incremental **Bending Angle** (including all overbend adjustments), then keeps it raised for all successive sub-steps. For each sub-step, the clamping beam opens to the machine operation's **Minimum Opening Height**, and the backgauge moves forward by the incremental backgauge step distance, but the bending beam does not return to its home position until all sub-steps have been completed.

 **Note:** When using **Stamping Mode**, if the Clamp rises above the Safety Stop, the bending beam will return to zero and Stamping Mode will not work as intended. You can adjust your Safety Stop in **Parameter 317 – Safety Stop Height**.

Once all sub-steps have been completed, the clamping beam opens to the programmed **Clamp Open Position** (or **Parameter 312 - Minimum Opening Height**, whichever is greater) to release the profile.

Material Handling Operations – Flips, Rotates and Turns

During the **Automatic** mode whenever a **Flip**, **Rotate** or **Turn** machine operation is executed, the motion controller does not take any extra actions. When one of these operations is reached within a program, the machine operator is reminded to perform the handling operation by a large visual indicator on Pathfinder's view pane.



A **Flip** operation indicates that the machine operator needs to pull the sheet metal out of the machine and turn it over end-for-end and top-to-bottom, similar to the spinning of an airplane propeller.



A **Rotate** operation indicates that the machine operator needs to pull the sheet metal out of the machine and exchange it end-for-end, but not top-to-bottom, similar to the spinning of a helicopter rotor. A **Rotate** operation between two bends forces the opposite edge of the sheet to be up against the back gauge for each bend.



A **Turn** operation can be thought of as a combination **Flip** and **Rotate**, the end result being that the profile is swapped top-to-bottom and front-to-back, but not end-for-end.

The image goes away automatically whenever the clamping beam is lowered for the next **Bend**, **Radius** or **Hem** operation.

Running a Non-Graphical Profile in the Automatic Mode

Once a new non-graphical profile has been created or an existing profile has been loaded from the **Profile Library**, the user can set the machine into the **Automatic** mode by pressing the

Automatic mode  button on the main toolbar.

 **Note:** Entering the **Automatic** mode should only be performed by trained machine operators familiar with the operation of automatic folding machinery.

While in the **Automatic** mode, Pathfinder displays its view pane with the **Non-Graphical Machine Operations** view selected, as shown below:

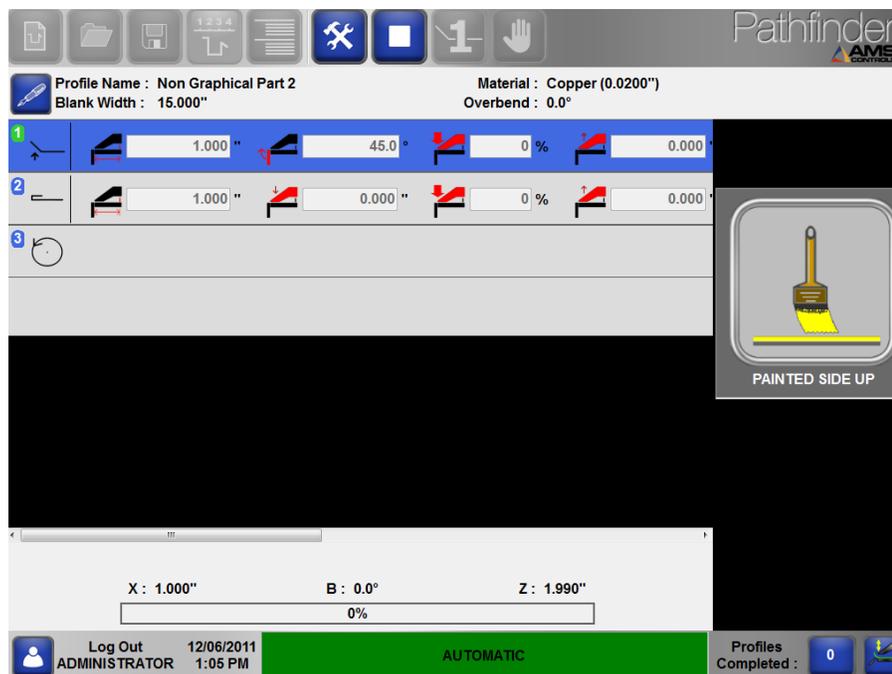


Figure 16: Non-Graphical Machine Operations View – Automatic Mode

The automatic mode operation of the motion controller for non-graphical profiles is identical to how it operates for graphical profiles. The only difference is in the way the information is displayed on Pathfinder's screen.

- The machine operations table indicates the currently executing operation by showing it with a blue background.
- The current actual position for each moving axis will be displayed numerically on the bottom of the screen.
- The machine operation buttons are inactive during the automatic mode so that no machine operations may be added or deleted.

- The properties of each machine operation are disabled so their values may not be changed during the automatic mode.
- The painted side indicator and all material handing indicators are displayed on the right side of the screen whenever the appropriate action is required.

Using the Profile Counter

Pathfinder's **Profile Counter** function keeps track of the number of profiles that have been made on the folding machine. The **Profile Counter** can be accessed at any time by touching the **Profile Counter**

Counter  button on the main status bar. It can be used in one of two modes, **Count Up Mode** and **Count Down Mode**.

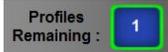
Count Up Mode

In **Count Up Mode** the counter starts at zero and *increments* by one each time a profile is completed on the machine. This mode is useful when the machine operator simply wants to maintain a running total of the number of profiles completed on the machine.

Count Down Mode

In **Count Down Mode** the user enters the number of profiles he wants to make before he starts his job, and the counter value *decrements* by one each time a profile is completed on the machine. When the counter reaches zero, Pathfinder takes the machine out of the **Automatic** mode and informs the operator that the current batch has been completed.

In either mode the user can easily adjust or reset the profile counter value. Simply touch the

Profile Counter  button on the main status bar to display the **Profile Counter** dialog window.

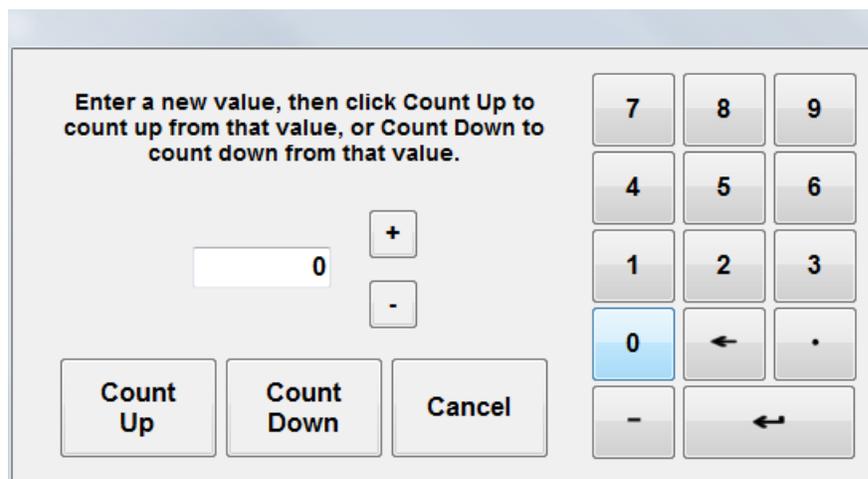


Figure 17: Profile Counter Dialog Window

Use the **Plus** or **Minus** buttons to add 1 or subtract 1 from the current counter value, or use the numeric keypad to change the counter value to any number. Also, the user can switch modes at any time by selecting the **Count Up** or **Count Down** buttons.

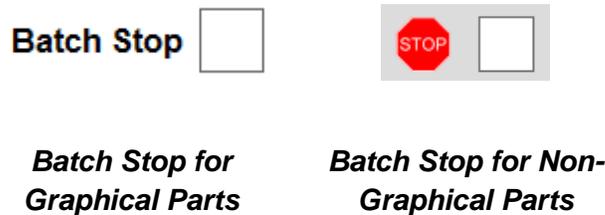
 **Note:** The **Profile Counter** value automatically resets to zero any time a new profile is loaded from the **Profile Library**.

Using Batch Stops

One of Pathfinder's most innovative features is the ability for the machine operator to create **Batch Stops** while running a program on his folding machine. Using **Batch Stops** allows the user to easily repeat a sub-section of a profile's machine operations, thus partially completing several profiles at a time. Once a stack of partially formed profiles is made, the machine operator can then perform a tedious handling operation (like a flip or a rotate) on the entire stack all at once. Then he can continue running the remaining machine operations and complete each profile in the stack. For some jobs, using **Batch Stops** effectively can significantly increase production rates by eliminating time-consuming material handling operations on each and every profile.

Adding a Batch Stop to a Program

For both graphical and non-graphical profiles, any machine operation representing a normal bend, hem or radius forming operation can be designated as a batch stop. Simply select the operation you'd like to mark and check the check box for the **Batch Stop**.



The selected operation will be the last one performed for the batch until all profiles are completed or the **Batch Stop** is removed.

It is easy to see at a glance which operation or operations are designated as **Batch Stops**. The small **Machine Operation** number in the left hand corner will be red if that operation is a **Batch Stop**, as seen in Figure 18.

05	Position 1.250"	Bend 70.0°	
		Batch Stop <input checked="" type="checkbox"/>	
	Overbend Angle	<input type="text" value="0.0"/>	°
	Backgauge Offset	<input type="text" value="0.000"/>	"
	Clamp Closed Position	<input type="text" value="0.000"/>	"
	Pressure	<input type="text" value="0"/>	%
	Clamp Open Position	<input type="text" value="0.000"/>	"
	Backgauge Position	<input type="text" value="1.250"/>	"
	Bend Angle	<input type="text" value="70.0"/>	°

Figure 18: Batch Stop Enabled

 **Note:** More than one machine operation can be designated as a batch stop in a single profile.

Using Batch Stops in the Automatic Mode

While running a profile on the machine that contains one or more batch stop machine operations, Pathfinder's view pane will indicate which sub-section of the program is currently active by graying out the inactive machine operations as shown in the example below. The batch stop operation number is highlighted in red.

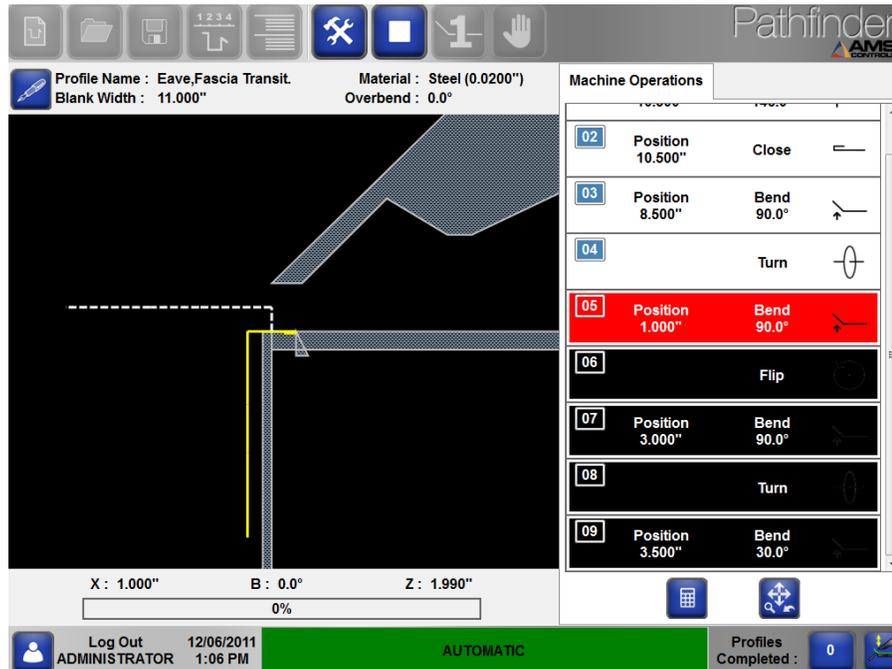


Figure 19: Batch Stop During Automatic Mode

In this example, once the motion controller completes machine operation #5, it immediately returns to operation #1 to allow the operator to repeat the top section of operations for several profiles. If Pathfinder is in **Count Down Mode**, once the top section of operations has been repeated for the set number of iterations, Pathfinder asks the operator if he'd like to continue running the next section. At this point, the operator would flip the entire stack of partially formed profiles and be ready to run the bottom section of machine operations to complete each profile. If Pathfinder is in **Count Up Mode**, the operation will not be prompted to move on to the next step. Always remember to use Count Down Mode when using Batch Stops.

Chapter 5: Using Materials and Categories

Introduction to Materials and Categories

When setting up Pathfinder, it is important to understand how to define materials and their properties as well as organize your **Profile Library** by using **Categories** and **Sub-Categories**. Operators cannot create profiles until the materials used for each profile have been created in the **Material Definition Table**. In addition, finding and organizing profiles is much simpler when they are organized into **Categories**.

Using the Material Definition Table

Pathfinder's Material Definition Table contains a collection of properties for various sheet metal material types and thicknesses. Pathfinder looks up the data in the table for the current profile each time the system enters the automatic mode and sends it to the motion controller.

The **Material Definition Table** can be accessed while in the **Tools** screen by selecting **Materials** from the left hand menu.

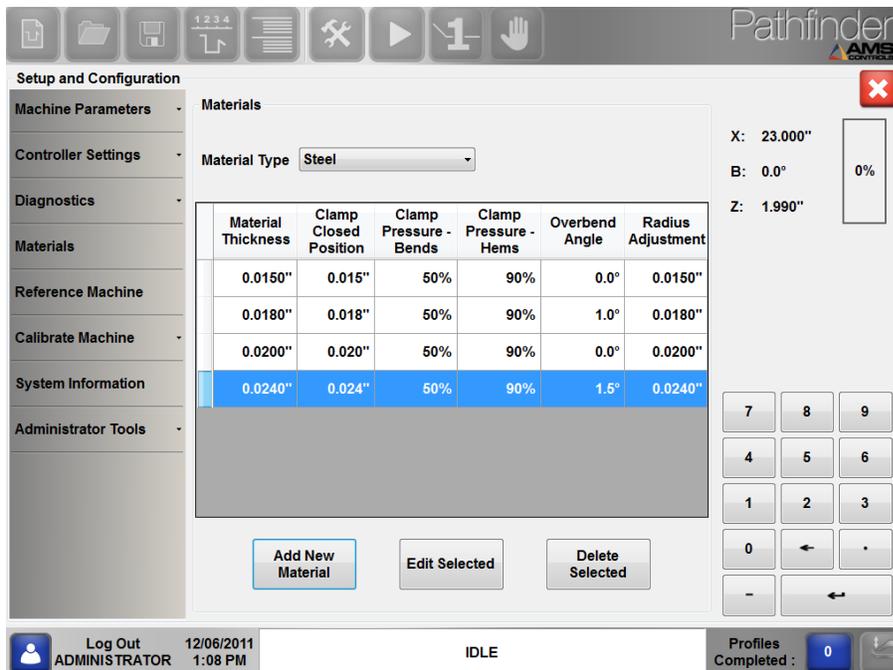


Figure 20: Material Definitions Screen

Various material types are available in the drop-down selection list. For the selected material type, the table shows a list of all material records, one for each thickness. Each material record has the following properties:

- The **Material Type** refers to the actual material being used, whether Aluminum, Copper, Stainless, Steel or Zinc. At this time, you cannot add other material types.
- The **Thickness** property refers to the thickness of the material being defined.
- The **Clamp Closed Position** property specifies the default closing distance for the clamping beam whenever the machine clamps the profile for a normal-bend, hem or radius-forming operation. The default closing distance can be overridden in each machine operation by setting the operation's **Clamp Closed Position** to a non-zero value.
- The **Clamp Pressure – Bends** property specifies the default clamping pressure that must be reached when the machine clamps the profile before performing a normal-bend or radius-forming operation. This property is specified as a percentage of the machine's maximum clamping pressure. The default clamping pressure can be overridden in each machine operation by setting the operation's **Pressure** to a non-zero value. This property applies only to folding machines equipped with a pressure transducer feedback device.
- The **Clamp Pressure – Hems** property specifies the default clamping pressure that must be reached when the machine clamps the profile during a hem operation. This property is specified as a percentage of the machine's maximum clamping pressure. The default clamping pressure can be overridden in each machine operation by setting the operation's **Pressure** to a non-zero value. This property applies only to folding machines equipped with a pressure transducer feedback device.
- The **Additional Overbend Angle** property specifies an extra amount of overbend that will be applied by the motion controller during every bend to compensate for material springback. Overbend angles are additive; the amount of overbend applied to a particular bend is equal to the sum of (1) the additional overbend angle defined for the material's thickness and (2) the overbend angle defined in the current machine operation. For more information about using overbend angles, see section **Material Springback Compensation** on page 43.
- The **Radius Adjustment** property specifies the position that the automatic radius adjustment axis will move to upon entering the automatic mode when a profile with a particular thickness is being made. This feature is used to adjust the separation between the corners of the clamping beam and bending beam surfaces when closed, to

accommodate sheet metals of different thicknesses. Not all folding machines are equipped with an automatic radius adjustment feature.

Add a New Material Definition

To add a new material definition,



Select the  button to enter the **Tools** screen. Select **Materials** from the toolbar on the left. A dropdown list of materials displays.

From the dropdown list, select the material for which you will add a definition. You can select:

- Aluminum
- Copper
- Stainless
- Steel
- Zinc

Select **Add New Material**. An empty New Material pop-up window displays.

In the **Material Thickness** field, enter the thickness of the material you are defining.

Enter any additional information you want to specify in the remaining fields.



Note: If you do not enter any specifics, Pathfinder calculates the default values for you.

Select **OK**. The Material Definitions screen re-displays with the material you just defined added to the list.

Delete a Material Definition

To delete a material definition,



Select the  button to enter the **Tools** screen. Select **Materials** from the toolbar on the left. A dropdown list of materials displays.

From the dropdown list, select the material you want to delete a definition for. You can select:

- Aluminum
- Copper
- Stainless
- Steel

- Zinc

Select the material definition you want to delete.

Select **Delete Selected**. The material definition you selected is deleted from the list.

Edit a Material Definition

To edit a material definition,



Select the  button to enter the **Tools** screen. Select **Materials** from the toolbar on the left. A dropdown list of materials displays.

From the dropdown list, select the material you want to edit a definition for. You can select:

- Aluminum
- Copper
- Stainless
- Steel
- Zinc

Select the material you want to edit.

Select **Edit Selected**. The New Material pop-up window displays, prefilled with information for the selected material.

Edit and adjust the fields as necessary.

Select **OK**. The **Material Definitions** screen re-displays with the material you just edited updated.

Material Springback Compensation

When working with sheet-metal folding machines, it is important to understand the concept of *material springback*. This is the tendency for the sheet metal to partially return to its original shape after it has been bent or formed. Springback is influenced not only by the tensile and yield strengths of the metal, but also by its thickness, bend radius and bend angle. The Pathfinder control system compensates for material springback by using a feature known as **Overbend**.

Overbend is the defined amount, in degrees, that a particular material must be bent past a specified angle in order to achieve the specified angle in the finished profile. Pathfinder's Material Definition Table allows the user to define an additional amount of **Overbend Angle** specific to each material record's thickness. Another **Overbend Angle** property can be defined within each machine operation. The two values of overbend will be added together by the motion controller while the profile is being made, for each and every bend. Using these two sources of overbend correctly can completely negate the effects of material springback, resulting in perfectly formed products.

Automatic Springback Compensation

If your folding machine is equipped with a springback sensor, you can configure Pathfinder to detect material springback and adjust overbend automatically using **Parameter 711 – Bending Angle Springback Mode**. This parameter has four options, described below:

- DISABLED – Pathfinder will use programmed overbends only.
- MEASURE ONLY – Pathfinder will bend to the specified bending angle with no overbend and collect data about where material springback occurs. This is a test mode, essentially, and the data is not reported back to Pathfinder.
- FIRST PART AUTO – Pathfinder will bend to the specified bending angle with no overbend. It will detect springback and compensate with overbend. It stores the correctly calculated overbend for each bend of the first profile run on the machine. One subsequent profiles, it will use these previously calculated values to calculate overbend. This option is best for productivity.
- ALL PARTS AUTO – Pathfinder will bend to the specified bending angle with no overbend. It will detect springback and compensate with overbend. It will do this for every bend of every profile, regardless of the previous results on the same bend. This option is best if there is a lot of variation from sheet-to-sheet.

Using Categories and Sub-Categories

Pathfinder's **Categories** function can be used to better organize large profile libraries by creating groups of similar or related profiles. Each profile in the library can optionally be assigned a category and a sub-category during profile creation. Existing profiles can have categories and sub-categories assigned to them at any time by using the **Edit Profile Details**  button in the view pane.

Once profiles are grouped by **Category** and **Sub-Category**, they can be found more easily in the **Profile Library** screen by using filters. See **Introduction to the Profile Library** on page 12 for more details.

Creating, Editing and Deleting Categories and Sub-Categories

Categories and sub-categories can be used any way that helps your Operators find the parts they need quickly. You can use Categories to separate profiles by type (gutter, eave, valley, etc.) or by customer (Company 1, Company 2, etc.). You can then further sub-divide them to create even more organizational structure to your Profile Library.

Access the **Category Editor** screen by touching to the **Create New Profile**  button, then selecting the **Category Details** radio button.

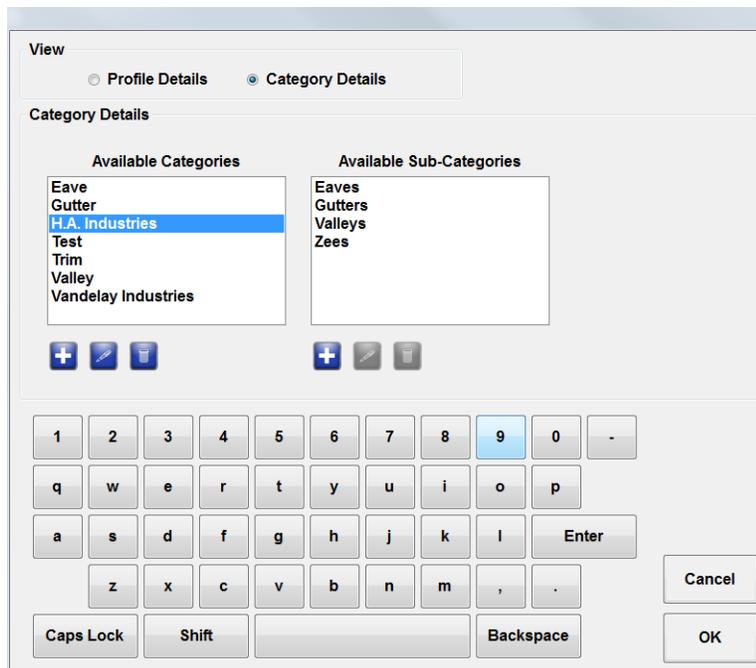


Figure 21: Category Details Screen

The names of all categories and sub-categories are displayed side-by-side, with **Categories** listed on the left and **Sub-Categories** listed on the right. Touch any **Category** to view its associated **Sub-Categories** on the right.

Use the buttons below each list to:

-  Add a new Category or Sub-Category
-  Edit the name of the selected Category or Sub-Category
-  Delete the selected category or Sub-Category

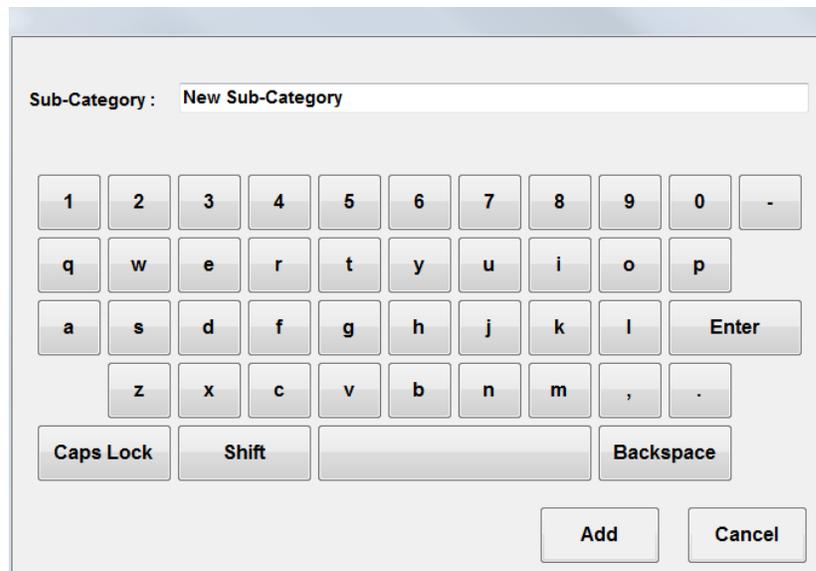


Figure 22: New Sub-Category Dialog

 **Note:** When deleting categories or sub-categories that have library profiles assigned to them, the user will be warned that if he chooses to continue, the profiles will be re-assigned to an empty category or sub-category.

Chapter 6: Programming Profiles

What sets Pathfinder apart from other folding machine control systems is how easy it is to create and program new profiles. Most profiles are stored as a combination of geometric features and one or more bending sequences, instead of by the machine operations or operations required to make them. This separation of machine-specific information from the geometric profile makes it very easy to transport a Pathfinder profile library from one folding machine to another, even if they are two completely different types of machines.

Pathfinder also supports a more traditional style of programming where a profile is defined entirely by a list of machine operations. These profiles will be referred to as **non-graphical profiles** for the remainder of this document.

A new profile can be defined either by creating one “from scratch” or by selecting an existing profile from the library and modifying it.

Creating a New Profile

In Pathfinder, profiles are classified in one of two ways, graphical or non-graphical. A **graphical** profile is made up of three basic components: General information, a geometric profile and one or more bending sequences. A **non-graphical profile** contains general information and a list of machine operations required to make the profile.

Defining the General Profile Information

The first step in creating a new profile is to define some general information about the profile and the material used to make it.

On the Pathfinder main toolbar, select the **Create New Profile**  button. The **New Profile Information** screen appears.

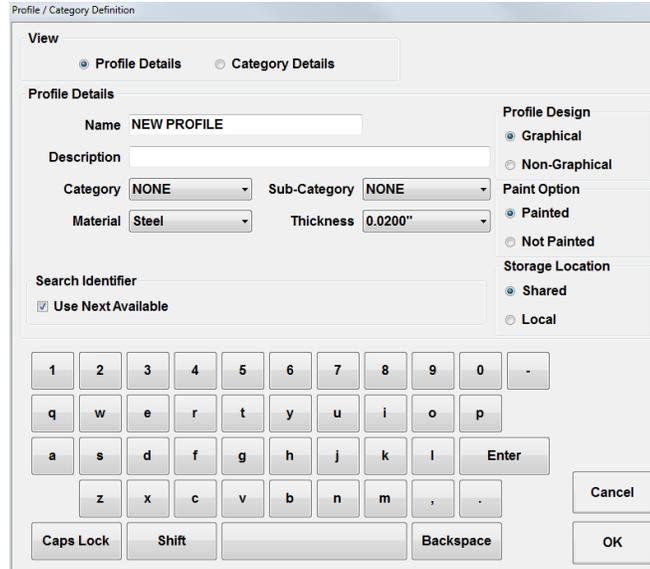


Figure 23: New Profile Information Screen

In the **Name** field, enter a name for the new profile.

In the **Description** field, enter a description of the profile (optional).

In the remaining fields, enter any additional information, including:

- Category
- Sub-Category
- Material
- Thickness
- Blank Width (for non-graphical profiles only)
- Search Identifier (see **Search Identifier** below)
- Profile Design Type (Graphical or Non-Graphical)
- Paint Option

 **Note:** The Paint Options are different for graphical and non-graphical profiles. For graphical profiles, choose between Painted or Not Painted. The painted surface will be determined graphically in the **Profile Editor** screen. For non-graphical profiles, choose between Up, Down or Not Painted. This designation refers to how the profile should be loaded into the machine prior to the first machine operation.

- Storage Location (Shared or Local)

 **Note:** Here you can choose to store the profile locally on this particular Pathfinder PC, on the shared network to access it from other Pathfinder-controlled folding machines or in both locations.

Select the **OK** button. The **New Profile Information** screen closes, returning the user to the Profile Editor view.

Search Identifier

When you have a large profile library, finding commonly used parts quickly can be very important. The **Search Identifier** feature helps to find your most popular profiles by associating them with numbers that can be searched from the **Profile Editor** screen.

 **Note:** This search allows numeric entry only; the on-screen keyboard will not be used.

If Search Identifier is enabled, when creating a new profile you can select the checkbox titled Search Identifier – Use Next Available and Pathfinder will assign the next sequential number to this part. However, if you would like to assign a specific number to a profile, simply uncheck the Use Next Available checkbox and enter your number into the Search Identifier box.

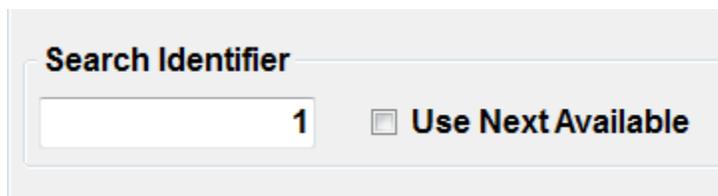


Figure 24: Entering a Search Identifier

To open a profile using its **Search Identifier** number, enter it into the **Search** box while in the **Profile Editor**. This number is currently not searchable from the **Profile Library** screen.

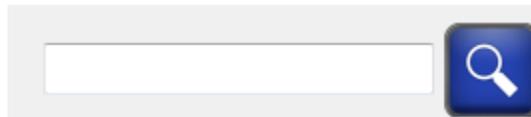


Figure 25: Search Box

In this way, you can assign shortcut numbers for profiles you use over and over again without memorizing their profile names or numbers. Search Identifiers are also found in the **Profile Library** screen on the bottom of each profile's thumbnail.



Figure 26: Search Identifier on Bottom of Profile Thumbnail

To enable or disable the **Search Identifier** feature, select the **Tools** button and then press **Controller Settings, Search Settings. Parameter 750 - Use Profile Search Identifier**, can then be easily enabled or disabled.

From this screen you can also determine where Pathfinder searches for the numbers entered into the Search Box. There are three levels of search and three areas to search: **Job Identifier**, **Profile Identifier** and **Profile Name**. Pathfinder will look for the number at the first level; if it does not find anything, it will move to the second level and search, etc. Once a result has been found, it will automatically open the first item to match the search.

Defining a Graphical Profile

If the newly created profile was designated as graphical, then the **Profile Editor** screen appears. In this screen a profile is represented by both a graphical line drawing and a table of geometric features, consisting of segments, angles, hems and radii that make up the profile's shape. The **Profile Editor** view of Pathfinder's view pane is shown below:

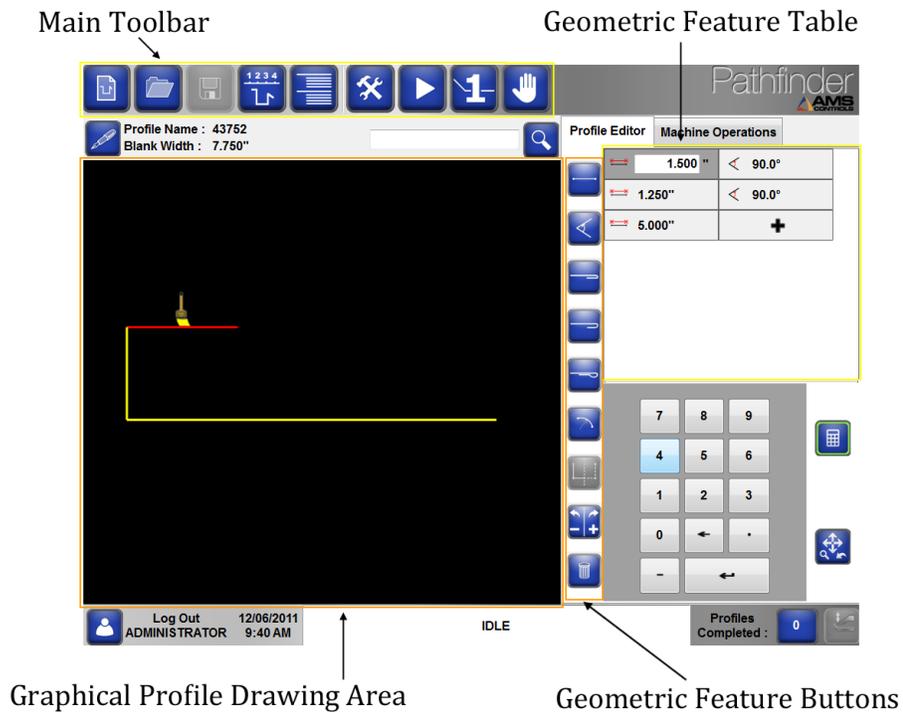


Figure 27: View Pane – Profile Editor View

A profile is defined by simply adding new geometric features to the table. This can be accomplished in several ways:

1. Sketch the part by selecting points in the **Graphical Profile Drawing Area**; or
2. Select a **Geometric Feature** button to insert that feature into the table above the currently selected feature; or
3. Use the numeric keypad to make a **Shortcut Key** selection, and then touch the **Enter** button.

Profile Sketching

Pathfinder versions 2.01.03 and later feature an innovative way to draw new profiles: **Profile Sketching**. Users can create new profiles simply by touching the screen to create vertices and segments. Selecting one point creates a vertex. Selecting another point will create a segment to connect the initial vertex and the new vertex. This feature allows users to intuitively “sketch” parts on the touch screen. Fine-tuning of angles and segments can be done by selecting the segment or angle and editing the values in the **Geometric Feature** table.

When using profile sketching, the screen will pan to follow the segment you are creating. After the segment is created, the screen will automatically resize to show the entire profile centered on the screen.

One benefit of profile sketching is that the user can now create profiles oriented in any direction. Previous versions of Pathfinder required that the initial segment run horizontal on the screen and users often had to reorient the image by using the rotate view buttons. Now the image can be created identical to any written sketch without rotating the view.

Snap-To Angles and Lengths

When using the profile sketching feature, Pathfinder will automatically “snap-to” a specified angle or segment length. These lengths and angles are defined in **Parameter 716 Profile Sketch Length Snap-To** and **Parameter 717 Profile Sketch Angle Snap-To**. It is important to set these parameters to lengths and angles that are most convenient for the profiles you will create. For most users, we recommend using 1/8” for Profile Sketch Length Snap-To and 15° for Profile Sketch Angle Snap-To.

716 Profile Sketch Length Snap-To	1/8" ▾
717 Profile Sketch Angle Snap-To	15 °

Figure 28: Profile Sketching Parameters

Angles or lengths can always be manually edited by selecting the feature in the **Geometric Feature** table.

Creating Hems

When sketching in Pathfinder, you can create open and closed hems easily. When creating a hem, swing the segment close to the previous segment. As the segment gets closer to the previous segment, it will “snap-to” an open hem. Swinging the segment even closer creates a closed hem. Adjustments to the open hem can be made by selecting the open hem feature on the right side and entering the height required.

Tear-drop hems are not yet supported in profile sketching. To create a tear-drop hem, the user must select the tear-drop hem button to insert it into the profile. Profile sketching is still

available when a tear-drop hem is included in the profile, but any adjustment to the hem made while sketching will remove the tear-drop property.

Deleting Segments and Angles

Users can delete the last segment and angle by selecting the green vertex and moving it back towards its originating vertex, which is outlined in red. When the green vertex reaches the red outlined vertex, it automatically deletes the associated angle and segment.

Radius Features and Invalid Profiles

Radius features are not currently supported with the Profile Sketching feature. Profile Sketching is disabled on profiles with radius features. We anticipate that future versions of Pathfinder will support radius profile sketching.

Profile Sketching is also disabled on invalid profiles. Once the error causing the invalidity is corrected, Profile Sketching will be enabled.

If you have a profile that contains a radius part and is invalid, you will receive the "Invalid Profile" error. Once the invalidity is fixed, you will then receive the "Radius Part" error.

Geometric Features

Once a geometric feature has been added to the table, the properties for that feature may be edited. The different types of geometric features and their properties are described in detail below:

Segment

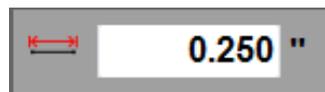


Figure 29: Geometric Feature - Segment

Segments represent each straight line section of the profile and are defined by only one property, **Length**. Each segment length must be non-zero, and a profile may not contain two consecutive segments. Two segments must always be separated by an **Angle**, **Hem** or **Radius** feature.

Touch the **Segment**  button, or select shortcut key **1** and **Enter** to insert a **Segment** feature into the current profile.

 **Note:** When a **Segment** feature is selected, a paint brush icon appears in the graphical profile drawing area next to the selected segment. This indicates which surface of the profile

is the painted side. The painted surface for the entire profile can be easily changed from one side to the other by touching the **Switch**  button while any **Segment** feature is selected.

Angle



Figure 30: Geometric Feature - Angle

Angles represent each bend in a profile and are also defined by only one property, **Angle**. The convention used to define the angle property is that it is the angle between the previous and next geometric features. The value for the angle property must be between -180.0 and +180.0 degrees.

Angles can be defined as **Inside or Outside Angles**. An Inside Angle is defined as if bending the Profile completely back on itself is a zero degree (0°) bend. And Outside Angle is defined as if bending the Profile completely back on itself is a 180° bend. Whether to define angles as Inside or Outside is the operator's preference. To select whether Pathfinder uses Inside Angles or Outside Angles, adjust **Parameter 707 - Profile Bending Angle Mode**.

Various examples of Inside Angles are shown in the images below.

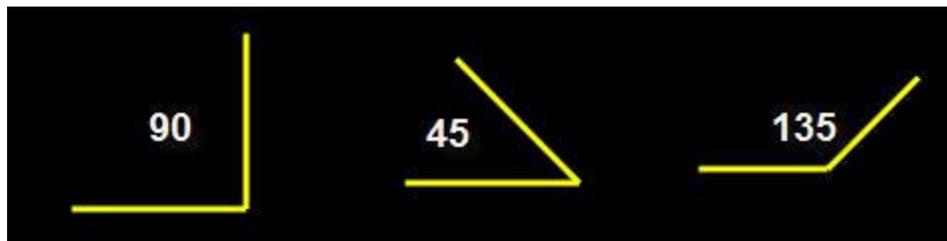


Figure 31: Inside Angle Examples

A profile may not contain two consecutive **Angle** features, and an **Angle** may not be the first or last feature in the profile.

Touch the **Angle**  button, or select shortcut key **2** and **Enter** to insert an **Angle** feature into the current profile.

 **Note:** Touch the **Switch**  button while an **Angle** feature is selected to quickly reverse the value of the **Angle** property from positive to negative.

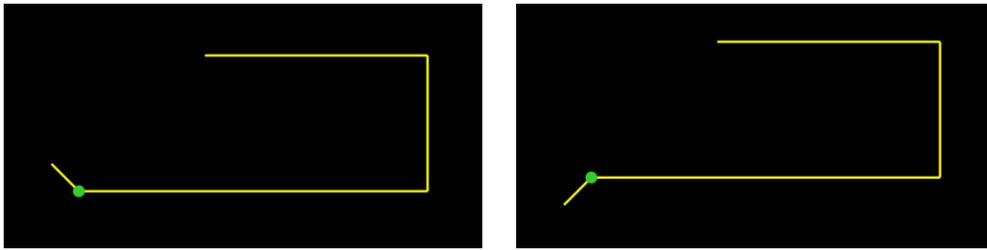


Figure 32: Switching Angles Example

Hem



Figure 33: Geometric Feature – Closed Hem



Figure 34: Geometric Feature - Open Hem



Figure 35: Geometric Feature - Tear-Drop Hem

A **Hem** feature can be thought of as a special type of **Angle**, in which the two adjacent segments are folded completely on top of one another. **Hem** features are treated differently in the bending sequence than **Angle** features. **Hems** are created by two machine operations, a bend followed by a hem operation, while **Angles** are created by a single machine bend.

A **Hem** feature must always be preceded by a **Segment** and followed by a **Segment**. The figure below shows an example of a **Hem** feature sandwiched between two **Segments**.

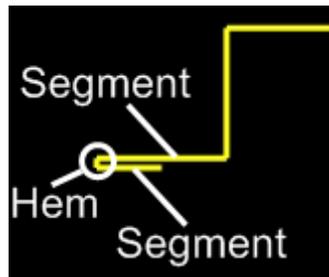


Figure 36: Hem Construction Example

Three different types of **Hems** may be defined in a profile, **Closed Hems**, **Open Hems** and **Tear-Drop Hems**. **Open Hems** are defined by only one property, the **Clamp Closing Distance**. The **Clamp Closing Distance** determines the height that the clamping beam closes to while performing the close hem operation. **Tear-drop Hems** are defined by one property, the **Hem Offset**. The **Hem Offset** determines the distance that the backgauge is adjusted between the bend and closing operations while forming the tear-drop shaped hem.

Only **Closed Hems** may be defined in the middle of a profile; **Open Hems** and **Tear-Drop Hems** may only be defined at the beginning or end of the profile.

Touch the button for **Closed Hem**  (or shortcut key **3**), **Open Hem**  (or shortcut key **4**), or **Tear-Drop Hem**  (or shortcut key **5**) to add a **Hem** feature to the current profile.

 **Note:** Touch the **Switch**  button while any **Hem** feature is selected to quickly invert the direction that the hem is bent (CW or CCW from the preceding segment).

Radius



Figure 37: Geometric Feature - Radius

A **Radius** feature represents a curved segment within the profile. The **Radius** feature is made up of three properties, **Radius**, **Arc Angle** and **Quality**. The **Radius** property defines the distance from the center of the partial circle to its perimeter. If the **Radius** feature is thought of as a portion of a completed circle, then the **Arc Angle** defines the number of degrees within a circle that the curved segment will be formed to. The **Quality** property is used by Pathfinder to determine the number of incremental bends, and the relative backgauge movement between each bend, required by the machine to produce the curved segment. Several examples of **Radius** features are shown in the figure below.

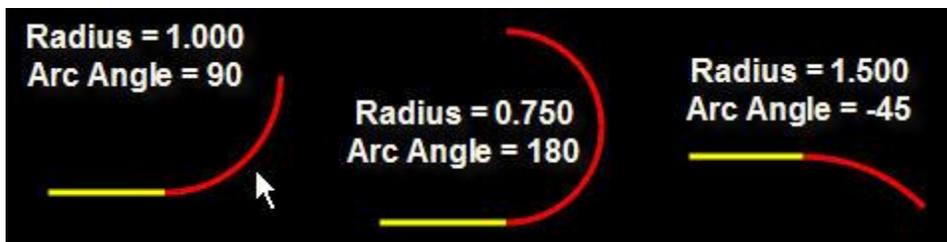


Figure 38: Radius Examples

Touch the **Radius**  button or select shortcut key **6** and **Enter** to insert a **Radius** feature into the current profile. For an example of using the Radius function, see sample profile **5K Gutter**, page 154.

 **Note:** Touch the **Switch**  button while a Radius feature is selected to reverse the direction that the Radius feature is formed (CW or CCW from the preceding segment).

Mirror

When creating symmetrical profiles, the **Mirror** function serves as a useful time-saver. Program the first half of the profile, ending on the angle, segment, hem or radius at the midpoint of the profile. At this point, Pathfinder will allow you to either enter a Segment or use the **Mirror** function.

Touch the **Mirror**  button or select shortcut key **7** and press **Enter** to “mirror” the first half of the profile. For an example of using the Mirror function, see sample profile **Deluxe Ridge Cap**, page 146.

Notice that every time a new feature is added to the table, or if any one of the selected feature's properties is modified, the graphical line drawing refreshes automatically to display the new shape. Also, the currently selected geometric feature will be highlighted in red in the line drawing and vertices of the selected angles will be highlighted in green.

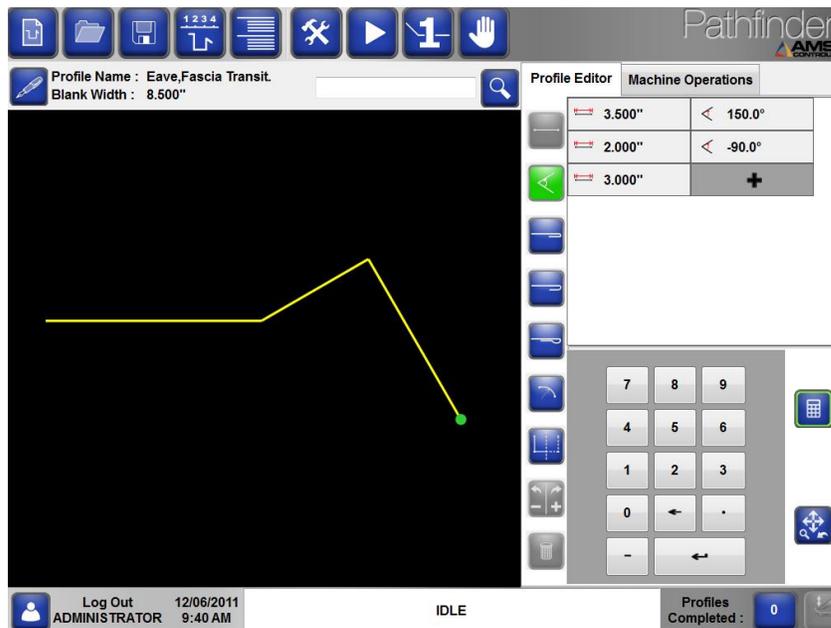


Figure 39: Partially Completed Profile

Editing Geometric Feature Properties

To edit any of the properties for any previously defined geometric feature simply touch the number you wish to edit, then use the numeric keypad to enter a new value for the property.

Touch the **Delete**  button with any geometric feature selected to remove it from the profile.

Continue adding new geometric features until the profile is completed.

 **Note:** Several Profile programming examples can be found in Appendix G: Profile Programming Examples on page 141.

Shortcut Keys

Although the Geometric Feature selection screen has changed, the shortcut keys used in previous versions of Pathfinder remain. To enter Geometric Features, you can either press the respective button or input the following shortcut numbers in the numeric keypad and press

Enter . When a shortcut key is selected, the corresponding button will be outlined in green.

Shortcut Number	Geometric Feature
1	Segment
2	Angle
3	Closed Hem
4	Open Hem
5	Tear-Drop Hem
6	Radius
7	Mirror

Defining a Non-Graphical Profile

If the newly created profile was designated as non-graphical, then the **Non-Graphical Machine Operations** screen appears. In this screen a profile is represented by a list of machine operations required to produce the profile. This method of programming is more similar to those used by numeric folding machine controllers and allows the user to think in terms of step-by-step absolute machine coordinates. The **Non-Graphical Machine Operations** view of Pathfinder's view pane is shown below:

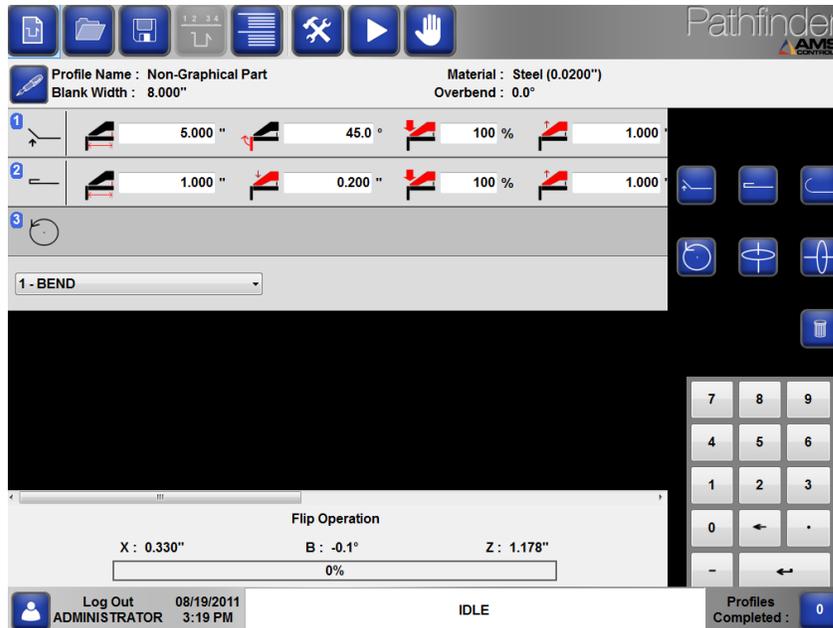


Figure 40: Machine Operations for Non-Graphical Profile

A non-graphical profile is defined by simply adding new machine operations to the table. This can be accomplished in several ways:

1. Select a machine operation type from the drop-down list, then touch the **Enter** button; or
2. Use the numeric keypad to make a selection from the drop-down list, then touch the **Enter** button; or
3. Select a **Machine Operation** button to insert that operation type into the table above the currently selected operation.

Once a machine operation has been added to the table, the properties for that operation may be edited. Also, any machine operation in the table may be deleted by simply selecting the

desired operation, then touching the **Delete**  button.

Machine Operations

The different types of machine operations and their properties are described in detail below:

Bend

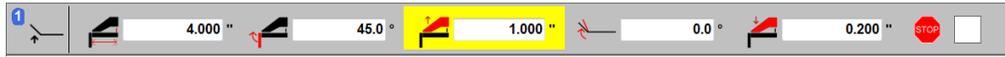


Figure 41: Non-Graphical Bend

A **Bend** is the most commonly used machine operation and represents the process of placing a single bend in a section of the sheet metal. You can enter a **Bend** into a non-graphical profile by selecting “1-Bend” from the drop-down box or using the shortcut key **1**.

Several properties may be edited by the user simply by selecting the text box next to the property's image, then entering a value using the on-screen numeric keypad. The **Bend's** properties are described below:



The **Backgauge Position** is the location that the backgauge will move to, relative to the machine's reference point, before the bend is performed.



The **Bending Angle** is the nominal angle the bending beam will rotate to while forming the bend for this operation. The motion controller will position the bending beam to the sum of the nominal **Bending Angle** and any **Overbend** angles specified while performing this operation.



The **Clamping Pressure** property specifies the percentage of the machine's maximum clamping pressure which must be achieved to perform the bend or hem operation. A **Pressure** of zero (0%) causes the motion controller to use the clamping pressure defined in the material table for the current profile's material type and thickness. This property applies only to machines equipped with pressure feedback transducers.



The **Clamp Open Position** property specifies the height the clamping beam will open to after the current machine operation is completed. If set to zero (0.000"), the motion controller will open the clamping beam to the value of the machine setup **Parameter 312 - Minimum Opening Height**; otherwise it will open to the height entered here.



The **Overbend Angle** property specifies an additional bending angle used by the motion controller to compensate for material springback while performing a bend. The motion controller will rotate the bending beam to the sum of the nominal **Bending Angle**, the machine operation **Overbend Angle** and the overbend angles defined in the material table for the current profile's material type and thickness.



The **Clamp Closed Position** property specifies the height the clamping beam will close to while clamping the profile before it is bent, or while closing a hem. A **Clamp Closed Position** of zero (0.000") causes the motion controller to lower the clamping beam to the default closing height specified in the material table for the current profile's material type and thickness.



The **Batch Stop** property, represented by a checkbox, designates whether or not this machine operation should be treated as the last operation for a set number of profiles so that a material handling operation can be performed on multiple profiles at once. See the section on **Using Batch Stops** on page 36 for more information.

Hem Operation



Figure 42: Non-Graphical Hem Operation

A **Hem Operation** represents the action of either completely or partially closing the hem formed by a previous bend. The **Hem Operation's** properties are a sub-set of the **Bend's** properties and are described in detail above.

You can enter a **Hem** into a non-graphical profile by selecting "2-Hem" from the drop-down box or using the shortcut key **2**.

Radius



Figure 43: Non-Graphical Radius

A **Radius** represents the action of creating a curved section in the metal by performing a series of small bends. Each incremental bend is referred to as a radius sub-step. You can enter a **Radius** into a non-graphical profile by selecting "3-Radius" from the drop-down box or using the shortcut key **3**.

Most properties of a radius can be edited by the user, and they are described in detail below:



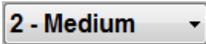
The **Backgauge Position** specifies the starting location that the backgauge will move to, relative to the machine's reference point, before the first radius sub-step is bent. Each sub-step requires the backgauge to move closer to the clamping beam by a small distance determined by the **Quality** property.



The **Radius** property specifies the distance from the center of the partial circle to its perimeter.



The **Arc Angle** property specifies the number of degrees within a circle that the curved segment will be formed to.



The **Quality** property indirectly specifies the number of incremental bends, and the relative backgauge movement between each bend, required by the machine to produce the desired curved segment. Machine setup parameters determine the incremental backgauge movement for **Coarse**, **Medium** and **Fine** radius quality settings. The **Coarse** quality setting typically requires fewer sub-steps while the **Fine** quality typically requires more sub-steps.



The **Number of Steps** property specifies the number of sub-steps required for the machine to produce the curved radius segment. This read-only property is determined automatically by Pathfinder, based on the curved segment's **Radius**, **Arc Angle** and **Quality** properties.



The **Bending Angle** property specifies the incremental bending angle used by the motion controller for each sub-step required to form the curved segment. This read-only property is determined automatically by Pathfinder, based on the curved segment's **Radius**, **Arc Angle** and **Quality** properties.

Shear

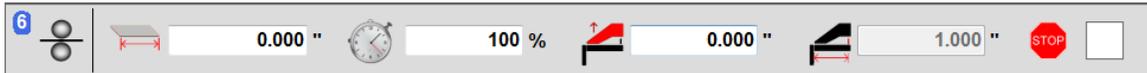
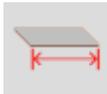


Figure 44: Non-Graphical Shear

Some folding machines are equipped with a shear. If the shear is enabled, it can be added to a non-graphical profile by selecting “7-Shear” from the drop-down menu or using shortcut key **7**.

Most folders with shears have two parameters, **Parameter 451 – Offset Distance** and **Parameter 452 - Forward Maximum Time**. These parameters define the distance from the bending point to the shear head, and the maximum amount of time the shear should move. These parameters must be set properly for the **Shear** to function.

 **Note:** There can be multiple shears in a non-graphical profile.



The **Shear Blank Width** property is the desired width for this particular profile.



The **Shear Timer** property is specified as a percentage of the maximum forward time that the shear should move when performing a shear, as set in **452 - Forward Maximum Time**. 100% would move the shear the full time specified in that parameter. 50% would move the shear half of that time.



The **Clamp Open Position** property specifies the height the clamping beam will open to after the shear is completed. The motion controller will open the clamping beam to the value of the machine operation **Clamp Open Position** or the value of the machine setup **Parameter 312 - Minimum Opening Height**, whichever is larger.



The **Backgauge Position** is the location that the backgauge will move to, relative to the machine's reference point, before the shear is performed. This position is calculated based on **Sheet Blank Width** and the **Shear Offset Distance** and is read-only on this screen.



The **Batch Stop** property, represented by a checkbox, designates whether or not this machine operation should be treated as the last operation for a set number of profiles so that a material handling operation can be performed on multiple profiles at once. See the section on **Using Batch Stops** on page 36 for more information.

Material Handling Operations – Flips, Rotates, and Turns

Material handling machine operations have no additional properties that can be edited by the user. These operations simply serve as place-holders in the list of machine operations to inform the machine operator that the profile must be removed from the machine and repositioned between consecutive **Bend**, **Hem** or **Radius**. The icons below show material movement as if looking at the front of the folding machine.



A **Flip** operation indicates that the machine operator needs to pull the sheet metal out of the machine and turn it over end-for-end and top-to-bottom, similar to the spinning of an airplane propeller. After this operation, the same edge will be against the backgauge, but the top and bottom will be reversed.



A **Rotate** operation indicates that the machine operator needs to pull the sheet metal out of the machine, and exchange it end-for-end, but not top-to-bottom, similar to the spinning of a helicopter rotor. A **Rotate** operation between two bends forces the opposite edge of the sheet to be up against the backgauge for each bend. After this operation, the same surface will face up and the reverse edge will go against the backgauge.



A **Turn Over** operation can be thought of as a combination **Flip** and **Rotate**, the end result being that the profile is swapped top-to-bottom and front-to-back, but not end-for-end. This is typically the easiest operation for the operator to perform.

Some trial and error may be required to fine-tune the properties for each machine operation. Once the desired values are found and entered for this profile, the user should save the profile in Pathfinder's **Profile Library**. All machine operation properties for the non-graphical profile will be saved so that the next time the same profile is loaded from the library, the profile can be immediately run on the folding machine.

 **Note:** The properties for non-graphical machine operation may not be changed while the machine is in the **Automatic** mode. Press the **Stop** button to exit **Automatic** and change **Machine Operation** properties.

Saving Profiles

After defining a new geometric profile or defining the machine operations for a new non-graphical profile, it can be saved in Pathfinder's **Profile Library**.

Touch the **Save Profile**  button on the main toolbar and the **Save Profile** dialog window appears.

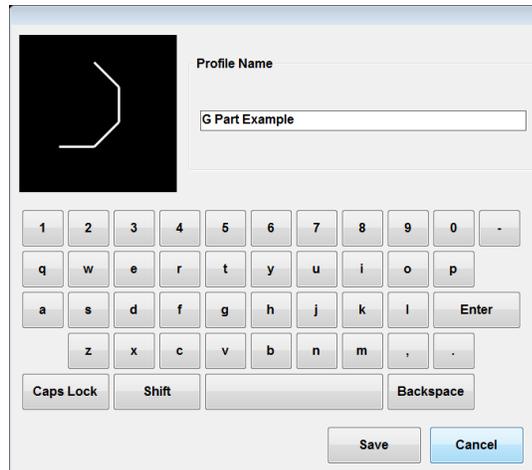


Figure 45: Save New Profile Dialog Window

Touch the **Save** button to add the new profile to the **Profile Library**. Select **Cancel** to exit this dialog without saving changes.

 **Note:** For non-graphical profiles, the thumbnail image is replaced by a “no” logo, since the profile cannot be represented graphically.



Figure 46: Save New Non-Graphical Profile Dialog Window

If a profile with the same name already exists in the **Profile Library**, a different version of the **Save Profile** dialog window appears.

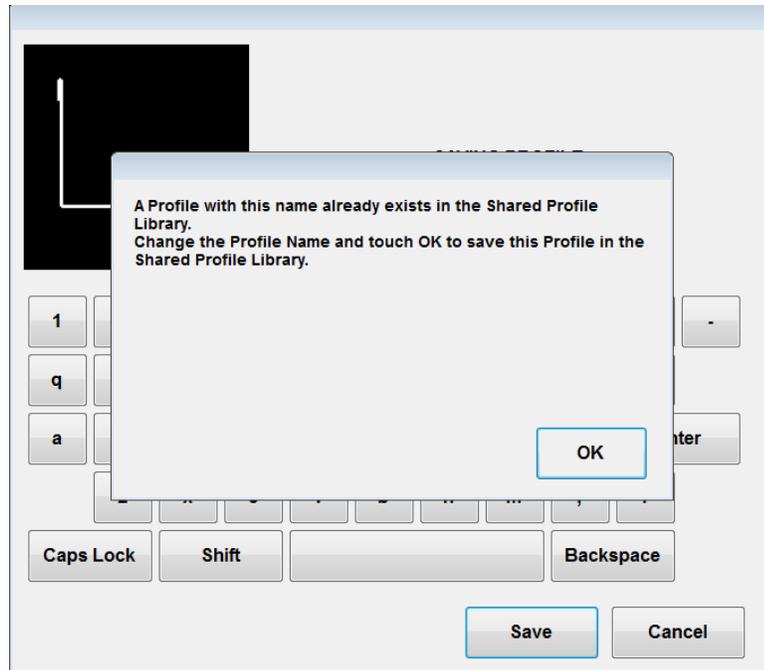


Figure 47: Save Existing Profile Dialog Window

In this window, you'll have the option to change the name of the profile you're saving, thus creating a new profile in the library, or simply leave the name as it is and over-write the existing library profile.

Once a profile has been saved, the **Save**  button will become disabled until any additional changes have been made to the current profile during this session. The Pathfinder system always prompts the user to save any changes made to a profile before allowing him to logout, open a new library profile or create a new profile from scratch.

Chapter 7: Creating Bending Sequences

Once a graphical profile has been created, the next step is to define the bending sequence, the order in which the bends will be performed on the folding machine. Pathfinder's innovative SmartPath™ technology will evaluate the potentially billions of possible bending sequences and very quickly return the top solutions based on the machine's tooling and geometry.

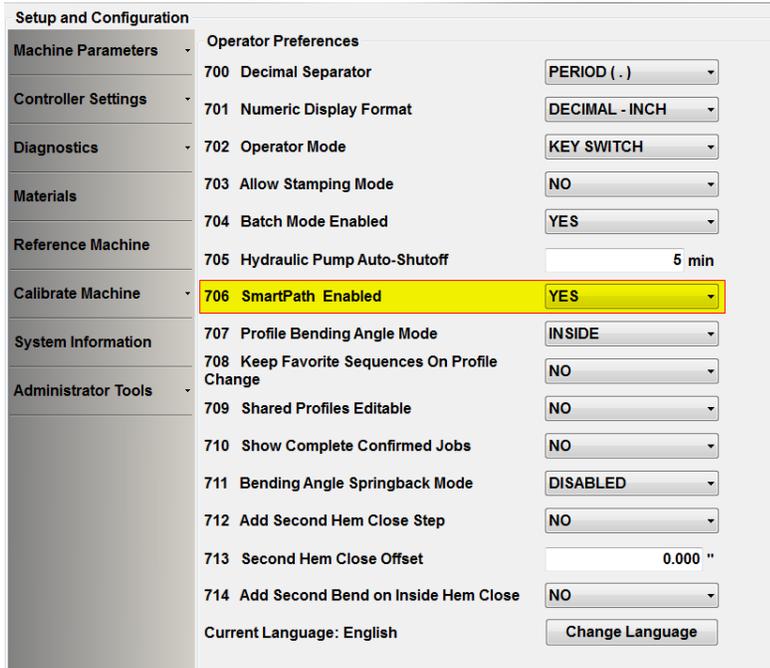
Pathfinder will automatically sequence a profile when you open the **Sequencing Screen**, select **Machine Operations** or press the **Run** button to put the machine into **Automatic**. So if you have a profile defined, all you need to do is press **Run** to start creating parts! You also have the option of tweaking Machine Operations or selecting a different sequence from the Sequencing Screen.

If a sequence other than one of the SmartPath solutions is desired, the operator may choose to create a custom bending sequence manually.

 **Note:** This section pertains only to graphical profiles. Non-graphical profiles are completely defined by a list of machine operations and no additional bending sequences are required.

Enabling SmartPath Automatic Bend Sequencing

To enable SmartPath Automatic Bend Sequencing, click the **Tools**  button and select **Controller Settings** then **Operator Preferences**. Select YES for **Parameter 706 - SmartPath Enabled**, as shown below.



Setup and Configuration		
Machine Parameters	Operator Preferences	
Controller Settings	700 Decimal Separator	PERIOD (.)
Diagnostics	701 Numeric Display Format	DECIMAL - INCH
Materials	702 Operator Mode	KEY SWITCH
Reference Machine	703 Allow Stamping Mode	NO
Calibrate Machine	704 Batch Mode Enabled	YES
System Information	705 Hydraulic Pump Auto-Shutoff	5 min
Administrator Tools	706 SmartPath Enabled	YES
	707 Profile Bending Angle Mode	INSIDE
	708 Keep Favorite Sequences On Profile Change	NO
	709 Shared Profiles Editable	NO
	710 Show Complete Confirmed Jobs	NO
	711 Bending Angle Springback Mode	DISABLED
	712 Add Second Hem Close Step	NO
	713 Second Hem Close Offset	0.000 "
	714 Add Second Bend on Inside Hem Close	NO
	Current Language: English	Change Language

Figure 48: Enabling SmartPath in the Setup and Configuration Screen

Similarly, to turn off the automatic bend sequencer, select NO for **Parameter 706 - SmartPath Enabled**. Your changes will take effect immediately.

Using the Sequence Library

With a graphical profile loaded into Pathfinder's view pane, touch the **Bending Sequence** button on the main toolbar to go to **Bend Sequencing** screen. Entering this screen initiates Pathfinder's SmartPath technology (if enabled), and within a few moments the **Sequence Library** screen appears showing a list of potential bending sequences for the current profile. The **Sequence Library** screen is shown below.

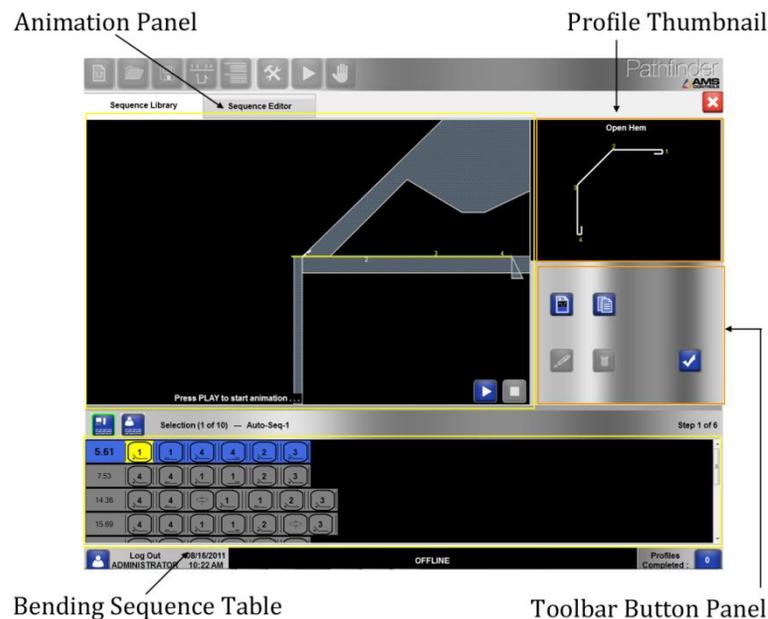


Figure 49: Sequence Library Screen

The **Profile Thumbnail** shows an image of the completed profile, with each angle, hem or radius feature labeled with a number so that it can be identified.

The **Animation** panel shows a side view of the folding machine tooling, with a before and after image of a partially completed profile. The **Animation** panel refreshes automatically whenever a new bending sequence or sequence operation is selected, and whenever a bending sequence animation is underway. The **Animation** panel also contains buttons to zoom and move the image, as well as DVD-style buttons to start, stop or pause a bending sequence animation.

The **Bending Sequence** table contains graphical representations of each bending sequence found by the SmartPath function, as well as any custom bending sequences created by the user.

The **Show SmartPath Sequences**  and **Show Custom Sequences**  buttons can be selected to show or hide those bending sequences in the table. The number of bending

sequences, the name of the selected sequence and the index of the current sequence operation are indicated in the **Bending Sequence** table's header.

The **Toolbar Button** panel contains buttons that allow the user to:



Create a new custom bending sequence.



Make a copy of an existing bending sequence.



Edit a custom bending sequence.



Delete a custom bending sequence.



Accept the currently selected bending sequence and prepare to run it on the machine.

Understanding Graphical Bending Sequences

Pathfinder represents a bending sequence as a collection of graphical icons, one for each bend, hem closing or radius forming operation required to make the profile on a machine. Other icons represent material handling operations, such as flipping the profile over, that are often required in-between bends. A typical bending sequence is shown below.



Figure 50: Typical Bending Sequence

At the far left is a number that represents the relative difficulty this bending sequence presents to the operator when it comes time to make the profile on a machine. This number can be thought of as the **Cost** of the sequence and is automatically calculated by the SmartPath algorithm. Several factors go into the cost calculation for a particular bending sequence including the number of material handling operations and the number and severity of any interference collisions between the sheet metal and the machine's tooling. Bending sequences with lower costs are typically preferred over sequences with higher costs.

To change how SmartPath calculates **Cost**, adjust the weight attached to each **SmartPath Setting**. See **Adjusting SmartPath Settings**, page 74.

The next part of the sequence are the icons that represent each bend, hem closing and radius forming operation that must be performed on the folding machine to make the profile. These icons can be thought of as the “sequence operations.”

Bends



A **Bend** is required for each **angle** or **hem** in the geometric profile. The number in the center of the icon corresponds to the label for that **angle** or **hem** shown in the **Profile Thumbnail**. **Bends** are listed left-to-right in the order they would be performed on the machine while forming this profile.

Hems



A **Hem** is required to complete a hem, after its corresponding **Bend** has been completed. Just as it requires two operations to create a hem on a folding machine, the **Bend** and the closing operation, two icons are used to represent this function in the graphical bending sequence.

Radius



A **Radius** represents the action of creating a curved segment on the folding machine. Even though it may take many incremental bends (sub-steps) to form a curved section on a machine, a **Radius** is represented as a single operation in the graphical bending sequence.

Material Handling Operations



A **Flip** operation indicates when the machine operator would have to pull the sheet metal out of the machine and turn it over end-for-end and top-to-bottom, similar to the spinning of an airplane propeller. **Flip** operations are required between two bends whenever the first bend goes upward, but the second bend goes downward.



A **Rotate** operation indicates when the machine operator would have to pull the sheet metal out of the machine and exchange it end-for-end, but not top-to-bottom, similar to the spinning of a helicopter rotor. A **Rotate** operation between two bends

forces the opposite edge of the sheet metal to be pushed against the backgauge for each bend.



A **Turn** operation can be thought of as a combination of a **Flip** and a **Rotate** operation, the end result being that the profile is swapped top-to-bottom and front-to-back, but not end-for-end. Since most profiles made on folding machines are much longer than they are wide, **Turn** operations are typically easier for the operator than **Flips** or **Rotates**.

Animating a Bending Sequence

Any bending sequence listed in the table can be selected simply by touching one of the icons in that sequence. Once a sequence is selected, the **Animation** panel refreshes to show what the profile would look like in the machine as of the selected sequence operation. The solid line represents what the profile will look like before the operation is performed, and the dotted line represents what it will look like after the operation.

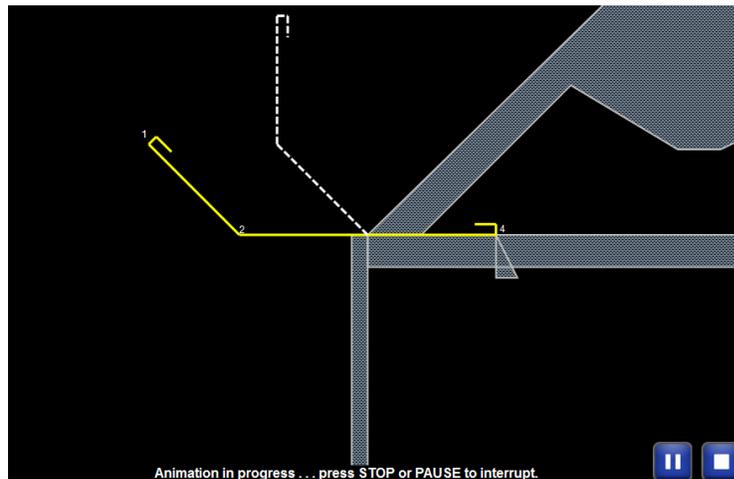


Figure 51: Sequence Animation Panel

The user may then touch the **Start Animation**  button to start animating the bending sequence. Pathfinder automatically displays what the profile would look like for each operation of the selected bending sequence, pausing momentarily for each operation, so the operator can visualize the profile being made on his machine.

The user may touch the **Pause Animation**  button to freeze the drawing on a particular operation, or touch the **Stop Animation**  button to end the sequence animation.

Selecting the Preferred Bending Sequence for a Profile

Once the user has decided which bending sequence he'd like to use on the machine, he can select the sequence in the table then simply touch the **Accept Sequence**  button. This causes the currently selected sequence to be marked as the preferred, or default, sequence for this profile. It is important to save the **Profile** to retain the preferred sequence. The **Bend Sequencing** screen closes, returning the user to the Profile Editor view.

Once a sequence has been marked as a favorite or preferred, it will automatically be used whenever you create the profile until you select another sequence as preferred.

If no sequence has been marked as preferred and you have several manual sequences available, Pathfinder will load the first manual sequence.

If no sequence has been marked as preferred and you have no manual sequences available, Pathfinder will auto-sequence the Profile and the first one in the results list will be copied to manual and marked as preferred.

To change a preferred sequence, enter the sequencing screen, select a sequence and click the checkmark.

Pathfinder combines information from the current profile and the preferred bending sequence to automatically create a table of machine operations, or operations required by the folding machine to make this profile. At this point, the profile is ready to be produced on the machine.

Preferred bending sequences, or favorites, are highlighted in green in the **Bend Sequencing** screen. Selected sequences are highlighted in blue, as seen below.

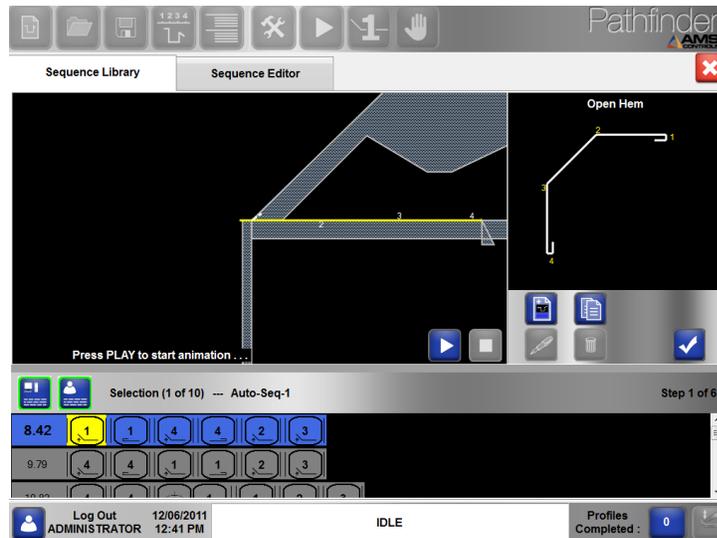


Figure 52: Bending Sequences

Adjusting SmartPath Settings

Pathfinder's SmartPath automatic sequencing algorithm can be adjusted to the operator's preferences. Changes made to SmartPath settings will affect the weight given to each setting when calculating the **Cost** of a bend sequence.

To adjust SmartPath Settings, access the **Tools** screen, select **Controller Settings** and **SmartPath Settings**. Here, you can adjust each setting on a sliding scale from No to Yes. If, for example, an operator prefers creating end-of-profile hems at the beginning of a sequence, the setting **End-of-Profile Hems First** can be adjusted all the way to YES on the sliding scale.

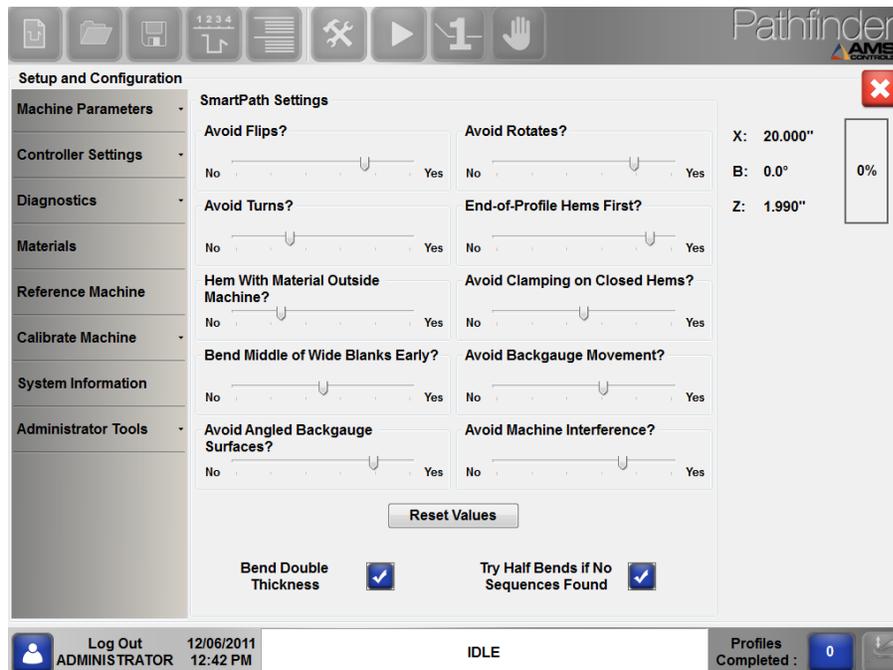


Figure 53: SmartPath Settings Screen

For a complete list of SmartPath parameters and a description of their function, see **SmartPath Settings**, page 115.

Creating a Custom Bending Sequence

Pathfinder's SmartPath technology strives to find the optimal bending sequence for every possible geometric profile. But in some cases, due to profile dimensions or machine geometry constraints, SmartPath may not be able to find any possible bending sequences. For these profiles, the user always has the option to create one or more custom bending sequences. In fact, he can create custom bending sequences for any profile, whether SmartPath was able to find acceptable bending sequences or not.

While in the **Sequence Library** screen, there are several ways to create a new custom bending sequence.

- Touch the **New Sequence**  button. This button creates an empty bending sequence, allowing the user to choose every operation.
- Touch the **Copy Sequence**  button. This option makes a copy of an existing sequence, and is useful when one of the SmartPath sequences is close to what the user wants, needing only minor adjustments.

With either method, a dialog window appears allowing the user to enter a name for the new bending sequence. After typing in a name and touching the **OK** button, the **Sequence Editor** screen appears.

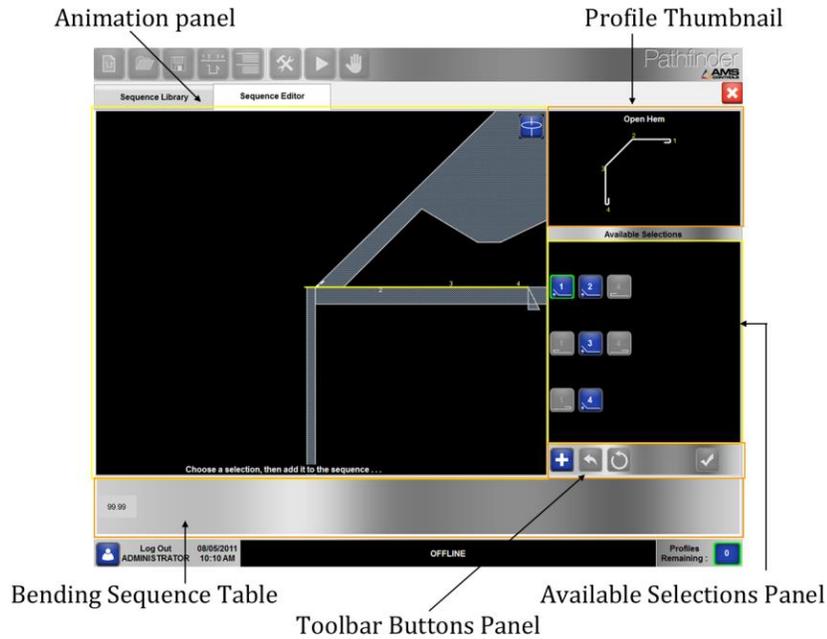


Figure 54: Sequence Editor Screen

Note: The horizontal bar between the animation screen and the sequences below it can be adjusted up or down to change the view to include either more of the sequences or fewer sequences.

Sequence Editor Screen

The **Sequence Editor** screen is made up of the following components:

The **Profile Thumbnail** shows an image of the completed profile, with each angle, hem or radius feature labeled.

The **Animation** panel shows a side view of the folding machine tooling, with a before and after image of a partially completed profile. The **Animation** panel represents what the profile would look like in the machine as of the currently selected sequence operation. It changes each time a different sequence operation is selected or whenever **Rotate** is selected.

The **Available Selections** panel contains buttons representing each sequence operation required to complete the bending sequence. The icons are the same as those used in the **Sequence Library** screen that make up a graphical bending sequence. There will always be a currently selected sequence operation, highlighted by a green or red outline. A green outline indicates that the selected operation is valid with the profile's current orientation.

The **Bending Sequence** table contains a graphical representation of the custom bending sequence which is currently being created and/or edited by the user. Once completed, a custom bending sequence will look very similar to the graphical bending sequences in **Sequence Library** screen.

The **Toolbar Button** panel contains buttons that allow the user to:



Add the selected operation to the custom bending sequence.



Remove the last operation from the custom bending sequence.



Remove all operations from the custom bending sequence.



Accept the completed custom bending sequence and prepare to run it on the machine.

Custom Bending Sequence Example – Parapet Rake Flash

This example assumes that the profile has already been created and loaded from the **Profile Library**, and the SmartPath auto-sequencing utility has already been initiated by going to the **Sequence Library** screen.

1. Touch the **New Sequence**  button.
2. The **Sequence Editor** screen appears as shown below:

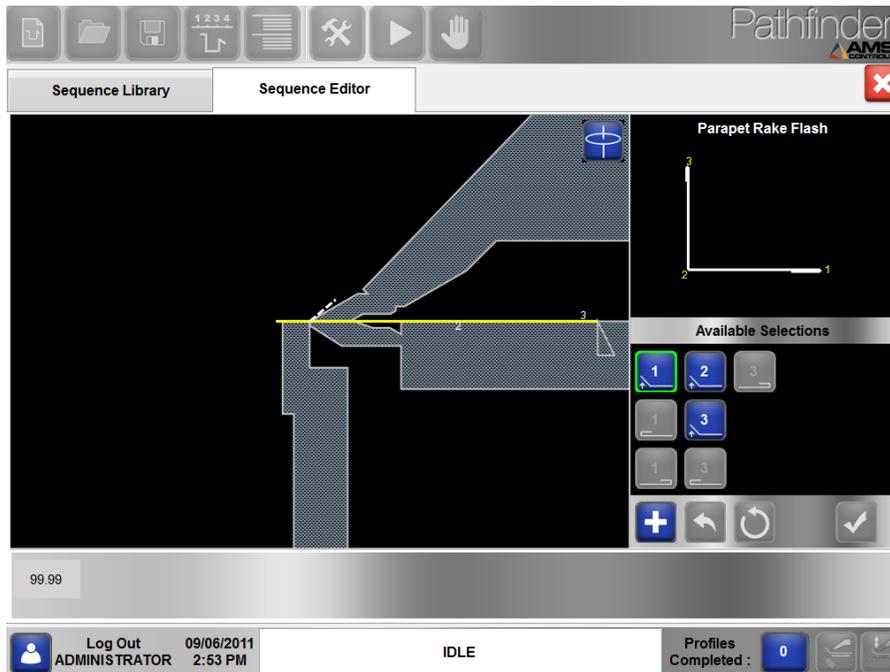


Figure 55: Creating a Custom Sequence – 1

3. Touch the **Bend-1**  button in the **Available Selections** panel to select this operation as the first operation of the sequence. The **Bend-1** button becomes outlined in green .
4. Touch the **Add**  button to add this operation to the sequence. Notice the **Bend-1** icon moves to the bottom of the screen and is now part of the custom bending sequence.
5. Select the **Close-Hem-1**  button.

6. Touch the **Add**  button to add the **Close-Hem-1** operation to the sequence.

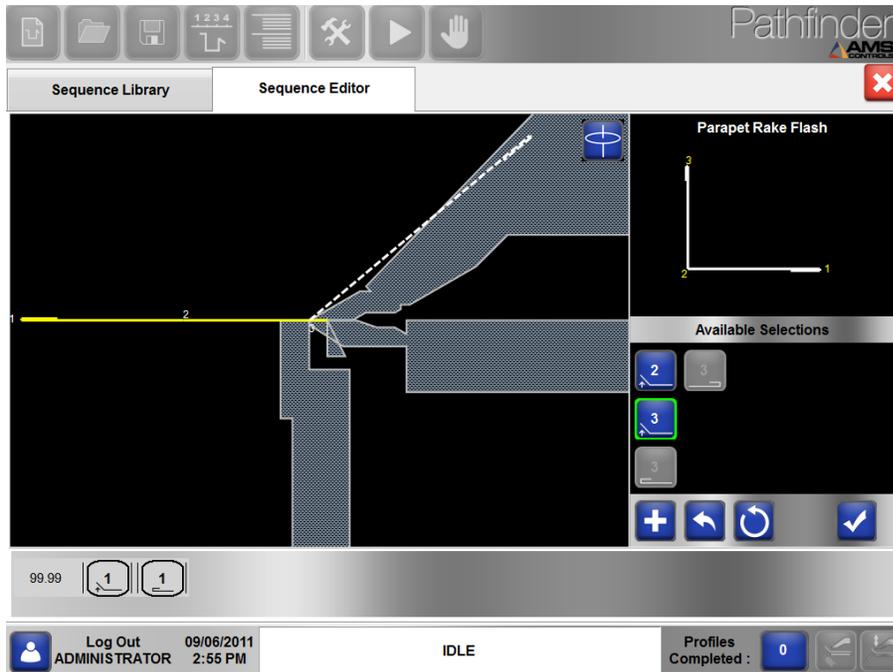


Figure 56: Creating a Custom Sequence - 2

7. Touch the **Bend-3**  button.
8. Select the **Close-Hem-3**  button. You will notice that the screen has a large pink **Turn** icon. This indicates that if we select this, the sequencer will automatically add a Turn before this operation.

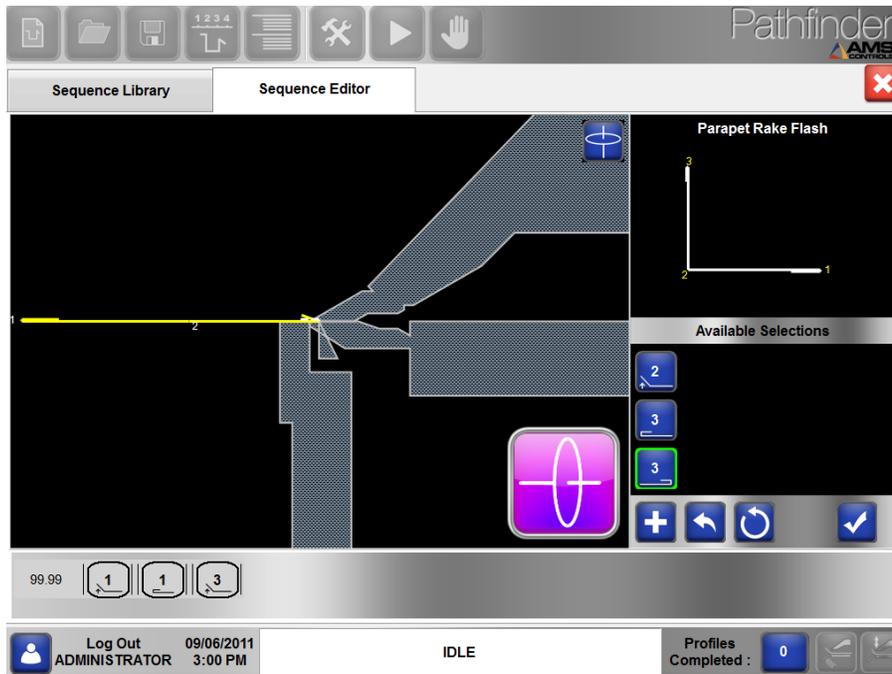


Figure 57: Creating a Custom Sequence - 3

9. Touch the **Add**  button to add the **Close-Hem-3** operation to the sequence. Note that the Turn has been added to the sequence bar.

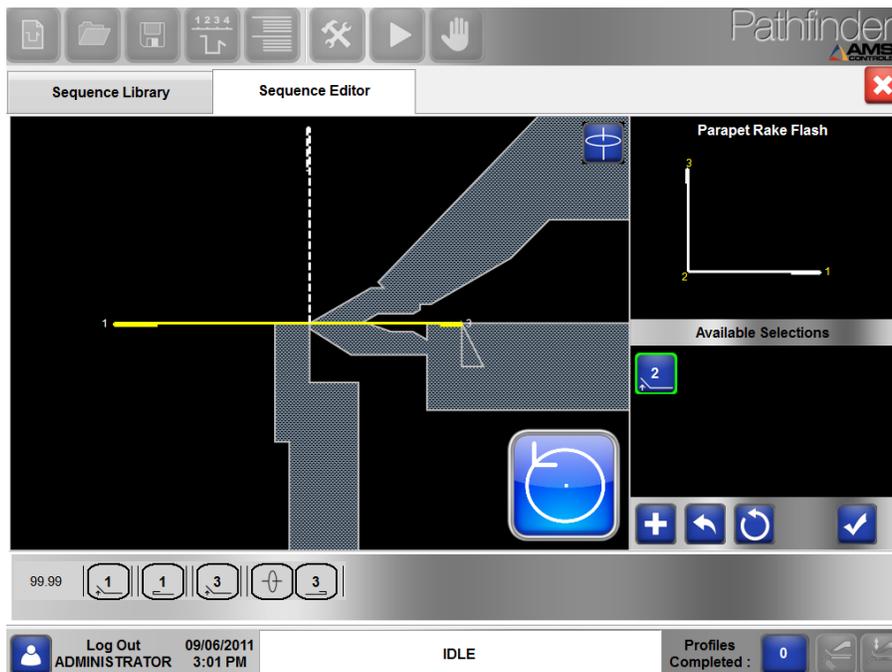


Figure 58: Creating a Custom Sequence - 4

10. Touch the **Bend-2**  button. Note that there is a large blue **Flip** button on the screen to indicate that a Flip must be performed before bend 2.
11. Touch the **Add**  button to add **Bend-2** and complete the custom bending sequence.
12. Touch the **Accept**  button to select this custom bending sequence as the preferred sequence and exit the **Sequence Editor** screen.

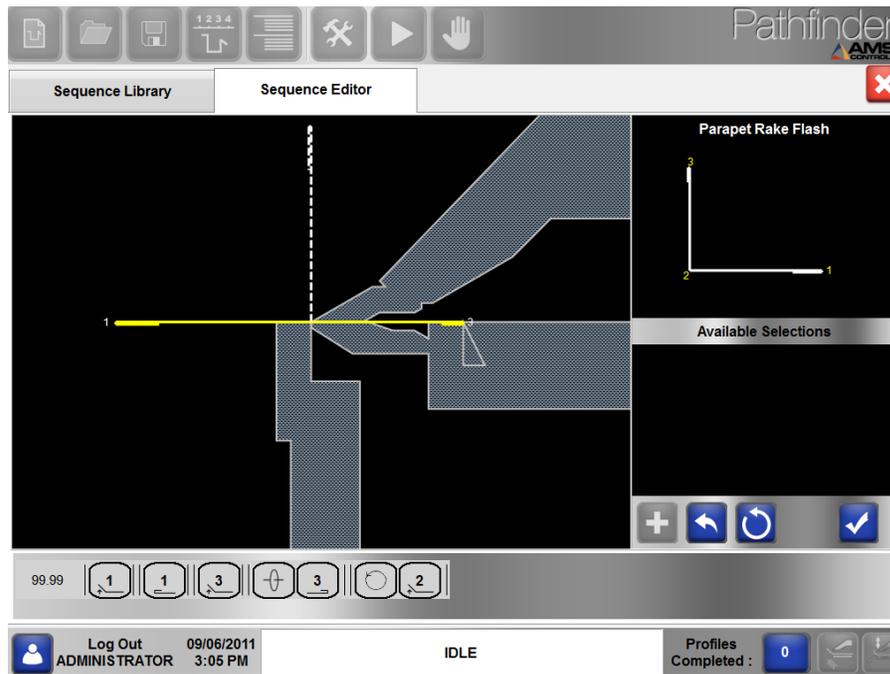


Figure 59: Creating a Custom Sequence – 5

Pathfinder returns to the Profile Editor view with the **Machine Operations** notebook tab active. Notice that the correct machine operations corresponding to the current profile and the preferred bending sequence have automatically been created, and are ready to be run on the folding machine.

Saving Bending Sequences

After one or more custom bending sequences has been defined for a profile, they can be saved, along with the profile information, by touching the **Save Profile**  button on the main toolbar. Pathfinder saves all custom bending sequences and also remembers which one has been selected as the preferred sequence. The next time the same profile is loaded from the

Profile Library, the custom bending sequences will be recalled and the preferred sequence will be ready to run on the machine.

Bending sequences that were automatically generated by SmartPath are not saved with the profile. They will simply be regenerated each time the user returns to the **Bend Sequencing** screen.

Chapter 8: One-Step Production

Although Pathfinder contains many features for creating profiles and sequencing them for production, it also allows operators to quickly produce parts without all of the bells and whistles. One-Step Production Mode, which is accessed from the Main Toolbar by selecting the button shown below, is the fastest way for an operator to make individual bends without using advanced features.



Figure 60: One-Step Button

As you can see in **Figure 61** below, the One-Step Production screen is simple. To use One-Step, the operator must select a Material and Thickness from the drop-down boxes. The pre-defined overbend for this Material and Thickness will be displayed on screen, but will not be editable.

After selecting Material and Thickness, the operator must select the angle he is bending from the blue buttons on the left side of the screen.

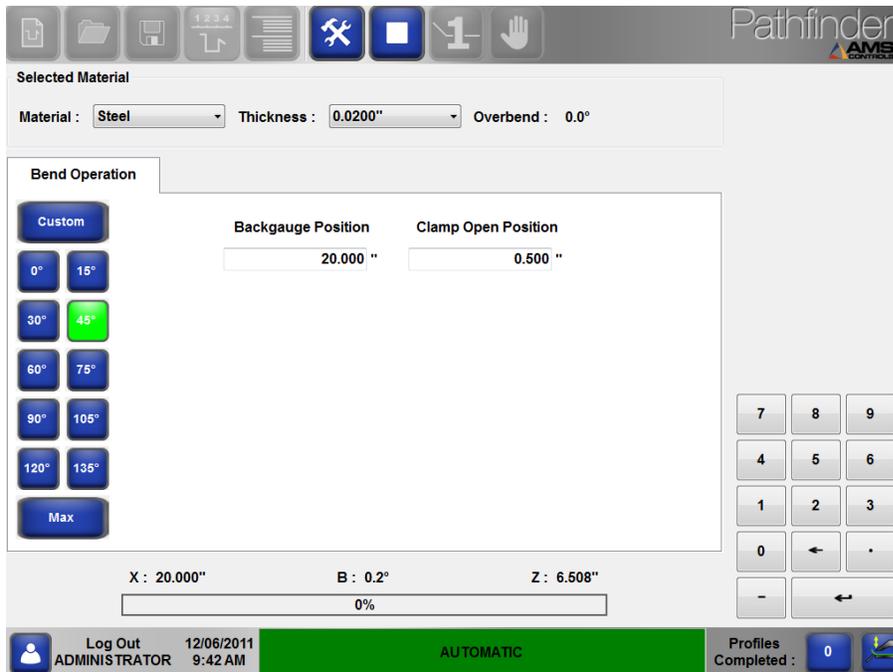
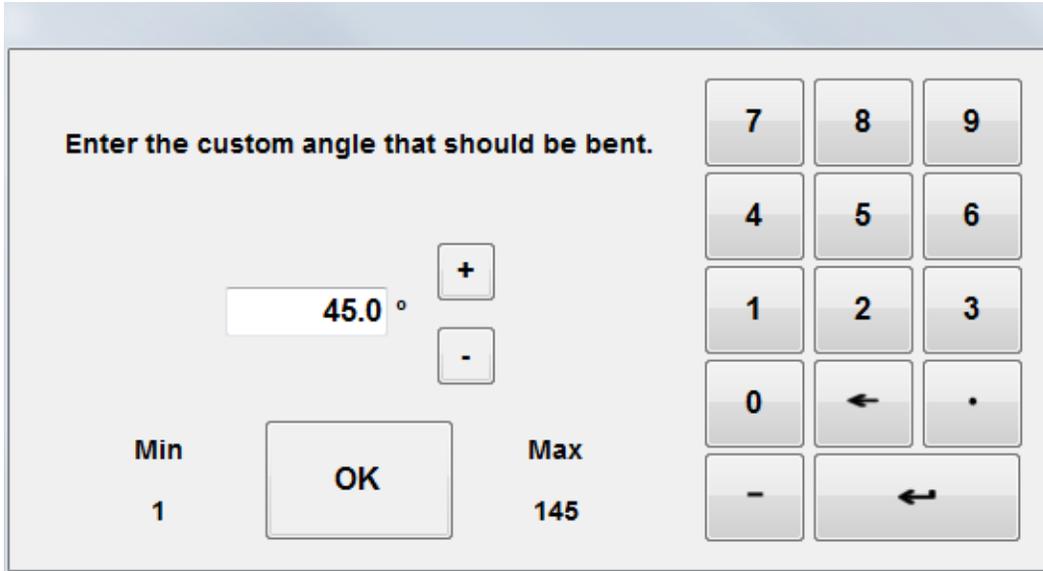


Figure 61: One-Step Production Screen

Commonly used angles are pre-set (15°, 30°, 45°, etc.) and custom angles can be entered by selecting the **Custom** button, which brings up the following dialog.



The dialog box is titled "Enter the custom angle that should be bent." It features a central text input field containing "45.0 °". To the right of the input field are two small buttons labeled "+" and "-". Below the input field is a large "OK" button. To the left of the "OK" button, the text "Min" is positioned above the number "1". To the right of the "OK" button, the text "Max" is positioned above the number "145". On the right side of the dialog is a numeric keypad with buttons for digits 0-9, a decimal point, a left arrow, and a minus sign. The keypad is arranged in a grid: the first row has 7, 8, 9; the second row has 4, 5, 6; the third row has 1, 2, 3; the fourth row has 0, a left arrow, and a decimal point; the fifth row has a minus sign and a right arrow.

Figure 62: One-Step Custom Angle Dialog

The Custom Angle dialog conveniently includes the minimum and maximum bending angles for the machine.

Selecting the **Max** button automatically bends the material to the maximum bending angle for that machine.

After selecting an angle, the operator can either adjust the Backgauge and Clamp Open Positions or accept the default positions and begin creating parts. When the clamping beam is closed, the One-Step Production screen notifies the operator by displaying a large **Clamped** icon.

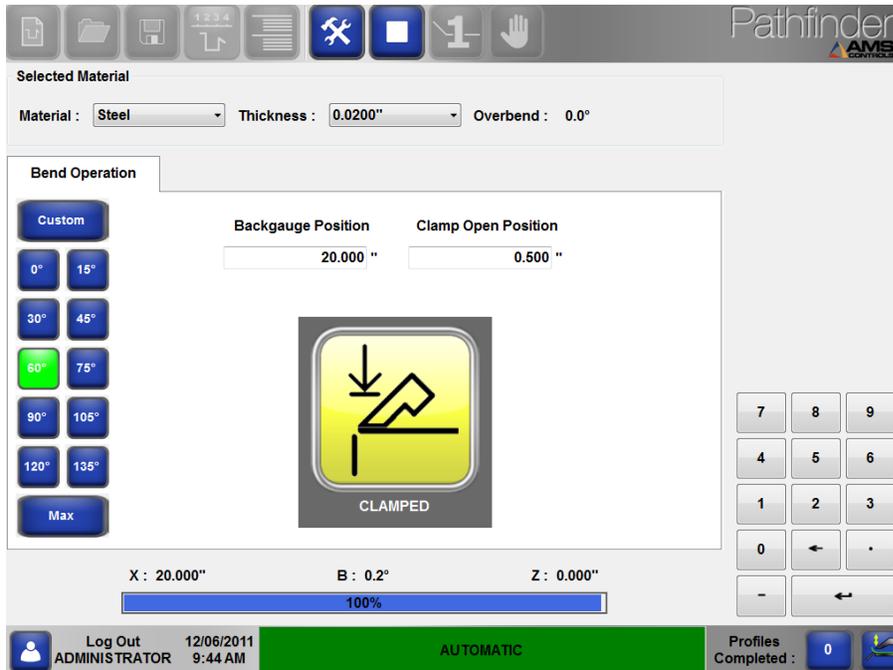


Figure 63: One-Step Clamped Icon

As the operator produces profiles, Pathfinder tracks the number of profiles completed in the bottom right corner. Touching the number button allows the operator to change from **Count Up** to **Count Down** mode and vice versa.



Figure 64: Profiles Completed

Note: Operators can access the **Tools** screen and check **Diagnostics - Input and Output Status** while still in **Automatic** when using One-Step Production. This was not possible in earlier versions of Pathfinder.

Note: One-Step Production Mode is not intended for regular high-volume production. It is intended for quick, individual bends.

Chapter 9: Manual Machine Movement

Pathfinder can be used to manually jog the different axes of the folding machine. Simply access the **Manual Jog** screen by pressing the hand button  on the main toolbar across the top of the screen.

Selecting this button will open the **Manual Jog** screen, as seen below.

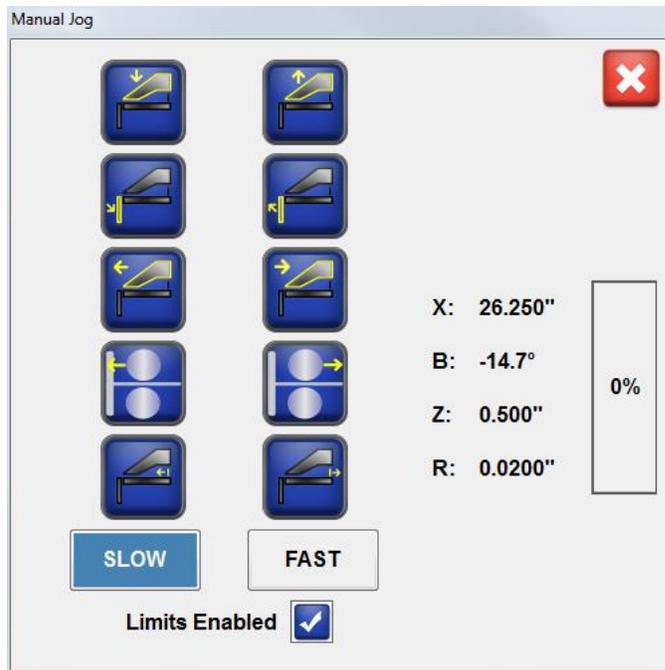


Figure 65: Manual Jog Dialog

At this point, touching a button will move the axis in the displayed direction. The positions of all axes are displayed on the right side of the screen.



Clamping Beam Down



Clamping Beam Up



Rotate Clamp CW



Rotate Clamp CCW



Bending Beam Down



Bending Beam Up



Radius Adjustment Forward



Radius Adjustment Back



Shear Forward



Shear Home



Backgauge Forward



Backgauge Back

On this screen, you can also select the speed of the machine axes: **SLOW** or **FAST**. These speeds are based on parameters for each axis being referenced. These buttons will have no effect if the axis only has one speed.

When logged in as an Administrator, you will see the **Limits Enabled** checkbox. Other users will always have Limits Enabled automatically.

Enabling limits prohibits operators from doing things that the motion controller deems potentially harmful to the machine and its components. Such potentially harmful activities include:

- Moving the bending beam while the clamp is not closed.
- Moving the backgauge towards the clamp while the clamp IS closed.
- Moving any axis when it is sitting on its overtravel limit.

- Moving the clamp while the shear is not at its home position.

The motion controller will use parameter-defined minimum and maximum positions to prevent any axis from moving past its limits.

Disabling limits may be necessary to set up the machine or for maintenance. For example, if an overtravel limit switch is hit due to improper calibration or unset parameters, disabling limits allows the operator to jog the axis back to within its limits.

Appendix A: the Machine

Referencing

 **Note:** Referencing is usually performed by an installation technician at the time of installation, after which it typically should not need to be performed again unless power is lost while the machine's axes are moving or if the machine is moved while Pathfinder is off. In some cases, re-referencing may need to be performed after an update to the motion controller.

Many moving axes on the folding machine have reference points which may require referencing. When you attempt to go into automatic mode and the machine requires referencing, the Pathfinder controller informs you that the machine requires referencing.

If you access the **Reference Machine** screen after the machine has already been referenced, it will inform you that all machine axes are referenced. Even if this message is given, the machine can always be re-referenced.

Use **Reference Machine** to reference any of the machine's moving devices. To reference axes,

Select the **Tools**  button.

Select **Reference Machine**. The Reference Machine window displays.

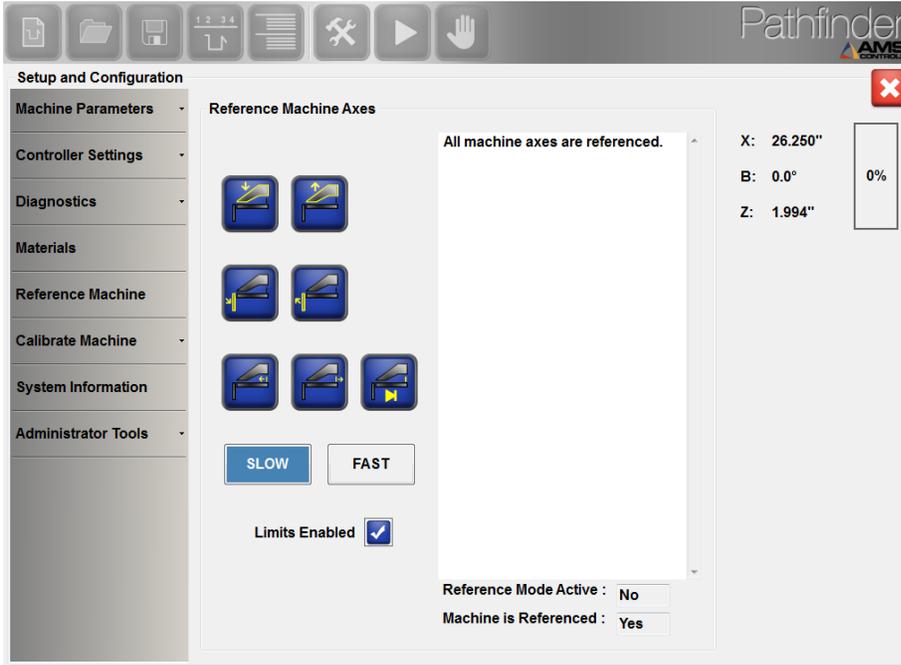


Figure 66: Reference Machine Screen

Follow the on-screen instructions, which will vary by machine and configuration, selecting the flashing buttons as instructed by Pathfinder to reference the necessary machine axes.



Clamp Down –Jogs the Clamping Beam down.



Clamp Up –Jogs the Clamping Beam up.



Rotate Clamp Clockwise – Rotates the Clamping Beam clockwise so the operator can access other tooling. Currently only used on Roper Whitney Kombi-Beam models.



Rotate Clamp Counter-Clockwise - Rotates the Clamping Beam counter-clockwise so the operator can access other tooling. Currently only used on Roper Whitney Kombi-Beam models.



Bending Beam Down – Jogs the Bending Beam down.



Bending Beam Up –Jogs the Bending Beam up.



Reference Bending Beam – References the bending beam by jogging the bending beam back to the home switch and referencing itself to that home switch. This is only used on machines with incremental encoders on the bending beam and a bending beam home switch.



Backgauge Forward – Jogs the backgauge forward toward the Bending Beam.



Backgauge Back – Jogs the backgauge back toward the back of the table.



Reference Backgauge – References the backgauge by jogging the backgauge back to the home switch and referencing itself to that home position.



Radius Adjustment Forward – Jogs the Radius Adjustment towards the Bending Beam.



Radius Adjustment Back – Jogs the Radius Adjustment towards the Backgauge.

On this screen, you can also select the speed of the machine axes: **SLOW** or **FAST**. These speeds are based on parameters for each axis being referenced. These buttons will have no effect if the axis only has one speed.

When logged in as an Administrator, you will see the **Limits Enabled** checkbox. Other users will always have Limits Enabled automatically.

Enabling limits prohibits operators from doing things that the motion controller deems potentially harmful to the machine and its components. Such potentially harmful activities include:

- Moving the bending beam while the clamp is not closed.
- Moving the backgauge towards the clamp while the clamp IS closed.
- Moving any axis when it is sitting on its overtravel limit.
- Moving the clamp while the shear is not at its home position.

The motion controller will use parameter-defined minimum and maximum positions to prevent any axis from moving past its limits.

Disabling limits may be necessary to set up the machine or for maintenance. For example, if an overtravel limit switch is hit due to improper calibration or unset parameters, disabling limits allows the operator to jog the axis back to within its limits.

Appendix B: Calibrating the Machine

Pathfinder's Administrative Tools includes a **Calibrate Machine** function. When Pathfinder requires calibration, you will see the following message at the bottom of your screen.

WAITING FOR CALIBRATION DATA

Figure 67: Waiting for Calibration Data

To start the calibration process, click the **Tools** button and select **Calibrate Machine**. From this screen, you can calibrate the **Bending Beam Position**, **Clamping Beam Position**, **Clamping Beam Pressure** and **Radius Adjustment**.

Referencing Absolute Encoders

Some machines have an absolute encoder on the **Bending Beam**, **Clamping Beam** and/or **Radius Adjustment**. Since the encoder is absolute, it does not need to be "reset" based on a switch. However, it does need to track all of the range of motion of the axis to which it is tied, with values between zero and its maximum.

If your machine has an absolute encoder on any of its axes, your calibration screen for each axis will have a **Reference Encoder** button. Pressing this button will reset the encoder to a value in the middle of its range of motion. If this button is not present, there is no encoder to reference.

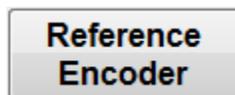


Figure 68: Reference Encoder Button

 **Note:** It is important that you reference the absolute encoder **before** continuing to calibrate each axis. Failure to do so could result in inaccurate calibration.

To reference an absolute encoder, move the axis to a position in the middle of its range of motion. Once there, click **Reference Encoder** on the calibration screen. This will reset the encoder to a value in the middle of its valid range. Then, when calibrating, you ensure that all of the feedback measurements that you are recording are above zero.

Please note that if you press **Reference Encoder** when the axis has already been calibrated, all calibration data for that axis is removed.

Bending Beam Position

Calibrating the bending beam position requires taking measurements across the total range of the bending beam's motion. To measure the angle of the bending beam, use a magnetic inclinometer (available through woodworking stores).

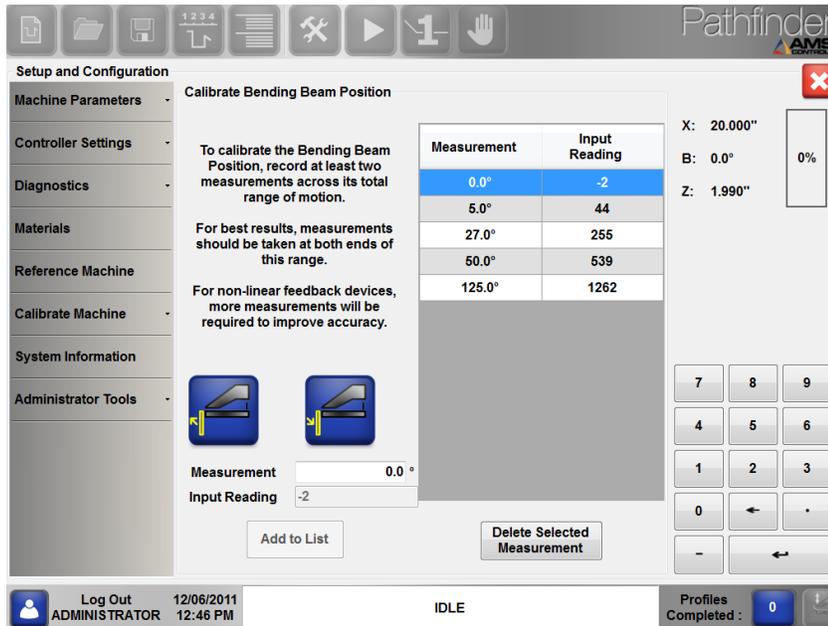


Figure 69: Bending Beam Calibration Screen

Jog the bending beam to a position and enter the measurement into the **Measurement** box and press **Enter**. Then select **Add to List** to add the measurement to the table. Repeat this for several angle positions, including both the highest and lowest range of motion for your particular machine.

Take the angle measurement for every 20 to 25 degrees for the most accurate calibration.

Note: Calibration measurements do not have to be taken in order. For example, you can take a measurement at 45°, then 100°, then jog back to 10° and take a measurement. The order of these measurements does not matter.

Remember, the more measurements you take, the more accurate the position.

Clamping Beam Position

Calibrating the clamping beam position requires taking measurements across the total range of the clamping beam's motion. Use a **caliper** to measure the angle of the clamping beam.

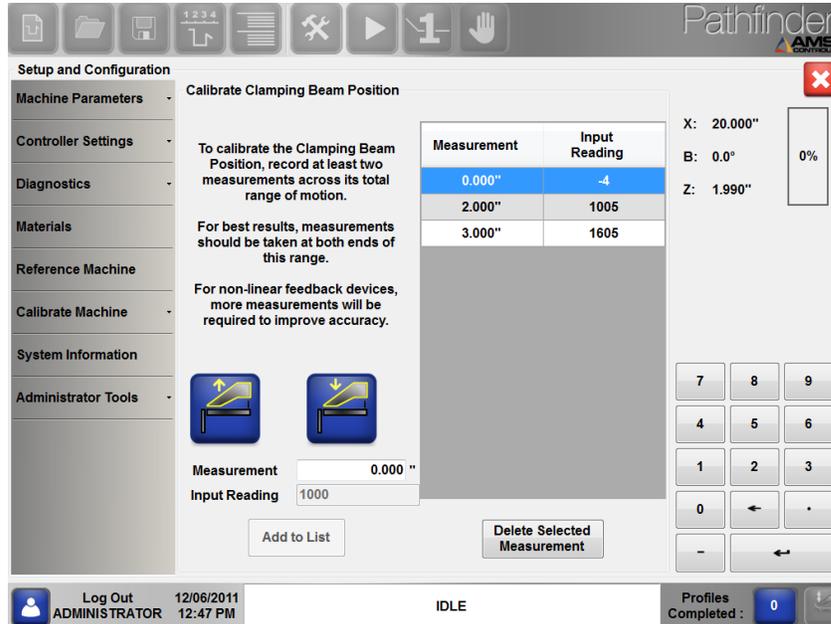


Figure 70: Clamping Beam Calibration Screen

Jog the clamping beam to a position, then enter the measured position into the **Measurement** box, press **Enter** and select **Add to List**. Repeat this for several measurements all along the clamping beam's range of motion. Feeler gauges may be helpful near the fully closed position. On machines with eccentric type clamping mechanisms, it is important to get many readings below the safety height for best results.

Remember, the more measurements you take, the more accurate the position.

Clamping Beam Pressure (Optional)

Clamping beam pressure must only be calibrated on machines with pressure transducer feedback devices. Calibrating the clamping beam pressure requires taking measurements across the total range of the clamping beam's motion. To measure the clamping beam pressure, watch the pressure input reading in the top right of the screen.

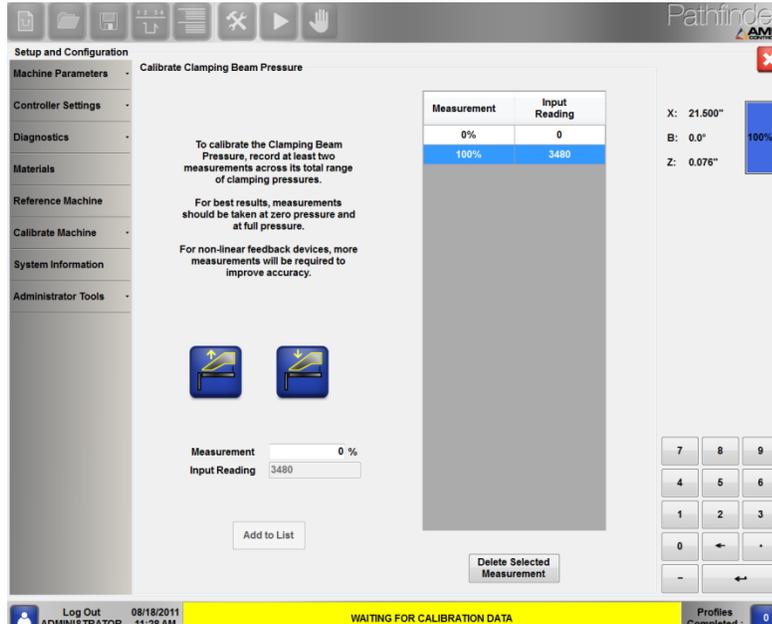


Figure 71: Clamping Beam Pressure Calibration Screen

Jog the clamping beam closed, until it is touching the table but not dramatically changing the input reading, then enter the pressure as 0% into the **Measurement** box, press **Enter** and select **Add to List**. Jog the clamping beam down as far as it will go, then enter the pressure as 100% into the **Measurement** box, press **Enter** and select **Add to List**.

Radius Adjustment Position (Optional)

If you are using a folding machine that allows for Radius Adjustment, then this option will appear under **Calibrate Machine**.

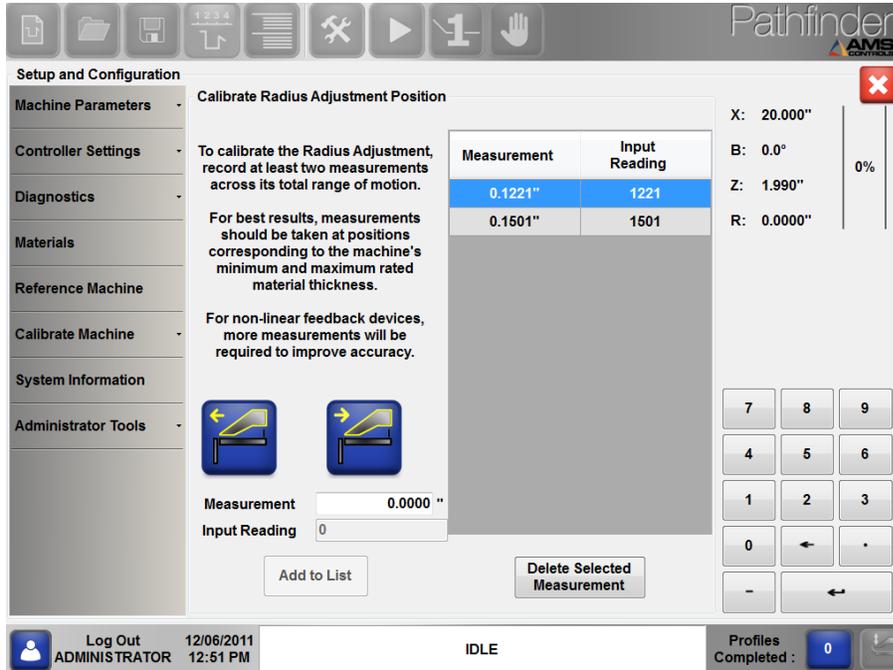


Figure 72: Calibrating Radius Adjustment

To calibrate the Radius Adjustment, the clamp must be open to a position greater than one inch. Jog the clamping beam as far away from the bending beam as possible and calibrate that to the maximum rating. Enter that measurement into the **Measurement** box, hit **Enter** and click **Add to List** to add the calibration data.

Then, jog the clamping beam as close to the bending beam as possible and calibrate that to the minimum rating. Enter that measurement into the **Measurement** box, hit **Enter** and click **Add to List** to add this data to the calibration table.

Re-referencing the Clamping Beam

If the machine has a safety stop on the clamping beam, it is important to re-reference the clamping beam after calibration. This will ensure that the safety stop position is accurate. If your machine does not have a safety stop on the clamping beam, you can skip this step.

Return to the **Reference Machine** screen and select the **Clamping Beam Down** button until it is fully clamped. Follow any instructions that are shown on the screen. Once the Clamping Beam has been re-referenced, the machine will be ready to use.

Setup Parameters

Pathfinder contains many parameters that allow users to customize the control system's behavior for their specific folding machine. The parameters are divided into four main

categories, accessible by touching the **Tools**  button on the main toolbar.

Each parameter is classified into the following categories, for your reference:

Class indicator	Classification Description
Machine	Machine characteristic. Physical characteristics about installed components, wiring, geometry or how the machine must function, etc.
Machine Axis Tuning	Machine Axis Tuning. Settings that affect the speed, behavior, controllability or tolerance of an axis like a bending beam.
Safety	Safety Related Parameter. Parameters related to a corporate standard affecting safety.
Customer Preference	Corporate/Customer Preference. May or may not relate to safety.
Part Quality	Part Quality Settings
UI & Local	User Interface and Local/Regional/Country Settings
Part Creation	Part Creation Settings. Could be considered safety related, Part Quality Related or Production Efficiency related depending on the circumstances.

Machine Parameters

Machine Parameters includes parameters specific to each controlled moving axis on the folding machine, including:

- Backgauge Parameters
- Bending Beam Parameters
- Clamping Beam Parameters
- Radius Adjustment Parameters
- Shear / Slitter Parameters

Backgauge Parameters

ID	Parameter Name	Parameter Description	Value Limits or Available Selections	Classification
101	Encoder Direction	Determines which rotational direction of the backgauge encoder corresponds to positive movement (or increasing linear position) of the backgauge.	CW CCW	Machine
122	Home Position	Specifies the distance from the backgauge's normal gauging surface to the machine's bending point whenever the backgauge makes contact with its home reference switch.	Lower: -2.000 Upper: 99.999 Units: Inches	Machine
123	Fast Speed – Towards Clamp (for frequency inverter controlled backgauges)	Specifies the percentage of the frequency inverter's maximum speed to be used when positioning the backgauge in fast speed.	Lower: 1 Upper: 100 Units: Percent	Machine Axis Tuning
124	Fast Speed (for servo controlled backgauges via SERCOS interface)	Specifies an absolute velocity to be used when positioning the backgauge in fast speed.	Lower: 0 Upper: 100 Units: Feet/Minute	Machine Axis Tuning
125	Slow Speed (for servo controlled backgauges via SERCOS interface)	Specifies an absolute velocity to be used when positioning the backgauge in slow speed.	Lower: 0 Upper: 100 Units: Feet/Minute	Machine Axis Tuning
126	Reference Speed	Specifies the percentage of the frequency inverter's maximum speed to be used when referencing the backgauge to its home reference switch.	Lower: 0 Upper: 100 Units: Percent	Machine Axis Tuning
127	Slow Distance	Specifies the amount of distance for which the backgauge will shift into slow speed prior to stopping at its programmed target position.	Lower: 0.000 Upper: 99.999 Units: Inches	Machine Axis Tuning
128	Stopping Mode	Determines whether or not the motion controller will automatically monitor and adjust the backgauge Stopping Reaction Time after each position target is reached during the automatic mode.	AUTOMATIC MANUAL	Machine Axis Tuning
129	Slow Speed – Towards Clamp	Specifies the percentage of the frequency inverter's maximum speed to	Lower: 1 Upper: 100	Machine Axis Tuning

	(for frequency inverter controlled backgauges)	be used when positioning the backgauge in slow speed.	Units: Percent	
130	Stopping Reaction Time	Compensates for the amount of time required to stop the moving backgauge as it approaches its programmed target position. This value is continually adjusted by the motion controller when Parameter 128 - Stopping Mode is set to AUTOMATIC.	Lower: 0.000 Upper: 2.000 Units: Seconds	Machine Axis Tuning
131	Encoder Resolution	Specifies the amount of linear distance the backgauge moves for each increment of the backgauge encoder	Lower: 0.0000400000 Upper: 0.5000000000 Units: Inches/Count	Machine
132	Position Tolerance	Specifies the distance from the targeted backgauge position that is considered close enough to be "on target."	Lower: 0.000 Upper: 10.000 Units: Inches	Machine Axis Tuning
133	Tolerance Testing Mode	Specifies what will occur if the backgauge stops outside of the specified position tolerance.	AUTO RETRY DISABLED HALT ON ERROR	Machine Axis Tuning
134	Finger Offset Distance	Specifies the difference between the backgauge's normal gauging surface and its alternate gauging surface whenever the backgauge finger is activated.	Lower: 0.000 Upper: 99.999 Units: Inches	Machine
135	Mid Finger Offset Distance	Specifies the difference between the backgauge's normal gauging surface and its alternate gauging surface whenever the mid backgauge finger is activated.	Lower: 0.000 Upper: 99.999 Units: Inches	Machine
136	Mid Finger Activation Threshold	Specifies the smallest absolute position target the backgauge can achieve without activating the mid backgauge finger.	Lower: 0.000 Upper: 99.999 Units: Inches	Machine
137	Fast Speed – Away from Clamp	Specifies the percentage of the frequency inverter's maximum speed to be used when positioning the backgauge moving away from the clamp in fast speed.	Lower: 1 Upper: 100 Units: Percent	Machine Axis Tuning
138	Slow Speed – Away from Clamp	Specifies the percentage of the frequency inverter's maximum speed to be used when positioning the	Lower: 1 Upper: 100 Units: Percent	Machine Axis Tuning

		backgauge moving away from the clamp in slow speed.		
140	Minimum Position	Specifies the smallest achievable position target the backgauge can reach, relative to the machine's bending point.	Lower: 0.000 Upper: 10.000 Units: Inches	Machine
141	Maximum Position	Specifies the largest achievable position target the backgauge can reach, relative to the machine's bending point.	Lower: 15.000 Upper: 99.999 Units: Inches	Machine
142	Outside Hem Close Position	Specifies the position the backgauge should move to when closing a hem with the material outside of the machine.	Lower: 0.000 Upper: 10.000 Units: Inches	Part Creation
145	Ramp Time	Specifies the amount of time to use to ramp the analog output from 0% up to 100% and from 100% down to 0%.	Lower: 0.000 Upper: 5.000 Units: Seconds	Machine Axis Tuning
146	Finger Activation Threshold	Specifies the smallest absolute position target the backgauge can achieve without activating the backgauge finger.	Lower: 0.000 Upper: 99.999 Units: Inches	Machine
147	Clamping Beam Collision Crisis Distance	Specifies an alternate minimum position limit for the backgauge any time the clamping beam is positioned lower than its Backgauge Collision Crisis Distance.	Lower: 0.000 Upper: 10.000 Units: Inches	Machine
148	Forward Acceleration Time	Specifies the amount of time allowed for the backgauge to accelerate from slow speed to fast speed when moving in the forward direction.	Lower: 0.000 Upper: 10.000 Units: Seconds	Machine Axis Tuning
149	Forward Deceleration Time	Specifies the amount of time allowed for the backgauge to decelerate from fast speed to slow speed when moving in the forward direction.	Lower: 0.000 Upper: 10.000 Units: Seconds	Machine Axis Tuning
150	Reverse Acceleration Time	Specifies the amount of time allowed for the backgauge to accelerate from slow speed to fast speed when moving in the reverse direction.	Lower: 0.000 Upper: 10.000 Units: Seconds	Machine Axis Tuning
151	Reverse Deceleration Time	Specifies the amount of time allowed for the backgauge to decelerate from fast speed to slow speed when moving in the reverse direction.	Lower: 0.000 Upper: 10.000 Units: Seconds	Machine Axis Tuning

152	Overshoot Distance	Specifies the amount of distance the backgauge will move past its programmed target while approaching in the reverse direction. The backgauge will then change directions and approach its target in the forward direction.	Lower: 0.000 Upper: 4.000 Units: Inches	Machine Axis Tuning
153	Radius Adjustment - Fine	Specifies the approximate amount of distance the backgauge will move for each sub-step while forming a radius segment with a FINE quality setting.	Lower: 0.03125 Upper: 1.00000 Units: Inches	Part Quality
154	Radius Adjustment - Medium	Specifies the approximate amount of distance the backgauge will move for each sub-step while forming a radius segment with a MEDIUM quality setting.	Lower: 0.03125 Upper: 1.00000 Units: Inches	Part Quality
155	Radius Adjustment - Coarse	Specifies the approximate amount of distance the backgauge will move for each sub-step while forming a radius segment with a COARSE quality setting.	Lower: 0.03125 Upper: 1.00000 Units: Inches	Part Quality
172	Disable When Part Secured	Determines whether the backgauge will be disabled when the part is secured by the clamp. When this parameter is set to "No," the backgauge will always remain enabled. When this parameter is set to "Yes," the backgauge will be disabled when the part is secured by the clamp.	No Yes	Machine

Bending Beam Parameters

ID	Parameter Name	Parameter Description	Value Limits or Available Selections	Classification
201	Encoder Direction	Determines which rotational direction of the bending beam encoder corresponds to positive movement (or increasing angular position) of the bending beam.	CW CCW	Machine
202	Maximum Bending Angle	Specifies the largest achievable angle the bending beam can be positioned to without colliding with the clamping beam tooling or other machine surfaces.	Lower: 0.0 Upper: 180.0 Units: Degrees	Machine
204	Fast Speed – Upward	Specifies the percentage of the frequency inverter's maximum speed to be used when positioning the bending beam in fast speed.	Lower: 1 Upper: 100 Units: Percent	Machine Axis Tuning
205	Slow Speed – Upward	Specifies the percentage of the frequency inverter's maximum speed to be used when positioning the bending beam in slow speed.	Lower: 1 Upper: 100 Units: Percent	Machine Axis Tuning
206	Power Mode Speed	Specifies the percentage of the frequency inverter's maximum speed to be used when positioning the bending beam in fast speed whenever the power mode is active.	Lower: 0 Upper: 100 Units: Percent	Machine Axis Tuning
207	Slow Distance – Up	Specifies the amount of angular distance for which the bending beam will shift into slow speed prior to stopping at its programmed target angle.	Lower: 0.0 Upper: 45.0 Units: Degrees	Machine Axis Tuning
208	Slow Start Time	Specifies the amount of time the bending beam starts moving in slow speed before shifting to fast speed while performing a bend during the automatic mode.	Lower: 0.000 Upper: 8.000 Units: Seconds	Machine Axis Tuning

209	Stopping Mode	Determines whether or not the motion controller will automatically monitor and adjust the bending beam Stopping Reaction Time after each target angle is reached during the automatic mode.	AUTOMATIC MANUAL	Machine Axis Tuning
210	Stopping Reaction Time - Up	Compensates for the amount of time required to stop the moving bending beam as it approaches its programmed target angle. This value is continually adjusted by the motion controller when the Parameter 209 - Stopping Mode is set to AUTOMATIC.	Lower: 0.000 Upper: 2.000 Units: Seconds	Machine Axis Tuning
212	Switchover Delay Time	Specifies the amount of time the bending beam pauses once it has reached its target angle before it begins to return to its home position during the automatic mode.	Lower: 0.000 Upper: 10.000 Units: Seconds	Machine Axis Tuning
213	Fast Speed – Downward	Specifies the percentage of the frequency inverter's maximum speed to be used when positioning the bending beam moving downward in fast speed.	Lower: 1 Upper: 100 Units: Percent	Machine Axis Tuning
214	Slow Speed – Downward	Specifies the percentage of the frequency inverter's maximum speed to be used when positioning the bending beam moving downward in slow speed.	Lower: 1 Upper: 100 Units: Percent	Machine Axis Tuning
215	Delay Before Opening Clamping Beam	Specifies the amount of time the controller pauses after the bending beam has returned to its home position and before the clamping beam opens during the automatic mode.	Lower: 0.000 Upper: 10.000 Units: Seconds	Machine Axis Tuning
216	Acceleration Time	Specifies the amount of time allowed for the bending beam to accelerate from slow speed to fast speed.	Lower: 0.000 Upper: 10.000 Units: Seconds	Machine Axis Tuning

217	Deceleration Time	Specifies the amount of time allowed for the bending beam to decelerate from fast speed to slow speed.	Lower: 0.000 Upper: 10.000 Units: Seconds	Machine Axis Tuning
218	Raise Clamping Beam Overlap	Specifies a threshold for when the bending beam's current angle falls below this value, as it returns to its home position during the automatic mode, the clamping beam will start to open.	Lower: 0.0 Upper: 90.0 Units: Degrees	Machine Axis Tuning
219	Slow Distance – Down	Specifies the amount of angular distance for which the bending beam will shift into slow speed prior to stopping at its home position.	Lower: 0.0 Upper: 45.0 Units: Degrees	Machine Axis Tuning
220	Stopping Reaction Time – Down	Compensates for the amount of time required to stop the moving bending beam as it approaches its home position. This value is continually adjusted by the motion controller when Parameter 209 - Stopping Mode is set to AUTOMATIC.	Lower: 0.000 Upper: 2.000 Units: Seconds	Machine Axis Tuning
221	Ramp Time	Specifies the amount of time to use to ramp the analog output from 0% up to 100% and from 100% down to 0%.	Lower: 0.0 Upper: 5.0 Units: Seconds	Machine Axis Tuning

Clamping Beam Parameters

ID	Parameter Name	Parameter Description	Value Limits or Available Selections	Classification
301	Encoder Direction	Determines which rotational direction of the clamping beam encoder corresponds to positive movement (or increasing opening height) of the clamping beam.	CW CCW	Machine
302	Clamping Surface Dimension	Specifies the width of the clamping surface that makes contact with the sheet metal whenever the clamping beam is fully closed.	Lower: 0.000 Upper: 12.000 Units: Inches	Machine
304	Fast Speed - Downward	Specifies the percentage of the frequency inverter's maximum speed to be used when positioning the clamping beam in fast speed.	Lower: 1 Upper: 100 Units: Percent	Machine Axis Tuning
305	Slow Speed - Downward	Specifies the percentage of the frequency inverter's maximum speed to be used when positioning the clamping beam in slow speed.	Lower: 1 Upper: 100 Units: Percent	Machine Axis Tuning
306	Slow Distance	Specifies the amount of linear distance for which the clamping beam will shift into slow speed prior to reaching the safety stop distance while it is closing during the automatic mode.	Lower: 0.000 Upper: 10.000 Units: Inches	Machine Axis Tuning
307	Slow Start Time	Specifies the amount of time the clamping beam starts moving in slow speed before shifting to fast speed while raising or lowering during the automatic mode.	Lower: 0.000 Upper: 8.000 Units: Seconds	Machine Axis Tuning
308	Stopping Mode	Determines whether or not the motion controller will	AUTOMATIC	Machine Axis Tuning

		automatically monitor and adjust the clamping beam Stopping Reaction Time after each target opening height is reached during the automatic mode.	MANUAL	
309	Stopping Reaction Time – Up	Compensates for the amount of time required to stop the moving clamping beam as it approaches its programmed target opening height. This value is continually adjusted by the motion controller when Parameter 308 - Stopping Mode is set to AUTOMATIC.	Lower: 0.000 Upper: 2.000 Units: Seconds	Machine Axis Tuning
310	Stopping Reaction Time - Down	Compensates for the amount of time required to stop the moving clamping beam as it approaches its programmed target opening height. This value is continually adjusted by the motion controller when Parameter 308 - Stopping Mode is set to AUTOMATIC.	Lower: 0.000 Upper: 2.000 Units: Seconds	Machine Axis Tuning
312	Minimum Opening Height	Specifies the default clamping beam opening position after each machine operation is executed during the automatic mode. This value can be overridden for a specific machine operation by entering a larger value in the operation's Clamp Opening Height property.	Lower: 0.0625 Upper: 5.0000 Units: Inches	Machine Axis Tuning
313	Maximum Opening Height	Specifies the largest achievable opening height the clamping beam can be positioned to on this machine.	Lower: 3.000 Upper: 50.000 Units: Inches	Machine

315	Raise on E-Stop	Determines whether or not the clamping beam opens automatically whenever the emergency stop circuit is broken, and for what time duration it remains active.	DISABLED 1 SECOND 2 SECONDS MAXIMUM	Safety
316	Decompression Time	Specifies the amount of time the hydraulic pressure relief valve is activated prior to raising the clamping beam once any clamping pressure has built up in the system.	Lower: 0.000 Upper: 10.000 Units: Seconds	Machine Axis Tuning
317	Safety Stop Height	Specifies the position at which the clamping beam will stop while closing, requiring the machine operator to reactivate the foot-pedal or push-button before proceeding.	Lower: 0.100 Upper: 10.000 Units: Inches	Safety
318	Fast Speed – Upward	Specifies the percentage of the frequency inverter's maximum speed to be used when positioning the clamping beam moving upward in fast speed.	Lower: 1 Upper: 100 Units: Percent	Machine Axis Tuning
319	Slow Speed – Upward	Specifies the percentage of the frequency inverter's maximum speed to be used when positioning the clamping beam moving upward in slow speed.	Lower: 1 Upper: 100 Units: Percent	Machine Axis Tuning
320	Minimum Pressure	Specifies the minimum clamp pressure that can be applied on any bend or hem operation.	Lower: 0 Upper: 100 Units: Percent	Machine
324	Ramp Time	Specifies the amount of time to use to ramp the analog output from 0% up to 100% and from 100% down to 0%.	Lower: 0.00 Upper: 5.00 Units: Seconds	Machine Axis Tuning
325	Backgauge Collision Crisis Distance	Specifies the minimum opening height for the	Lower: 0.000 Upper: 10.000	Machine

		clamping beam which is required for the backgauge to be positioned at or less than its Clamping Beam Collision Crisis Distance.	Units: Inches	
326	Acceleration Time	Specifies the amount of time allowed for the clamping beam to accelerate from slow speed to fast speed.	Lower: 0.000 Upper: 10.000 Units: Seconds	Machine Axis Tuning
327	Deceleration Time	Specifies the amount of time allowed for the clamping beam to decelerate from fast speed to slow speed.	Lower: 0.000 Upper: 10.000 Units: Seconds	Machine Axis Tuning
328	Clamping Pressure Hysteresis	Allows for a drop in clamping pressure after a machine operation's target pressure has been reached. As long as the pressure drops by less than the specified percentage of its target, the motion controller considers the machine to be "at target pressure."	Lower: 1 Upper: 99 Units: Percent	Machine Axis Tuning
347	Open Hem – Closing Mode	Sets how the clamp behaves on hem close operations. When set to "Default," the clamp will use the stopping reaction time when moving to a target under the safety stop height. When set to "No Reaction," the clamp will not use the stopping reaction time when moving to a target under the safety stop height.	Default No Reaction	Machine Axis Tuning
348	Part Secured Pressure	Defines the minimum clamping beam pressure at which the part is considered secure in the clamp. This is the threshold at which the backgauge can be disabled	Lower: 1 Upper: 100 Units: Degrees	Machine Axis Tuning

		without risk of the part moving.		
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Radius Adjustment Parameters

Radius Adjustment Parameters are only activated on machines with a **Radius Adjustment**.

ID	Parameter Name	Parameter Description	Value Limits or Available Selections	Classification
400	Encoder Direction	Determines which rotational direction of the radius adjustment encoder corresponds to positive movement (or increasing linear position) of the radius adjustment.	CW CCW	Machine
401	Minimum Position	Specifies the smallest achievable position for the radius adjustment axis.	Lower: 0.010 Upper: 0.250 Units: Inches	Machine
402	Maximum Position	Specifies the largest achievable position for the radius adjustment axis.	Lower: 0.010 Upper: 0.250 Units: Inches	Machine
403	Stopping Mode	Determines whether or not the motion controller will automatically monitor and adjust the radius adjustment Stopping Reaction Time after each target position is reached during the automatic mode.	AUTOMATIC MANUAL	Machine Axis Tuning
404	Stopping Reaction Time	Compensates for the amount of time required to stop the moving radius adjustment axis as it approaches its programmed target position. This value is continually adjusted by the motion controller when Parameter 403 - Stopping Mode is set to AUTOMATIC.	Lower: 0.000 Upper: 8.000 Units: Seconds	Machine Axis Tuning
405	Fast Speed	Specifies the percentage of the frequency inverter's maximum speed to be used	Lower: 0 Upper: 100 Units: Percent	Machine Axis Tuning

		when positioning the radius adjustment axis in fast speed.		
406	Slow Distance	Specifies the amount of linear distance for which the automatic radius adjustment will shift into slow speed prior to reaching the target position while it is moving during the automatic mode.	Lower: 0.000 Upper: 1.000 Units: Inches	Machine Axis Tuning
407	Slow Speed	Specifies the percentage of the frequency inverter's maximum speed to be used when positioning the radius adjustment axis in slow speed.	Lower: 0 Upper: 100 Units: Percent	Machine Axis Tuning
408	Acceleration Time	Specifies the amount of time allowed for the radius adjustment axis to accelerate from slow speed to fast speed.	Lower: 0.000 Upper: 10.000 Units: Seconds	Machine Axis Tuning
409	Ramp Time	Specifies the amount of time to use to ramp the analog output from 0% up to 100% and from 100% down to 0%.	Lower: 0.000 Upper: 5.000 Units: Seconds	Machine Axis Tuning

Shear/Slitter Parameters

These parameters are only valid on machines with a **Shear** or **Slitter** function.

ID	Parameter Name	Parameter Description	Value Limits or Available Selections	Classification
451	Offset Distance	Specifies the distance from the slitter blade to the machine's bending point.	Lower: 0.000 Upper: 10.000 Units: Inches	Machine
452	Forward Maximum Time	Specifies the amount of time it takes for the slitter to move from its home position to its maximum forward position in fast speed.	Lower: 0.000 Upper: 60.000 Units: Seconds	Machine Axis Tuning
453	Fast Speed	Specifies the percentage of the frequency inverter's maximum speed to be used when moving the slitter in fast speed.	Lower: 0 Upper: 100 Units: Percent	Machine Axis Tuning
454	Slow Speed	Specifies the percentage of the frequency inverter's maximum speed to be used when moving the slitter in slow speed.	Lower: 0 Upper: 100 Units: Percent	Machine Axis Tuning
455	Acceleration Time	Specifies the amount of time allowed for the slitter to accelerate from slow speed to fast speed.	Lower: 0.000 Upper: 10.000 Units: Seconds	Machine Axis Tuning
456	Deceleration Time	Specifies the amount of time allowed for the slitter to decelerate from fast speed to slow speed.	Lower: 0.000 Upper: 10.000 Units: Seconds	Machine Axis Tuning
457	Ramp Time	Specifies the amount of time to use to ramp the analog output from 0% up to 100% and from 100% down to 0%.	Lower: 0.000 Upper: 5.000 Units: Seconds	Machine Axis Tuning

Controller Settings

Controller Settings includes parameters that pertain to the Pathfinder PC and/or the general operating conditions of the folding machine, and are divided into the following groups:

- SmartPath Settings
- Operator Preferences
- Search Settings
- Clock/Calendar
- Controller Name

SmartPath Settings

The **SmartPath Settings** screen allows the Operator to configure the SmartPath automatic sequencer depending on the operator's preferences.

It is not necessary to be logged in as an Administrator to adjust these settings.

Parameter Name	Parameter Description	Value Limits or Available Selections	Classification
Avoid Flips?	The closer to YES, the more cost applied to FLIP operations when sequencing.	NO TO YES SLIDING SCALE	Part Creation
Avoid Rotates?	The closer to YES, the more cost applied to ROTATE operations when sequencing.	NO TO YES SLIDING SCALE	Part Creation
Avoid Turns?	The closer to YES, the more cost applied to TURN operations when sequencing.	NO TO YES SLIDING SCALE	Part Creation
End-of-Profile Hems First?	The closer to YES, the more the sequencer attempts to do end-of-profile hem bends and closes first.	NO TO YES SLIDING SCALE	Part Creation
Hem With Material Outside Machine?	The closer to YES, the more the sequencer attempts to close hems with the material outside of the machine. The closer to NO, the more the sequencer attempts to close hems with the material inside of the machine.	NO TO YES SLIDING SCALE	Part Creation

Avoid Clamping on Closed Hems?	The closer to YES, the more the sequencer attempts to not clamp down on parts of the Profile that have already been hemmed and closed.	NO TO YES SLIDING SCALE	Part Creation
Bend Middle of Wide Blanks Early?	The closer to YES, the more the sequencer attempts to perform a bend in the middle of the Profile first to help solidify a wide blank for other required manipulation.	NO TO YES SLIDING SCALE	Part Creation
Avoid Backgauge Movement?	The closer to YES, the more the sequencer attempts to perform operations in an order that minimizes backgauge movement.	NO TO YES SLIDING SCALE	Part Creation
Avoid Angled Backgauge Surfaces?	The closer to YES, the more the sequencer attempts to avoid pushing angled metal up against the backgauge.	NO TO YES SLIDING SCALE	Part Creation
Avoid Machine Interference?	The closer to YES, the more the sequencer attempts to avoid positioning material up against parts of the machine.	NO TO YES SLIDING SCALE	Part Creation
Reset Values	Selecting this will reset all SmartPath settings.		
Bend Double Thickness	If checked, Pathfinder will bend double-thickness material (normally a hem in the middle of a part). If unchecked, Pathfinder will NOT bend double-thickness material.	ENABLED DISABLED	Part Creation
Try Half Bends if No Sequences Found	If checked, Pathfinder will attempt to sequence the Profile using half bends when the full bend sequencing method produces no valid sequences. Half bends can help avoid machine interference.	ENABLED DISABLED	Part Creation

	If unchecked, Pathfinder will attempt to sequence the Profile using only full bends.		
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Operator Preferences

To change Operator Preferences, you must be logged in as an Administrator.

ID	Parameter Name	Parameter Description	Value Limits or Available Selections	Classification
700	Decimal Separator	Specifies the character used to separate the integer and fractional portions of all numeric data throughout the application.	PERIOD (.) COMMA (,)	UI & Local
701	Numeric Display Format	Specifies which units system to use when displaying or editing numeric data.	DECIMAL-INCH MILLIMETER	UI & Local
702	Operator Mode	Determines the number of people required to operate the folding machine.	1 MAN 2 MAN KEY SWITCH	Safety
703	Allow Stamping Mode	Determines whether or not Stamping Mode may be activated by the user while forming radius segments.	NO YES	Part Quality
704	Batch Mode Enabled	Determines whether the profile counter functions in Profile Counting mode or Batch mode.	NO YES	
705	Hydraulic Pump Auto-Shutoff	Specifies the number of minutes the hydraulic pump motor will continue running while the machine is idle before automatically turning off.	Lower: 0.000 Upper: 60.000 Units: Minutes	Customer Preference
706	SmartPath Enabled	Determines whether or not the SmartPath automatic bend sequencing algorithm should execute whenever the Bend Sequencing screen is entered.	NO YES	Part Creation
707	Profile Bending Angle Mode	Determines the method that Angles are defined in the Profile Editor. Inside Angles	INSIDE OUTSIDE	UI & Local

		are defined as if bending the Profile completely back on itself is a 0° bend. Outside Angles are defined as if bending the Profile completely back on itself is a 180° bend.		
708	Keep Favorite Sequences on Profile Change	<p>Determines if stored bending sequences are kept when the definition of the Profile is changed. If set to YES, then favorite sequences (including backgauge offsets, overbend angles, clamp open positions, etc.) will be kept if you change segment lengths or angles - provided you do not flip the direction of an angle or hem.</p> <p>Adding or removing a segment to/from the Profile will ALWAYS remove any favorite sequences that have been stored with the Profile.</p> <p>Note: If one accidentally alters the profile in such a way that the favorite sequences are removed, closing and reopening the profile will restore defined offsets and overbends.</p>	NO YES	UI & Local
709	Shared Profiles Editable	Determines whether or not Operators have the ability to create and edit Profiles stored in the Shared Profile Library.	NO YES	UI & Local
711	Bending Angle Springback Mode	Determines how the angle sensor will work to detect and compensate for springback when creating Profiles. This is available only on folding	DISABLED MEASURE ONLY ALL PARTS AUTO FIRST PART AUTO	Machine

		machines with an angle sensor.		
712	Add Second Hem Close Step	Determines if a second hem close operation will be added immediately after the first hem close, at the specified Second Hem Close Offset. This is useful when working with hard steels.	NO YES	Part Creation
713	Second Hem Close Inside Offset	Specifies the distance that the backgauge will move from the first hem close operation to the second hem close operation, with the material inside of the machine.	Lower: 0.000 Upper: 5.000 Units: Inches	Part Creation
714	Add Second Bend on Inside Hem Close	Determines if a second small bend will be added at a small offset immediately after the first bend, in order to help ease closure of an inside hem.	NO YES	Part Creation
715	Second Hem Close Outside Offset	Specifies the distance that the backgauge will move from the first hem close operation to the second hem close operation, with the material outside of the machine.	Lower: 0.000 Upper: 5.000 Units: Inches	UI & Local
716	Profile Sketch Length Snap-To	Determines the nearest length that segment features will "snap" to when sketching a Profile in the Graphical Profile view.	1/4" 1/8" 1/16" 5mm 10mm	UI & Local
717	Profile Sketch Angle Snap-To	Determines the nearest angle that features will "snap" to when sketching a Profile in the Graphical Profile view.	Lower: 1° Upper: 30°	UI & Local
718	Profile Sketch Auto Pan Enabled	When set to YES, the viewable sketching screen will pan to accommodate profile lengths longer than the current view.	NO YES	UI & Local

	Current Language	Determines the current language for all visible text displayed throughout the application	ENGLISH SPANISH GERMAN FRENCH RUSSIAN CHINESE SLOVENIAN DUTCH PORTUGUESE POLISH	UI & Local
--	------------------	---	--	------------

Search Settings

The **Search Settings** screen contains two important parameters, the Profile Search Identifier and Search Priority Options.

ID	Parameter Name	Parameter Description	Value Limits or Available Selections	Classification
750	Use Profile Search Identifier	Determines if Pathfinder should allow Operators to assign numeric Identifiers to Profiles for searching using any search boxes.	NO YES	UI & Local
	First Level Search Second Level Search Third Level Search	Sets the order in which Pathfinder will look for the information entered into the Search Field. If nothing is found on the first level option, it will continue to the second level and then third level option, if necessary.	NONE JOB IDENTIFIER PROFILE IDENTIFIER PROFILE NAME	

Clock / Calendar Settings

To change clock and calendar settings, you must be logged in as an Administrator.

ID	Parameter Name	Parameter Description	Value Limits or Available Selections	Classification
600	Time Display Format	Specifies the format used for displaying the computer's current time.	12 – HOUR 24 - HOUR	UI & Local
601	Date Display Format	Specifies the format used for the displaying the computer's current date.	MM-DD-YYYY DD-MM-YYYY YYYY-MM-DD	UI & Local
602	Date Separator	Specifies the character used to separate the day, month, and year whenever the computer's current date is displayed.	SLASH (/) HYPHEN (-) PERIOD (.)	UI & Local

The Clock/Calendar settings page also contains a function that can be used to set the current time and date for the Pathfinder PC.

Controller Name

Typically, a controller's name is entered during the shared database or **Order Desk** setup. In this screen, you can change the name of your Pathfinder PC. This is used when adding the PC to a network, particularly if there is more than one Pathfinder PC on the network, to avoid naming conflicts.

To change the Pathfinder PC's name, simply select the **Change Controller Name** button and use the on-screen keyboard to enter a new name. Select **Save Changes** when you are finished.

Advanced Settings

Advanced Settings includes parameters that pertain to the Pathfinder PC and/or the general operating conditions of the folding machine, but are reserved for users with Administrator privileges.

Advanced Settings

ID	Parameter Name	Parameter Description	Value Limits or Available Selections	Classification
800	RS485 Converter Port Number	Specifies the Pathfinder PC's communications port number used for serial communication with the motion controller.	Lower: 1 Upper: 99 Units: None	Machine
901	Analog Output Voltage	Determines the voltage range used by the motion controller for interfacing with the system's frequency inverter or other motion control device.	0 TO +10 VOLTS -10 TO +10 VOLTS	Machine
902	Analog Output Polarity	Determines the voltage polarity of the motion controller's analog output circuit.	NORMAL INVERTED	Machine
903	Clamping Beam Feedback Type	Defines the type of signal that the Clamping Beam feedback device will transmit.	0 to 5 VOLTS 0 to 10 mA 0 to 20 mA	Machine
904	Clamp Pressure Feedback Type	Defines the type of signal that the Clamp Pressure feedback device will transmit.	0 to 5 VOLTS 0 to 10 mA 0 to 20 mA	Machine
905	Radius Adjustment Feedback Polarity	Determines the polarity of the feedback signal from the Radius Adjustment feedback device.	NORMAL INVERTED	Machine
906	Clamping Beam Feedback Polarity	Determines the polarity of the feedback signal from the Clamping Beam feedback device.	NORMAL INVERTED	Machine
907	Bending Beam Feedback Polarity	Determines the polarity of the feedback signal from the	NORMAL INVERTED	Machine

		Bending Beam feedback device.		
908	Clamp Pressure Feedback Polarity	Determines the polarity of the feedback signal from the Clamp Pressure feedback device.	NORMAL INVERTED	Machine
	Show Title Bar on Main Form	Turns Pathfinder into a modal dialog.	NO YES	UI & Local
	Controller Power Off Delay	Specifies the amount of time required by the Pathfinder PC to shut down its operating system. This allows time for the system to execute a proper shutdown before the motion controller circuitry removes system power from the PC.	Lower: 1 Upper: 300 Units: Seconds	Machine
	Require Pedal to Finish Hem Close	If set to YES, Pathfinder will not transition to the next operation until the pedal is pressed.	NO YES	Customer Preference
	Require Pedal for Radius in Stamping Mode	If set to YES, Pathfinder will not transition to the next radius step until the pedal is pressed.	NO YES	Customer Preference
	Allow Clamp Down Pedal Jog in IDLE	If set to YES, the Operator can use pedals while the machine is in IDLE.	NO YES	Customer Preference
	Allow Bend Pedal Jog in IDLE	If set to YES, the Operator can use the bend pedal to jog while the machine is in IDLE.	NO YES	Customer Preference
	Require Continuous Pedal Down to Bend	If set to YES, Pathfinder will require the pedal to be fully pressed during a bend. The bending beam will only move while the pedal is pressed.	NO YES	Safety

Changing the Machine Type

The **Advanced Settings** page also contains a function that can be used to select the **Machine Type** and available options for the folding machine that the Pathfinder control system is currently installed on as well as the **Connection Type** used.

Pathfinder controls can be used on different folding machines created by many manufacturers. It is important that Pathfinder is configured for the proper machine. To ensure proper configuration or to change the type of machine used, access the **Machine Type/Configuration** screen by selecting “**Change Machine Type**” on the **Advanced Settings** screen.

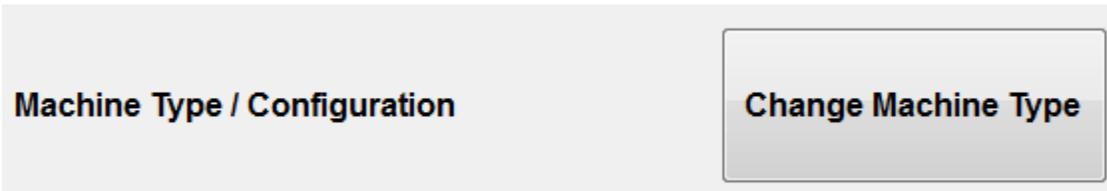


Figure 73: Change Machine Type Button

The Change Machine Configuration screen allows you to select the appropriate Machine Type, Model, Machine Options, Installed Black Box Hardware, and Geometry Option for each folding machine.

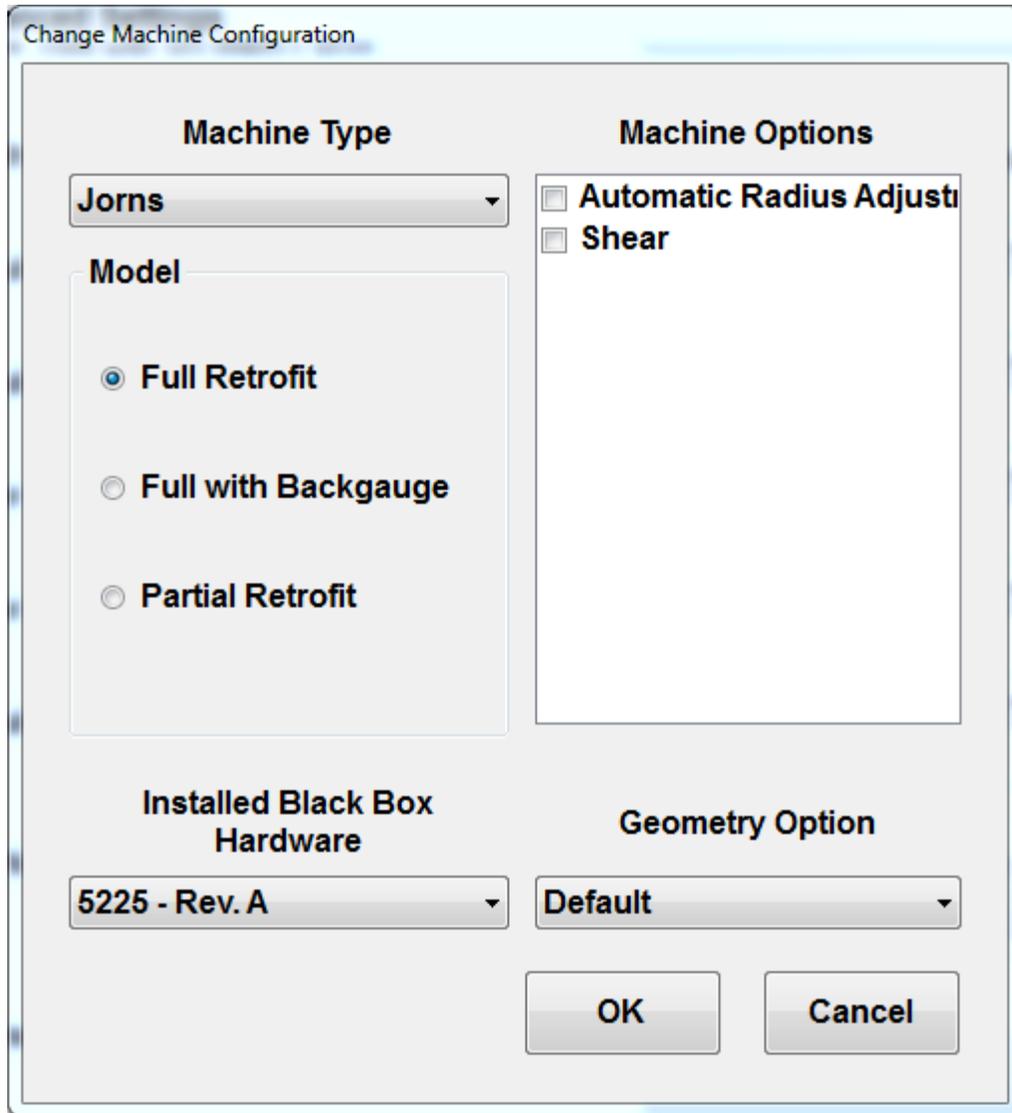


Figure 74: Change Machine Configuration – Showing Current Machine

Machine Types & Models

AMS Controls is always adding new folding machine types, but as of the printing of this manual, the following folding machine types are available:

- ASC (Standard, Hydraulic)
- Jorns (Full Retrofit, Full with Backgauge, Partial Retrofit)
- Jouanel (Electric, Jouanel Hydraulic)
- Premel
- Roper Whitney
- Schechtl (Standard, 305, MAE)
- Tensol (Standard, TE3000)

- Thalmann (Flow, ZR NG10, Thako)
- Transtech
- Vector

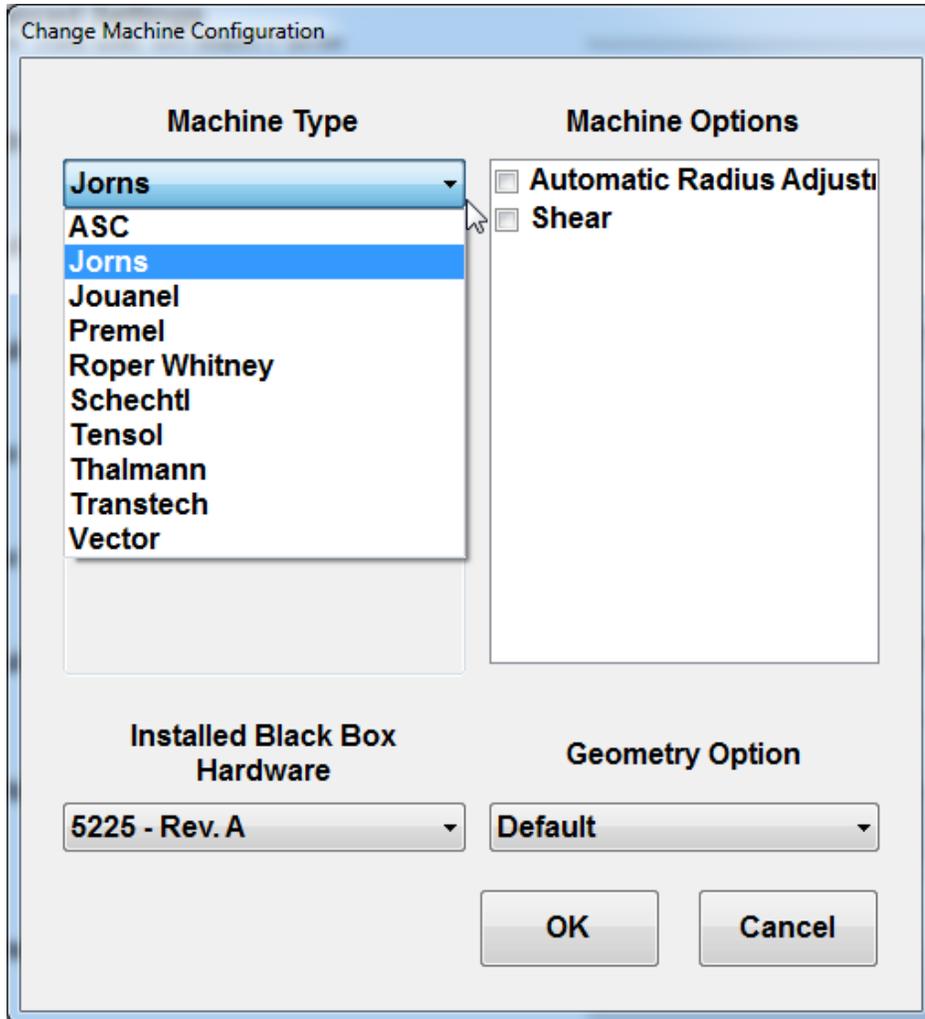


Figure 75: Machine Types

Each machine type has a subset of models available, which continues to grow as Pathfinder is further developed. The list above is not complete and is subject to change at any time.

Machine Options

Some folding machines will have options that must be accounted for in configuration. An example of options you may see for a machine type includes:

- Automatic Radius Adjustment
- Clamp Laser
- SERCOS

- Shear

The list of options above is not complete and is subject to change at any time.

Installed Black Box Hardware

Depending on the Machine Type, Model, and Machine Options selected, the Installed Black Box Hardware field may change. If the automatic selection does not match your black box model information, select the proper model information from the drop down box.

Geometry Option

On some machines, there are different options available for the folding machine's geometry. Select the appropriate option from the drop down box, if necessary.

After Selections

Once you have selected the necessary options, click the OK button. The following dialog will appear:

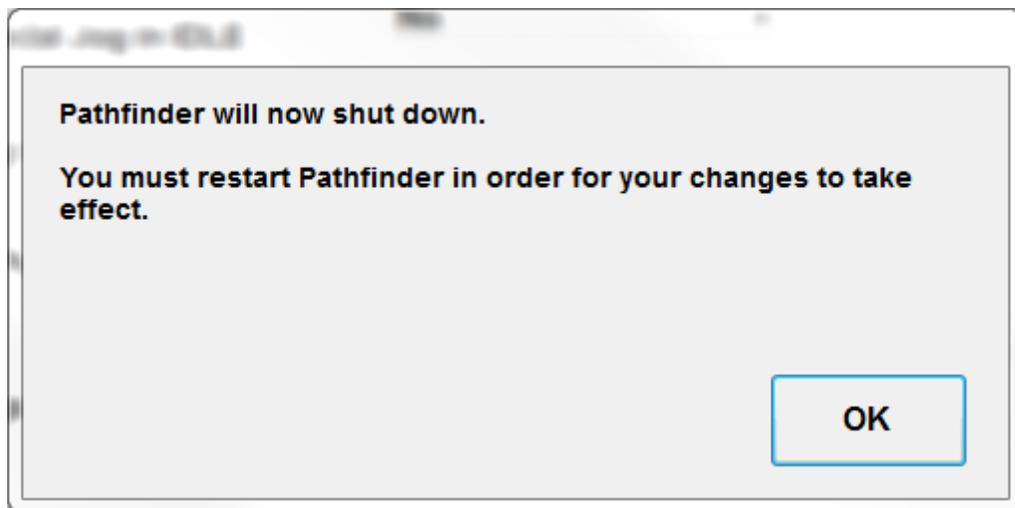


Figure 76: Pathfinder Must Restart After Selections Are Made

Click the OK button and Pathfinder will restart with the selected Machine Configuration.

Appendix C: Using the Diagnostics Screen

Introduction to the Diagnostics Screen

The Diagnostics Screen can be accessed by selecting the **Tools**  button, then pressing **Diagnostics, Input and Output Status**.

Pathfinder's Diagnostics Screen displays Input and Output Status for troubleshooting purposes. Each input and output is assigned an ID number and has a corresponding On checkbox. When the input or output is active, the On checkbox will be checked. When it is inactive, the checkbox will be empty.

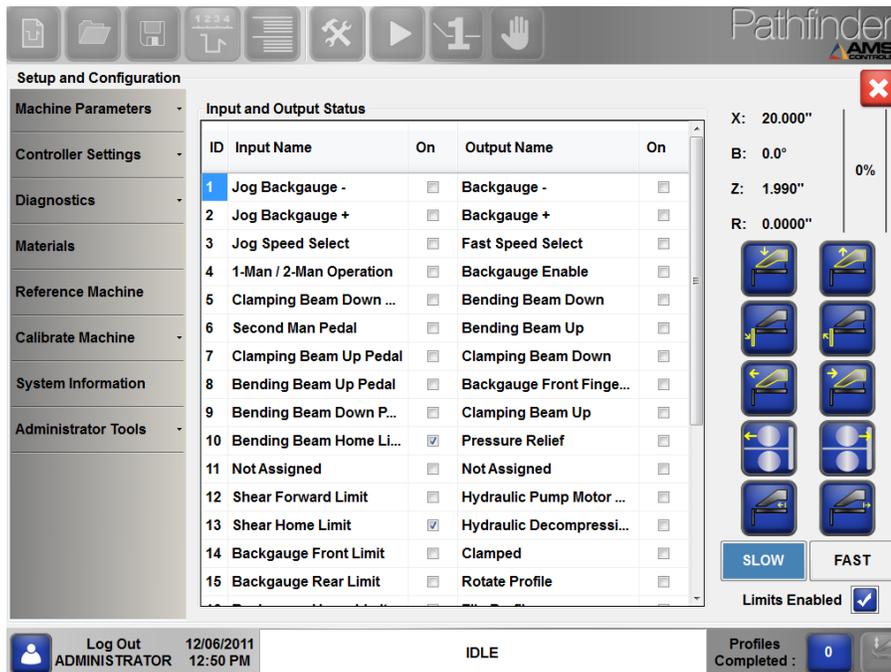


Figure 77: Diagnostics Screen

On the right side of the screen are buttons for manually jogging each axis of the machine. If your machine does not have a shear or radius adjustment, those buttons will not appear on this screen. Each of these buttons will jog an axis and allow you to use both SLOW and FAST modes, if the axis has two speeds, and if you are logged in as an Administrator, you can disable limits for troubleshooting purposes.

Input and Output Status

Each machine will have a different I/O Status screen, depending on the machine's features. If you are working with AMS Controls Technical Support to diagnose a problem, it will be important to see which inputs and outputs are active when specific actions are taken.

Inputs are listed on the left side of the screen, in numerical order. If an input has no feature assigned to it, it will say "Not Assigned." The checkbox to the right of the input name will be checked if the input is active and will be unchecked if the input is inactive.

Outputs are listed on the right side of the screen along with a similar checkbox to indicate whether the output is active.

Appendix D:

Administrator Tools

Introduction to Administrator Tools

Several advanced functions are available for Pathfinder system administrators including modifying machine setup parameters, managing users, backing up or restoring settings, importing profile libraries and applying updates to the Pathfinder software. To access these tools a user must login as an Administrator. See your system administrator for the appropriate Administrator password for Pathfinder.

Once logged in as an Administrator, most of the additional functionality available to you can be

found on the **Tools** screen. Touch the  button to go to the **Tools** screen.

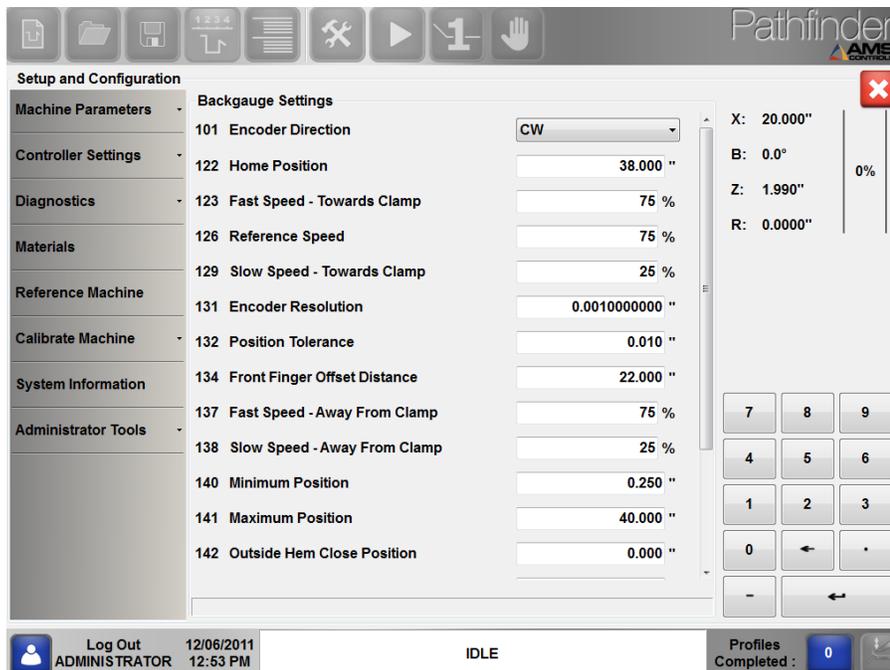


Figure 78: Tools Screen - Backgauge Settings

Note that all machine setup parameter values can now be modified and adjusted to fine-tune the machine's operation. These settings should only be changed by trained personnel as incorrect values could cause machine malfunctions. See the section on **Machine Parameters** on page 99 for more details.

User Roles

Pathfinder software comes with four defined user roles: Administrator, Operator, Demo, and AMS Controls. You can also create custom users when logged in as an Administrator.

The **Administrator** role permits the user to access all areas of Pathfinder software, including advanced functions like creating backups, updating the software, managing users, and more. The Administrator role can be renamed, hidden, or given a new password.

The **Operator** role permits the user to use most of the areas of Pathfinder, such as creating profiles, running parts, etc. It does not allow the user to access advanced functions like creating backups, updating the software, managing users, etc. The Operator role can be renamed, hidden, or given a new password.

The **Demo** role is used for demonstration purposes only. This role is very limited, allowing a user to see how Pathfinder software works without connecting to a black box or shared database. The Demo role can be renamed, hidden, or given a new password.

The role **AMS Controls** is used by AMS Controls Support Technicians for troubleshooting and updating purposes. This user role cannot be altered or deleted.

Managing Users

Users with Administrator rights can access the Manage Users screen under Tools/Administrator Tools/Manage Users.

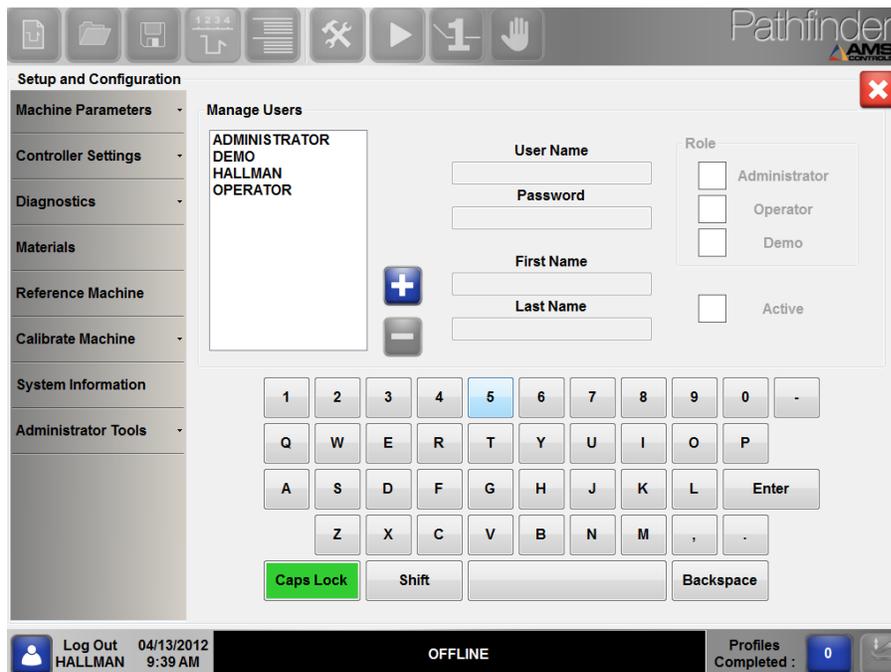


Figure 79: Manage Users Screen

On the Manage Users screen, an Administrator can change names, add users, remove users, change passwords, and activate/deactivate users.

Adding and Removing Users

In addition to the four standard users, Pathfinder allows for additional custom users. Custom users can be assigned with one of three roles: Administrator, Operator, or Demo.

To add a user, select the Add (+) button and enter the new user name, password, first name and last name. Next, select a role for that user by checking the box next to Administrator, Operator, or Demo. Finally, to ensure that the user will be shown on the Login screen, make sure the Active checkbox is checked.

Note: User Name, Password and Role are required fields. First and Last Name fields are optional.

To remove a user, select the user from the list and press the Delete (-) button.

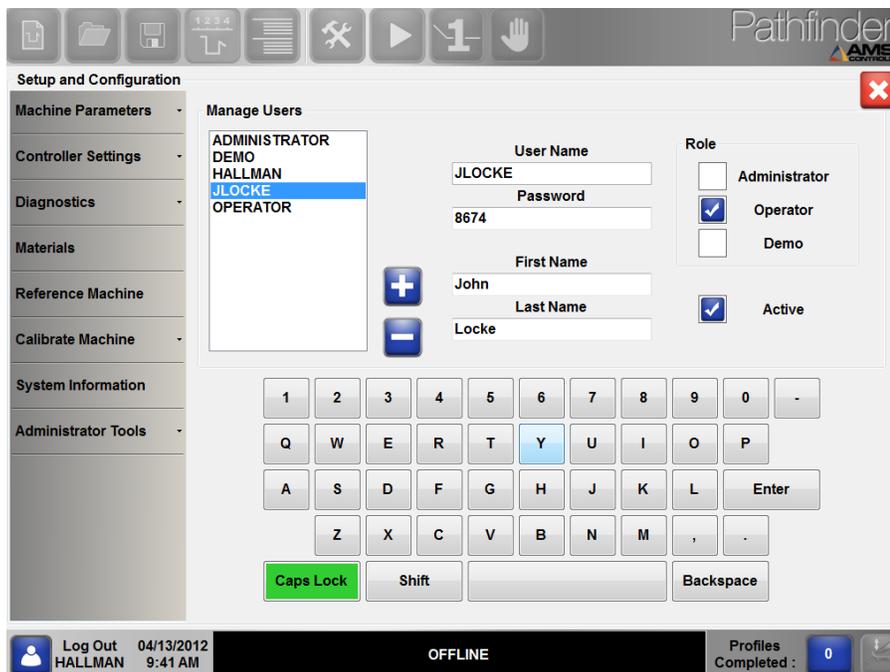


Figure 80 : Adding and Removing Users

Editing Existing Users

To edit an existing user, select the user from the list. Make necessary changes to the user name, password, first name, last name or role. The changes are automatically saved when you exit each field.

We highly recommend changing the Administrator password at the time of the initial install and keeping that password out of the hands of non-administrators. You can change the Administrator password by editing the existing Administrator user and entering a new password. You can only do this when logged in as the Administrator.

Note: You cannot change the role of, deactivate, or delete the Administrator currently logged into the machine. This is a safety measure meant to protect users from accidentally removing Administrator access.

Activating/Deactivating Users

To toggle a user between active or inactive status, select the user from the list and check the Active box to activate or uncheck it to deactivate.

A deactivated user is not removed from the system. Instead, it will not be shown on the Login screen. Only active users will be shown upon Login. Remember, the user AMS Controls cannot be deactivated or removed, but will always be found at the bottom of the Login list of Operator user names.

Backup / Restore / Import Procedures

These functions allow users to safeguard Pathfinder's critical information by copying their system data to an external USB flash drive. All machine setup parameters, material definitions and library profiles will be contained in the Pathfinder backup file. This file can be used to restore the system to a known state in the event that machine parameters were tampered with; profiles were accidentally deleted from the library, or in the unlikely event of a complete catastrophic failure. The backup file can also be used to transport a Profile Library from one folding machine to another.

On the **Tools** screen, select the **Administrator Tools** menu and the **Backup / Restore / Import** sub-menu.

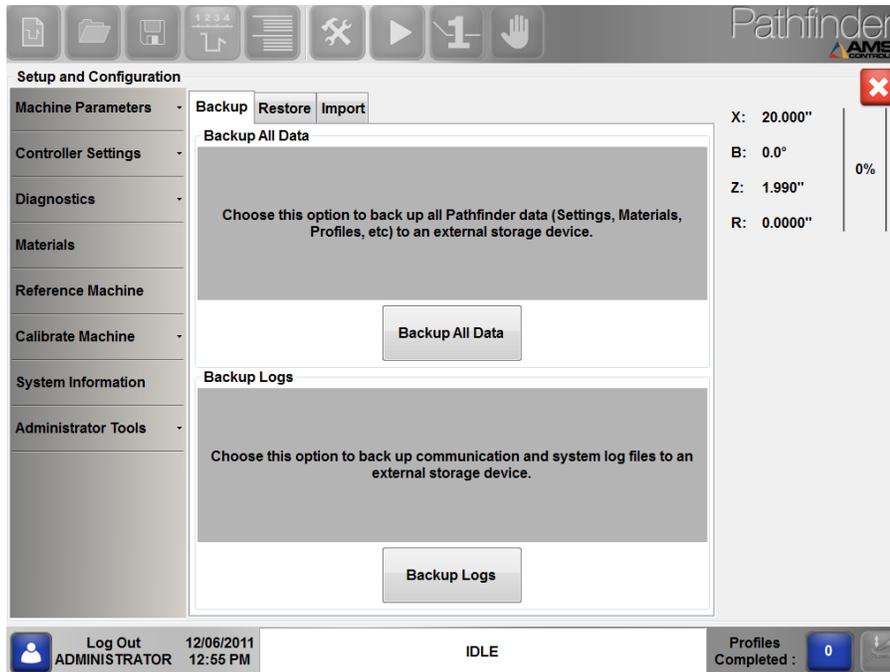


Figure 81: Backup, Restore, Import

Note: A removable USB flash drive must be inserted into one of the open USB ports on the Pathfinder PC before starting the Backup, Restore or Import functions.

Touch the **Backup All Data** button to create a Pathfinder backup file. Use the **Save File** dialog window to choose a location where the file will be saved, and use the on-screen keyboard to change the default file name if desired. This file will contain all machine parameters, controller settings, advanced settings and material definitions that have been currently saved in Pathfinder's local database. The backup file will also contain all profiles and custom bending sequences that have been saved in the **Profile Library**. It is recommended to create backup files on a regular basis as new profiles or sequences are added to the library, as well as any time significant changes are made to the machine parameters.

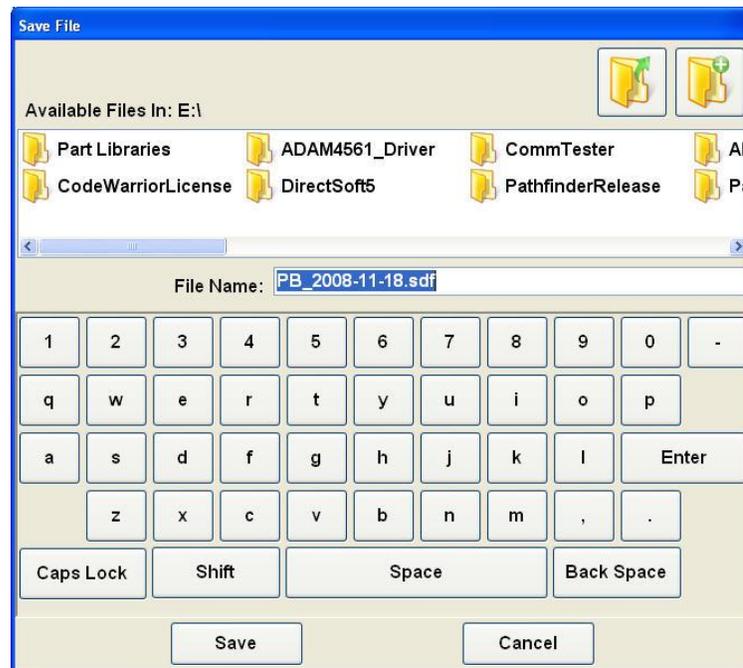


Figure 82: Save File Dialog Window

Touch the **Backup Logs** button to make a copy of Pathfinder's system and communication log files. These files may be necessary for technical support personnel to help diagnose any problems or issues found in the Pathfinder software.

On the **Restore** notebook tab, touch the **Restore All Data** button to restore all data from a previously saved Pathfinder backup file. Restoring all data will over-write all machine parameters, controller settings, material definitions and profile library data that are currently in Pathfinder's local database with the data contained in the backup file. Use this option with caution, after ensuring that the backup file you're restoring from contains data that is applicable for the machine being restored.

On the **Import** notebook tab, the user has the option to select which set of data to restore from the backup file. Choose **Import Settings** to only over-write Pathfinder's machine parameters and controller settings from the backup file. Choose **Import Materials** or **Import Profile Library** to merge the selected data from the backup file into Pathfinder's current local database. As profile data is imported, Pathfinder compares profile names from the backup file to names in its local **Profile Library**. If duplicate names are found, existing profiles will be **overwritten** by the new profiles.

Checking for Updates

Please note: Based on the version of software you are currently running, additional steps to those shown below may be required.

- **Version 1.18.53.0 or Newer** – No additional steps are required. All parameter and system calibration information will be transferred from the update.
- **Version 1.16.48.0 – 1.18.52.0** – The calibration screens have been upgraded. Once the update has been applied, you will be required to re-calibrate the machine. For help with the calibration procedure, please refer to **Calibrating the Machine**, page 93.
- **Version 1.15.42 or Older** – Contact AMS Technical Support. The update procedure for these versions is different than that shown below.

Updating Pathfinder Software

The **Check for Updates** function should be used to install a newer version of Pathfinder software on the machine. The PathfinderUpdate.zip file must be located in the root directory of a USB flash drive and inserted in one of the PC's available USB ports. On the **Tools** screen, select the **Administrator Tools** menu and the **Check for Updates** sub-menu. Pathfinder searches for any applicable software updates on all removable flash drives. The more files that are on your USB drive, the longer this process will take.

If an update is available, you will see the following dialog. Follow the on-screen instructions to install the new software on the machine.

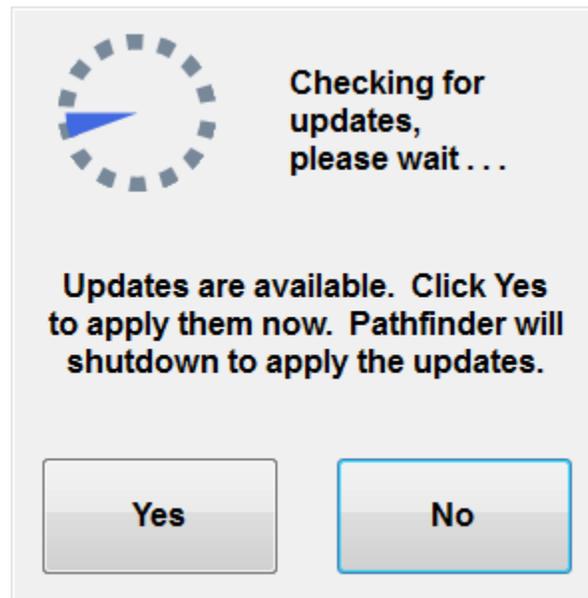


Figure 83: Checking for Updates

If updates are available, select **Yes** to shutdown Pathfinder and open the **Update Application**, as seen below.

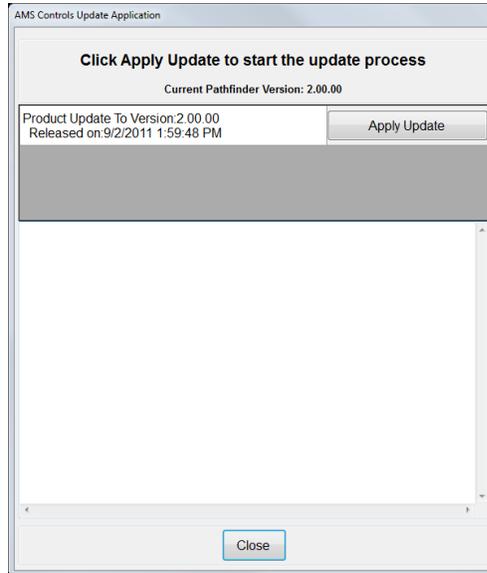


Figure 84: Update Application Dialog

The **Update Application** shows your current Pathfinder version as well as the versions available on the attached flash drive. Select the update you would like to install (typically, the most recent version unless instructed by Technical Support to use a different version) and click **Apply Update** to install the new version of the software. The updater screen will list the actions taking place as the software is installed.

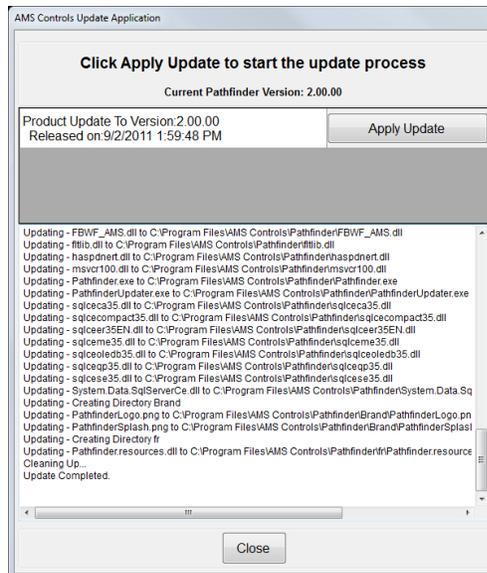


Figure 85: Applying Updates

Once the update is completed, click the **Close** button. Pathfinder will automatically restart with the newest version installed.

 **Note:** All data contained in the Pathfinder's local database, including machine parameters, material definitions and profile library data will be preserved when installing an update to a newer version.

Updating the Motion Controller

When logged in as an **Administrator**, if a **Motion Controller** update file, newer than the version currently running, is available on a connected USB flash drive, you will be prompted to apply the update when Pathfinder restarts.

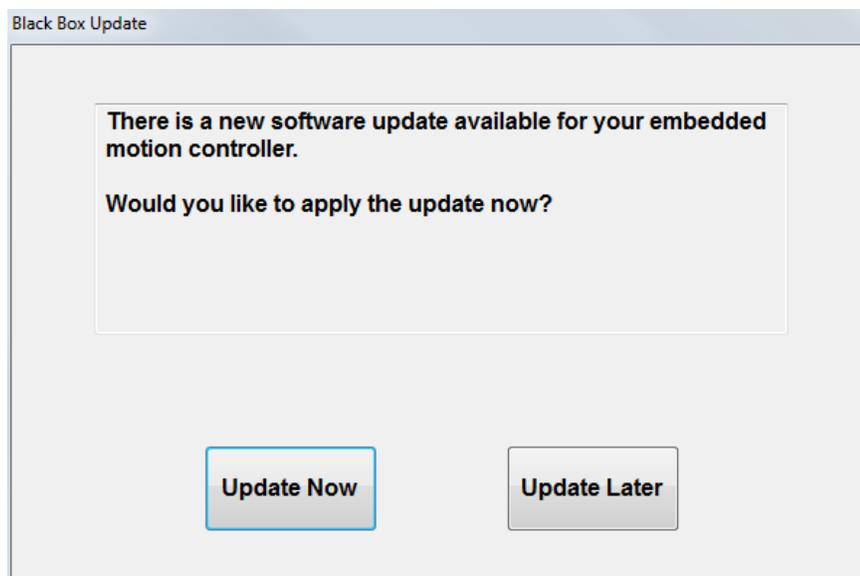


Figure 86: Motion Controller Update Dialog

Follow the on-screen instructions to install the new update. After the installation is complete, you will need to reference your machine. For more information, see **Referencing the Machine**, page 89.

Once the machine is referenced, you may continue running production on the updated machine.

Appendix E: System Information

Introduction to System Information

You can access information about your Pathfinder controller including Version Number, Machine Name and Database Versions along with Software and Hardware information by

selecting the **Tools**  button in the Main Toolbar, then clicking **System Information**.

In addition, Administrators can also access the Write Filter screen from this area.

General Information

The **General Information** tab includes basic information that is important for troubleshooting. If you call AMS Controls Technical Support, the Support Technician may ask you to reference this screen to determine the Version Number and Build Date of your Pathfinder Software.

This screen also lists the shared database being used by the Pathfinder PC and the automatic sequencer (SmartPath) version number.

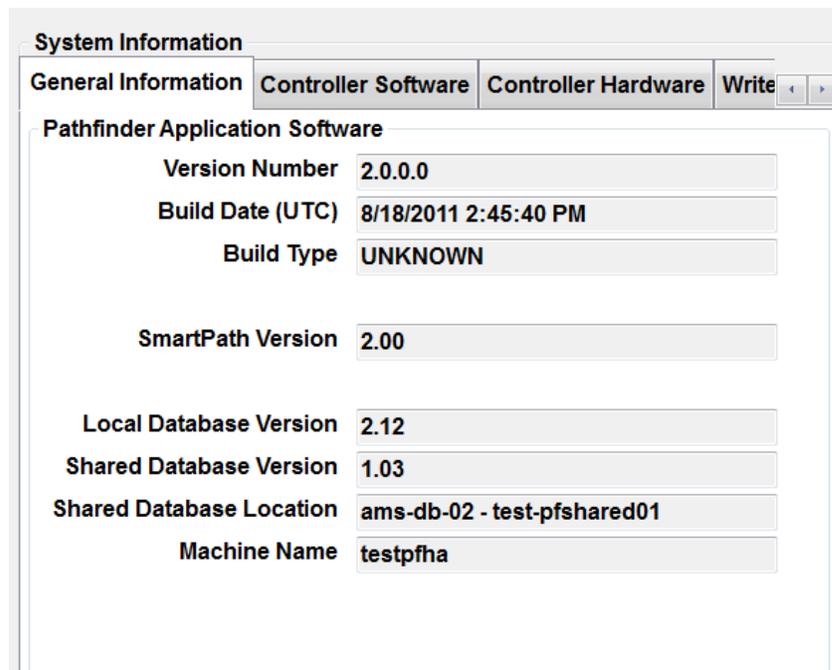


Figure 87: General Information

Controller Software

The **Controller Software** tab provides information on the software version your Pathfinder PC is currently running. This is crucial information for troubleshooting.

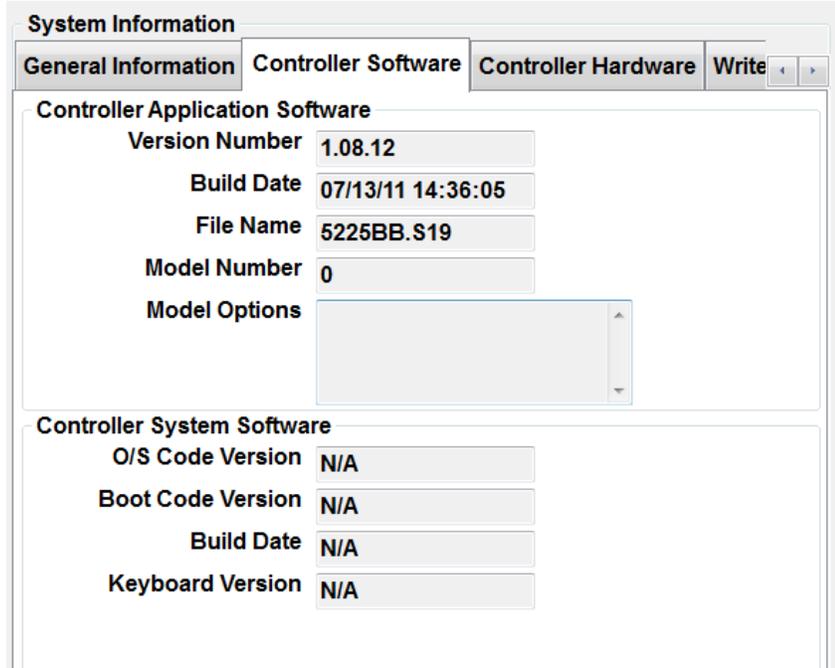
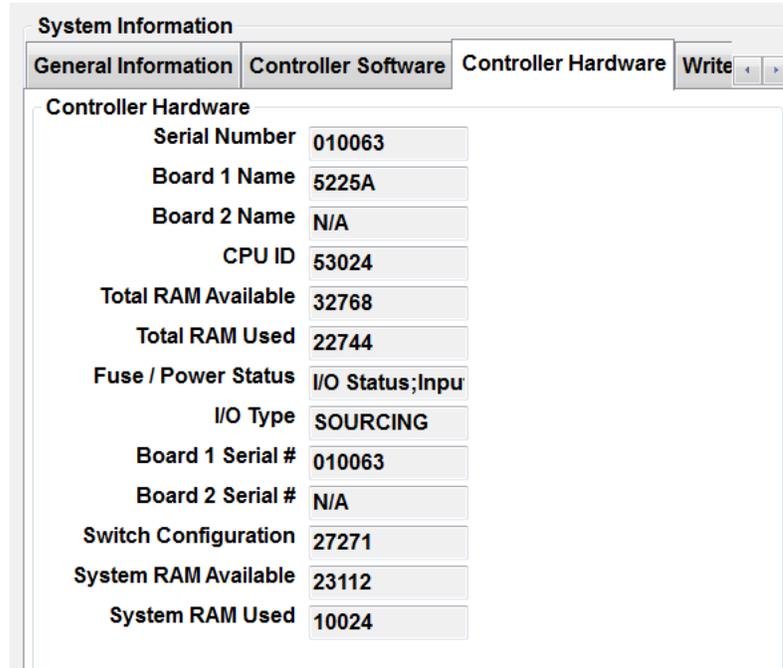


Figure 88: Controller Software

Controller Hardware

The **Controller Hardware** tab provides information about your Pathfinder Motion controller. This information is also crucial for troubleshooting purposes.



System Information			
General Information	Controller Software	Controller Hardware	Write
Controller Hardware			
Serial Number	010063		
Board 1 Name	5225A		
Board 2 Name	N/A		
CPU ID	53024		
Total RAM Available	32768		
Total RAM Used	22744		
Fuse / Power Status	I/O Status; Inpu		
I/O Type	SOURCING		
Board 1 Serial #	010063		
Board 2 Serial #	N/A		
Switch Configuration	27271		
System RAM Available	23112		
System RAM Used	10024		

Figure 89: Controller Hardware

Write Filter

Write Filtering is a mechanism used to protect directories on the Pathfinder PC. During the initial setup of the Pathfinder PC, an AMS Controls Technician will enable write filtering. This feature should not be disabled except by an AMS Controls Technician or to change the name of the controller or to set the date/time for the Pathfinder PC. You must be logged in as an **Administrator** to view this screen.

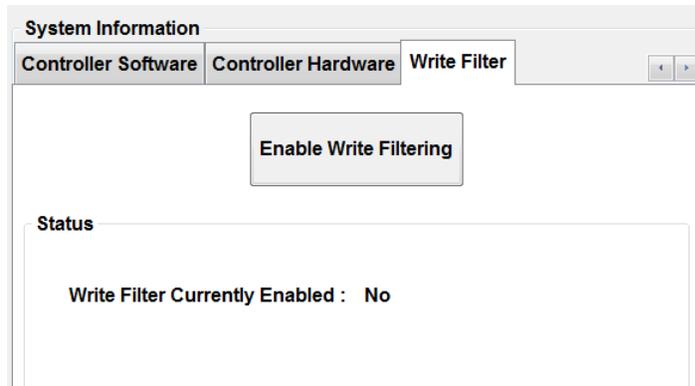


Figure 90: Write Filter Screen

To enable or disable Write Filtering, select the button on the **Write Filter** tab under **System Information**. For the changes to take effect, Pathfinder must cycle power on the Pathfinder PC. This will not happen automatically, so take caution when enabling and disabling the Write Filter and ensure that the machine is shut down properly and then restarted before taking any other actions.

If you are uncertain about the status of the Write Filter, accessing the **Write Filter** tab will always show you the current status. If you have not properly cycled power, it will also indicate that the enabling/disabling of the Write Filter has begun but requires the PC to be turned off and back on again before it can complete the process.

Appendix F: Calibrating the Touch Screen

If you are experiencing difficulties with the touch screen of the Pathfinder PC such as problems selecting items, the touch screen may require recalibration. This process is simple to perform and will result in increased touch screen accuracy.

The program **Touchscreen Utilities** is used to calibrate the touch screen on most Pathfinder PCs. To access this program, you must be able to access the PC's Desktop. This is done by logging into Pathfinder as an Administrator, then logging off. This will return you to the Desktop.

Open the **Pathfinder Tools** folder and double-click **Touchscreen Utilities**. The calibration program will open. Select the **Calibration** tab.

Make certain that "Use onboard EEPROM to store calibration result" is selected. Select "**9 point calibration**" and "**COM 4,**" then click "**Calibrate Now**".

The screen will go white and a red cross will appear on the screen. Simply touch the red "+" sign. It will move to nine calibration points. Once you have selected all nine calibration points, click "**Update**" to apply the calibration. Click "**OK**" to exit the Touchscreen Utilities application.

Restart Pathfinder to determine whether the calibration has solved your particular issue. If the issue is still not resolved, contact AMS Controls Support at 1-800-334-5213 for further troubleshooting.

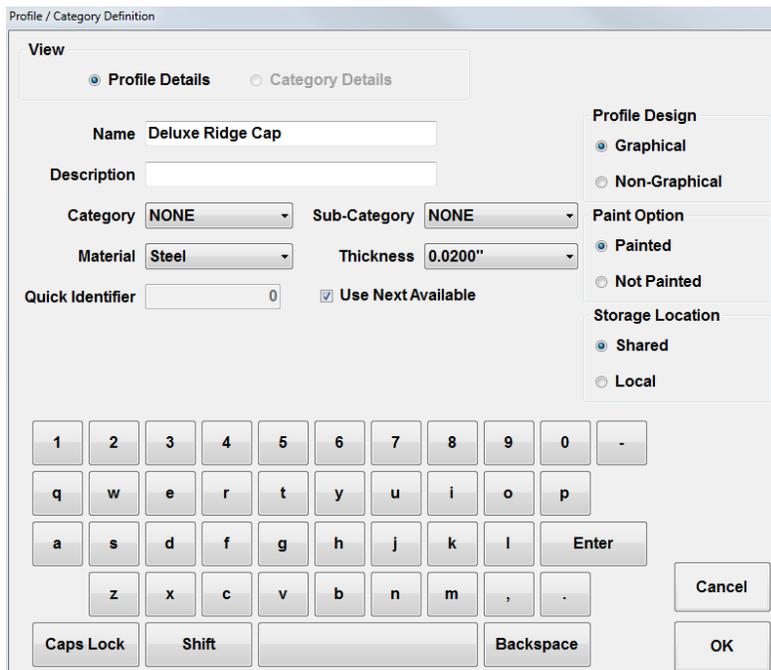
 **Note:** Use only your fingers or a stylus on the Pathfinder touch screen. Use of a sharp device, such as a screwdriver, will damage the screen beyond repair. Such use will also void the warranty on the device.

Appendix G: Profile Programming Examples

Deluxe Ridge Cap

This example creates a new part profile for a deluxe ridge cap. It takes advantage of Pathfinder's **Mirror** function since the profile is symmetrical.

1. Touch the **Create New Profile**  button on the main toolbar.
2. Enter the **Name** Deluxe Ridge Cap using the on-screen keyboard.



The screenshot shows the 'Profile / Category Definition' screen with the following configuration:

- View:** Profile Details (selected), Category Details
- Name:** Deluxe Ridge Cap
- Description:** (empty)
- Category:** NONE
- Sub-Category:** NONE
- Material:** Steel
- Thickness:** 0.0200"
- Quick Identifier:** 0
- Use Next Available:**
- Profile Design:** Graphical (selected), Non-Graphical
- Paint Option:** Painted (selected), Not Painted
- Storage Location:** Shared (selected), Local

An on-screen keyboard is visible at the bottom of the screen, and 'Cancel' and 'OK' buttons are located on the right side.

Figure 91: Deluxe Ridge Cap Example - 1

3. Enter a **Description** using the on-screen keyboard (optional).
4. Select a **Category** and **Sub-Category** from the drop down lists (optional).
5. Select a **Material Type** from the drop down list.
6. Enter the **Material Thickness** using the on-screen keyboard.
7. Touch the **OK** button. The **Create New Profile** screen closes and **Profile Editor** screen appears.

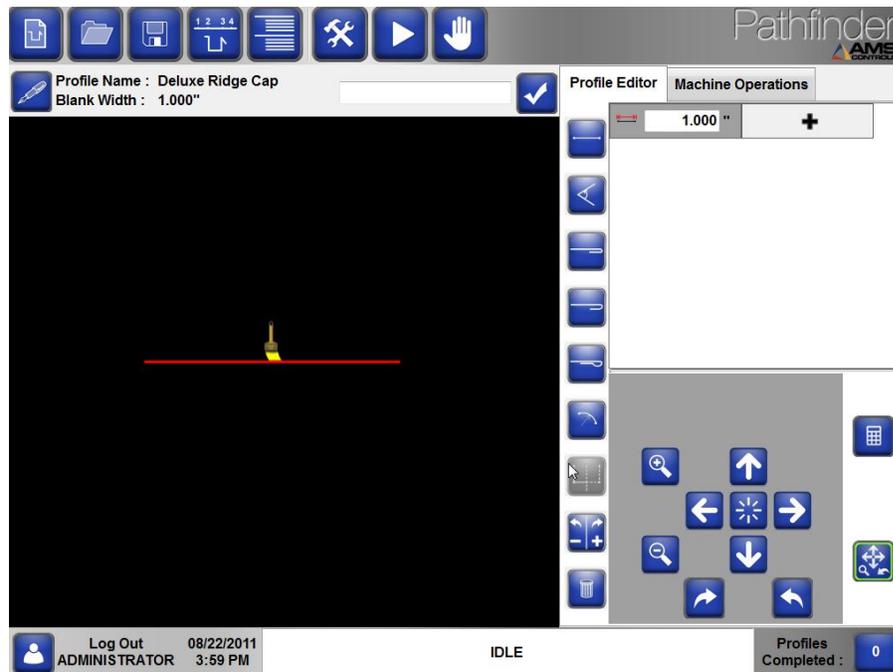


Figure 92: Deluxe Ridge Cap Example - 2

8. The first segment is created by default.
9. Use the on-screen numeric keypad to change the segment length to 0.5" then touch the **Enter** key.
10. Touch **Closed Hem Button**; or use the keyboard shortcut number **3** and touch the **Enter** key to add a closed hem to the profile.
11. Touch the **Enter** key to move to the next **Geometric Feature** of the profile.
12. Touch the **Enter** key or select the **Segment** button to add a new segment to the profile.

13. Use the on-screen numeric keypad to enter the segment length 2.375" then touch the **Enter** key.

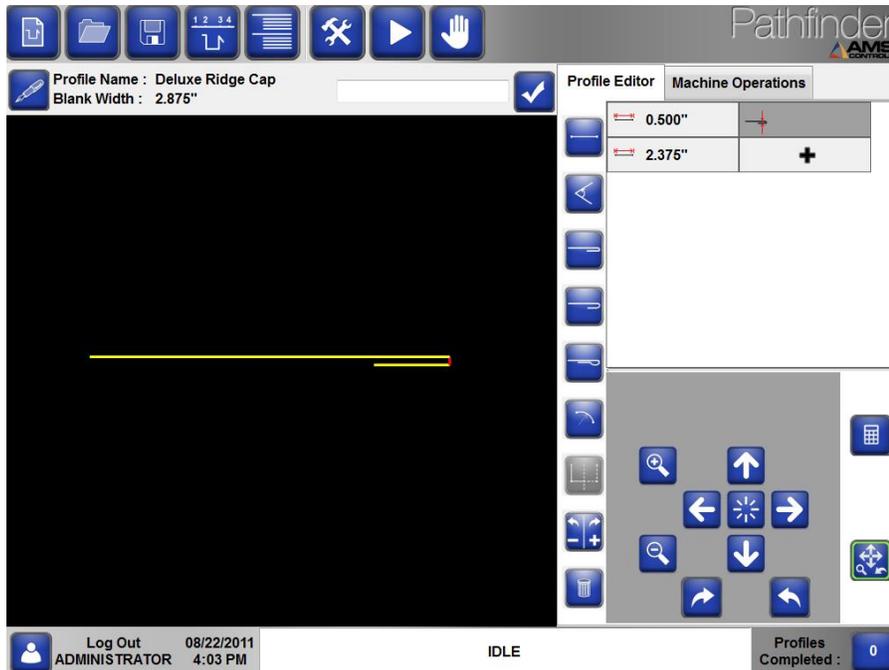


Figure 93: Deluxe Ridge Cap Example - 3

14. Touch the **Enter** key to add a new angle to the profile.
15. Use the on-screen numeric keypad to enter the angle -135 degrees then touch the **Enter** key.
16. Touch the **Enter** key to add a new segment to the profile.
17. Use the on-screen numeric keypad to enter the segment length 0.5" then touch the **Enter** key.
18. Touch the **Enter** key to add a new angle to the profile.
19. Use the on-screen numeric keypad to enter the angle 135 degrees then touch the **Enter** key.
20. Touch the **Enter** key to add a new segment to the profile.

21. Touch the **Switch**  button to select the top of this segment as the painted side. This affects the painted side for the entire profile.
22. Use the on-screen numeric keypad to enter the segment length 3.5" then touch the **Enter** key.
23. Touch the **Enter** key to add a new angle to the profile.
24. Use the on-screen numeric keypad to enter the angle 135 degrees then touch the **Enter** key.

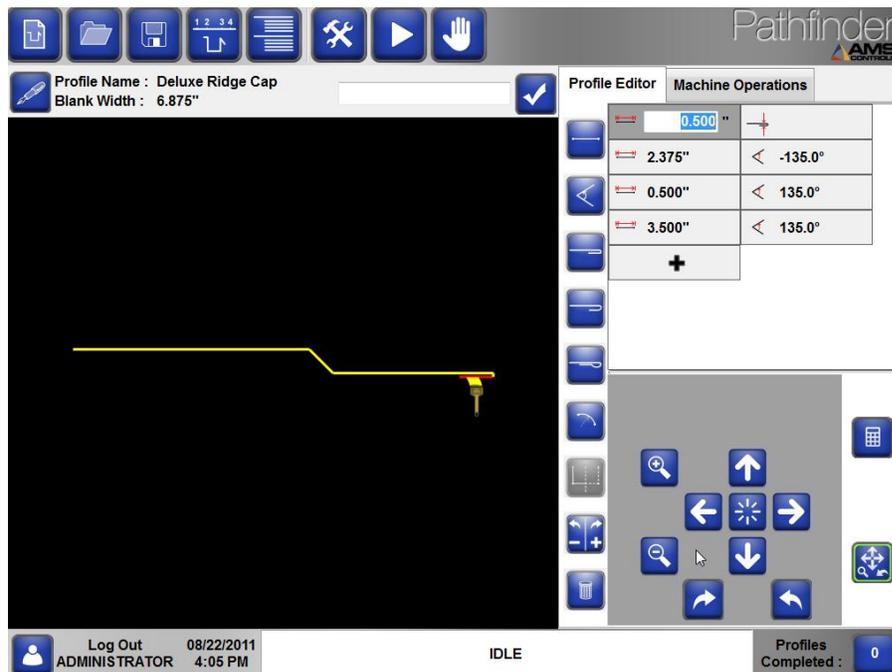


Figure 94: Deluxe Ridge Cap Example - 4

25. Touch the **Mirror** button or select keyboard shortcut number **7** and touch the **Enter** key. The **Mirror** function creates a "mirror image" of the profile, duplicating in reverse order all but the last geometric features that have been entered so far. This completes the symmetrical profile.

26. Touch the **Save Profile**  button to save this new profile in the **Profile Library**.

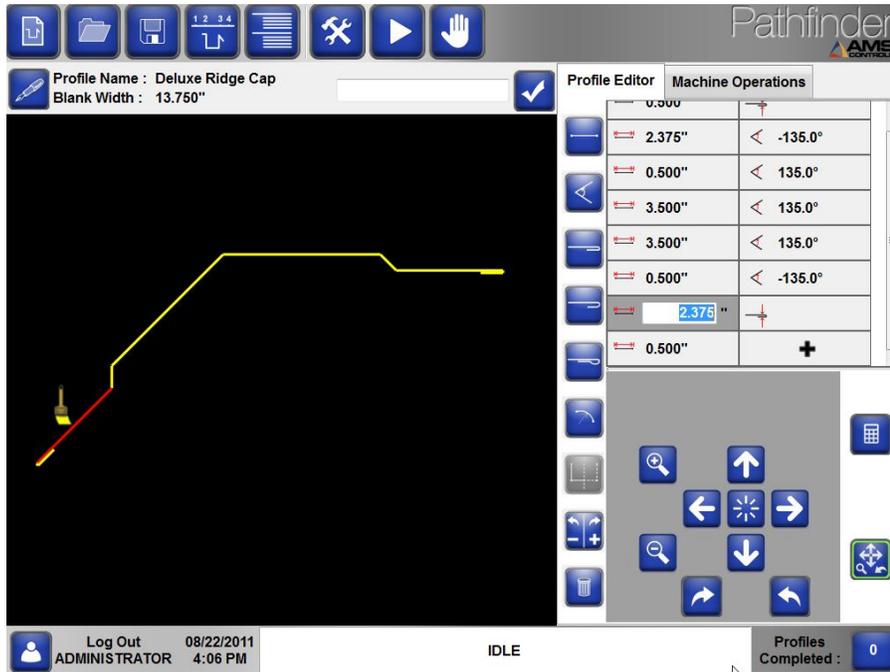


Figure 95: Deluxe Ridge Cap Example – 5

Drip Edge

This example creates a new profile for an asymmetrical drip edge containing an inside closed hem feature.

1. Touch the **Create New Profile**  button on the main toolbar.
2. Enter the **Name** Drip Edge using the on-screen keyboard.
3. Enter a **Description** using the on-screen keyboard (optional).
4. Select a **Category** and **Sub-Category** from the drop down lists (optional).
5. Select a **Material Type** from the drop down list.
6. Enter the **Material Thickness** using the on-screen keyboard.
7. Touch the **OK** button. The **Create New Profile** screen closes and **Profile Editor** screen appears.
8. The first segment is created by default.
9. Use the on-screen numeric keypad to change the segment length to 4.0" then touch the **Enter** key.

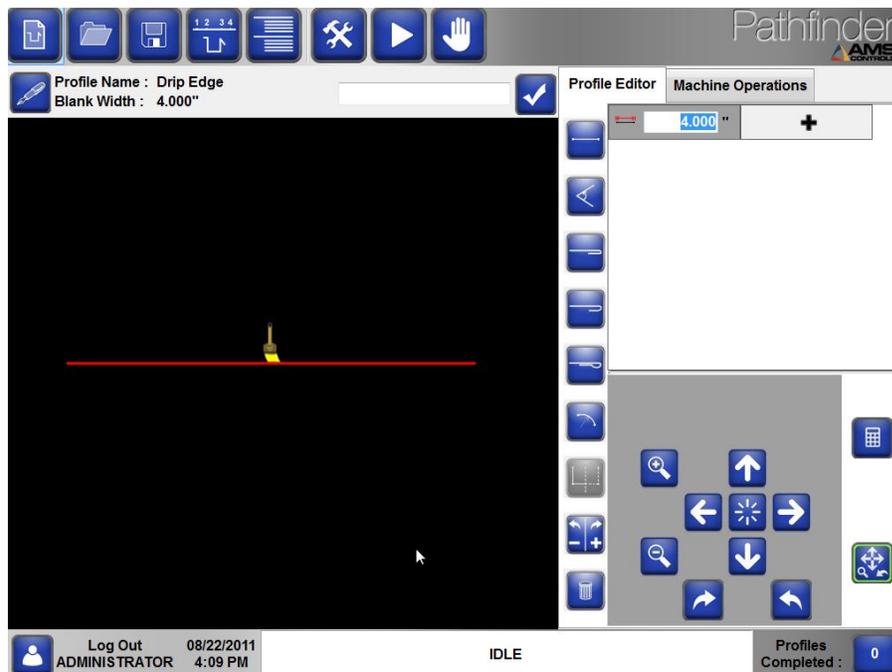


Figure 96: Drip Edge Example - 1

10. Touch the **Closed Hem** button or select the keyboard shortcut number **3**, then touch the **Enter** key to add a closed hem to the profile.
11. Touch the **Switch**  button to reverse the direction of the closed hem.
12. Touch the **Enter** key to move to the next **Geometric Feature** of the profile.
13. Touch the **Enter** key to add a new segment to the profile.
14. Use the on-screen numeric keypad to enter the segment length 1.0" then touch the **Enter** key.
15. Touch the **Enter** key to add a new angle to the profile.
16. Use the on-screen numeric keypad to enter the angle 90 degrees then touch the **Enter** key.
17. Touch the **Enter** key to add a new segment to the profile.
18. Use the on-screen numeric keypad to enter the segment length 3.0" then touch the **Enter** key.

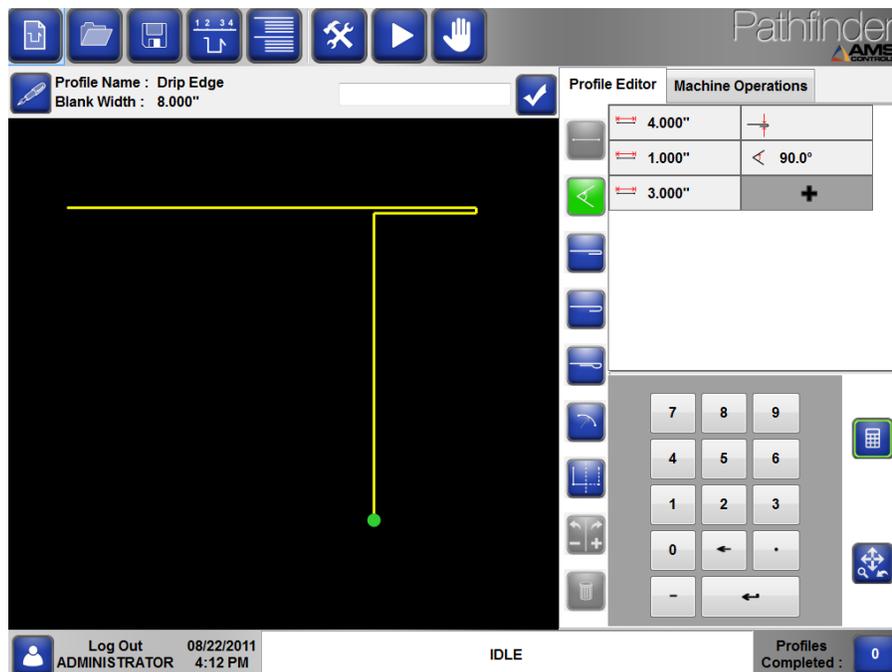


Figure 97: Drip Edge Example - 2

19. Touch the **Enter** key to add a new angle to the profile.

20. Use the on-screen numeric keypad to enter the angle 135 degrees then touch the **Enter** key.
21. Touch the **Enter** key to add a new segment to the profile.
22. Use the on-screen numeric keypad to enter the segment length 0.625" then touch the **Enter** key.
23. Touch the **Closed Hem** button or use keyboard shortcut number **3** then touch **Enter** to add a closed hem to the profile.
24. Touch the **Switch**  button to reverse the direction of the closed hem.
25. Touch the **Enter** key to add the **Closed Hem**.
26. Touch the **Enter** key to add a new segment to the profile.
27. Use the on-screen numeric keypad to enter the segment length 0.5" then touch the **Enter** key.

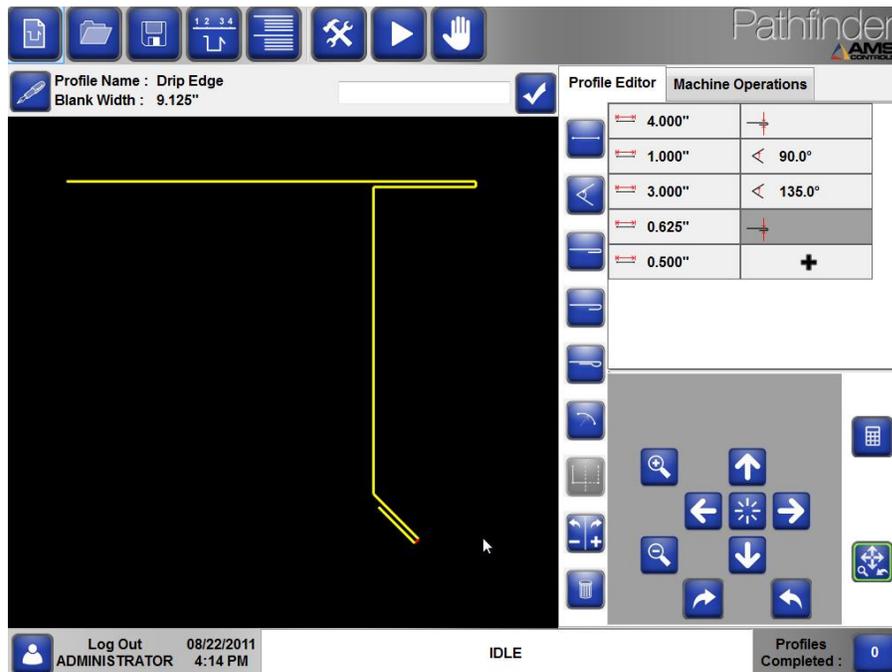


Figure 98: Drip Edge Example - 3

28. Touch the **Save Profile**  button to save this new profile in the **Profile Library**.

The Drip Edge profile has been completed and added to the **Profile Library**.

5K Gutter

This example creates a new profile for a gutter containing two radius features.

1. Touch the **Create New Profile**  button on the main toolbar.
2. Enter the **Name** 5K Gutter using the on-screen keyboard.
3. Enter a **Description** using the on-screen keyboard (optional).
4. Select a **Category** and **Sub-Category** from the drop down lists (optional).
5. Select a **Material Type** from the drop down list.
6. Enter the **Material Thickness** using the on-screen keyboard.

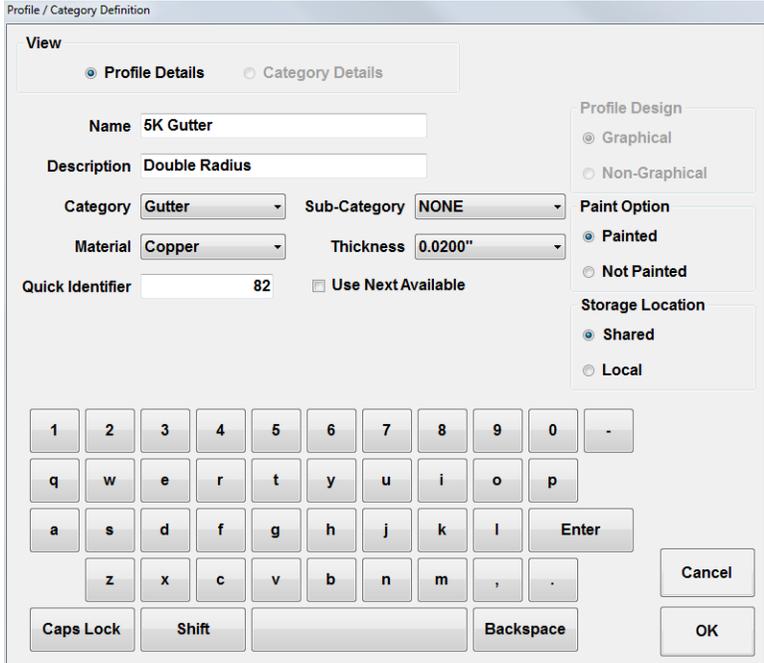


Figure 99: 5K Gutter Example - 1

7. Touch the **OK** button. The **Create New Profile** screen closes and **Profile Editor** screen appears.
8. The first segment is created by default.
9. Use the on-screen numeric keypad to change the segment length to 0.75" then touch the **Enter** key.
10. Touch the **Enter** key to add an angle to the profile.

11. Use the on-screen numeric keypad to enter the angle -90 degrees then touch the **Enter** key.
12. Touch the **Enter** key to add a segment to the profile.
13. Use the on-screen numeric keypad to enter the segment length 0.5" then touch the **Enter** key.

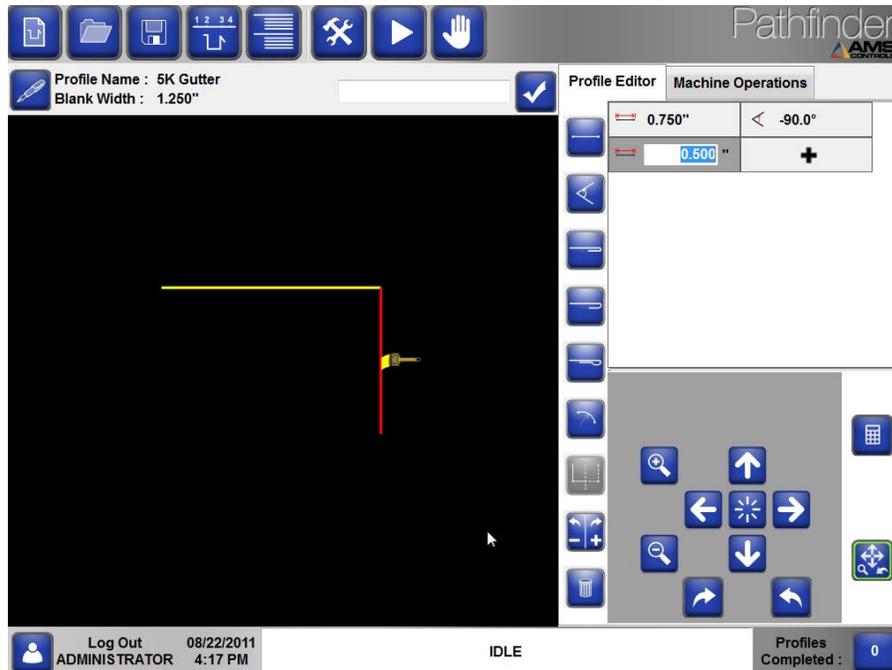


Figure 100: 5K Gutter Example - 2

14. Touch the **Enter** key to add an angle to the profile.
15. Use the on-screen numeric keypad to enter the angle -90 degrees then touch the **Enter** key.
16. Touch the **Enter** key to add a segment to the profile.
17. Use the on-screen numeric keypad to enter the segment length 0.25" then touch the **Enter** key.
18. Select the **Radius** button or use the keyboard shortcut number **6**, then touch the **Enter** key to add a radius to the profile.
19. Use the on-screen numeric keypad to enter the radius 1.5" then touch the **Enter** key.
20. Use the on-screen numeric keypad to enter the arc angle 115 degrees then touch the **Enter** key.

21. Select **2-Medium** from the **Quality** drop-down box.

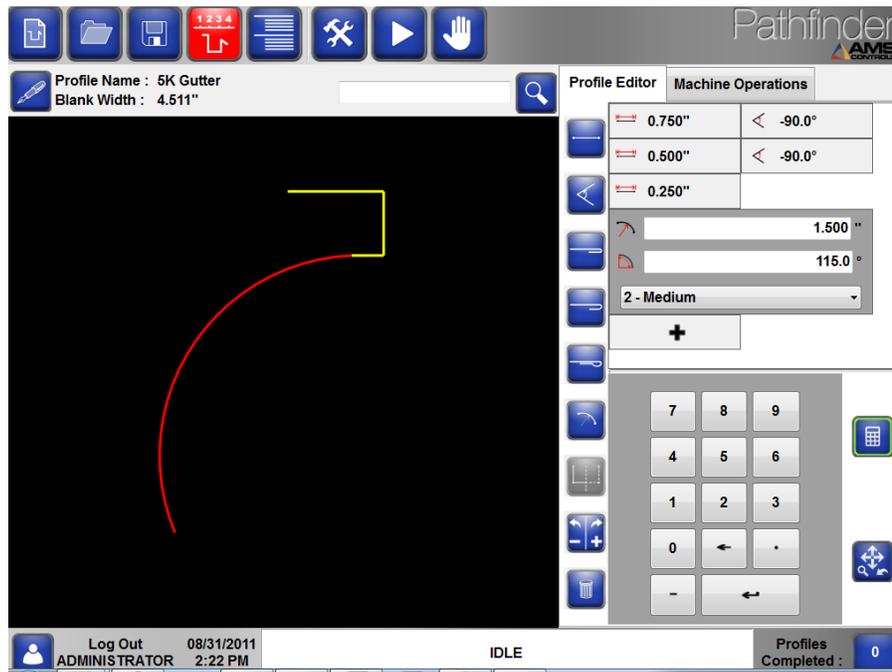


Figure 101: 5K Gutter Example - 3

22. Touch the **Enter** key to add a segment to the profile.
23. Use the on-screen numeric keypad to enter the segment length 0.5" then touch the **Enter** key.
24. Select the **Radius** button or use the keyboard shortcut number **6**, then touch the **Enter** key to add a radius to the profile.
25. Enter the radius 1.5" then touch the **Enter** key.
26. Enter the arc angle -115 degrees then touch the **Enter** key.
27. Select **2-Medium** from the **Quality** drop-down box.
28. Touch the **Segment** key or the shortcut **1** and enter the segment length 0.5" then touch the **Enter** key.

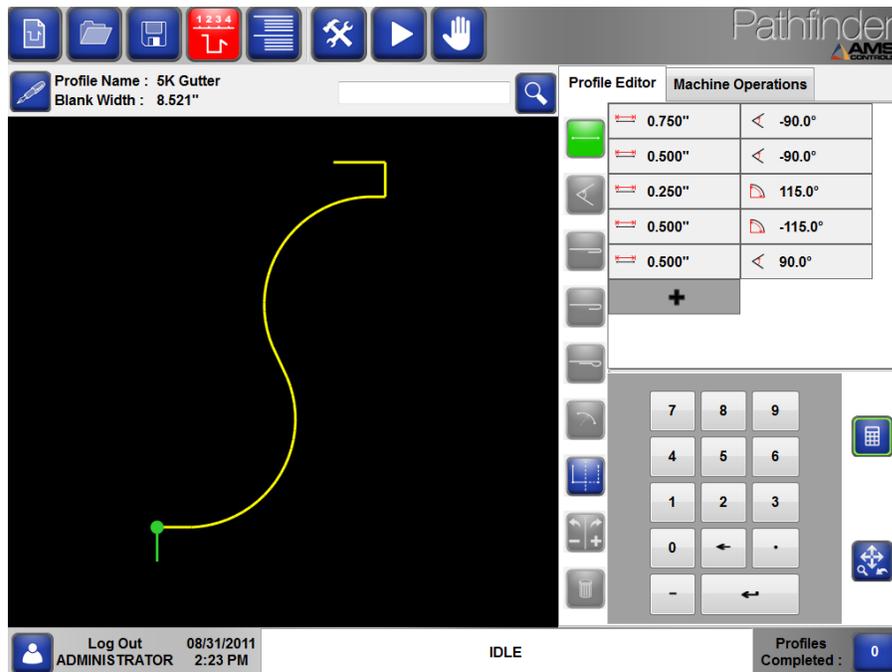


Figure 102: 5K Gutter Example – 4

29. Touch the **Enter** key to add an angle to the profile.
30. Use the on-screen numeric keypad to enter the angle 90 degrees then touch the **Enter** key.
31. Touch the **Enter** key to add a segment to the profile and enter the segment length 0.5" then touch the **Enter** key.
32. Use the on-screen numeric keypad to enter the angle -90 degrees then touch the **Enter** key.
33. Touch the **Enter** key to add a segment to the profile and enter the segment length 3.5" then touch the **Enter** key.
34. Touch the **Enter** key to add an angle to the profile.
35. Use the on-screen numeric keypad to enter the angle -90 degrees then touch the **Enter** key.
36. Touch the **Enter** key to add a segment to the profile.
37. Use the on-screen numeric keypad to enter the segment length 5.75" then touch the **Enter** key.

38. Touch the **Save Profile**  button to save this new profile in the **Part Library**.

The 5K Gutter profile has been completed and added to the **Profile Library**.

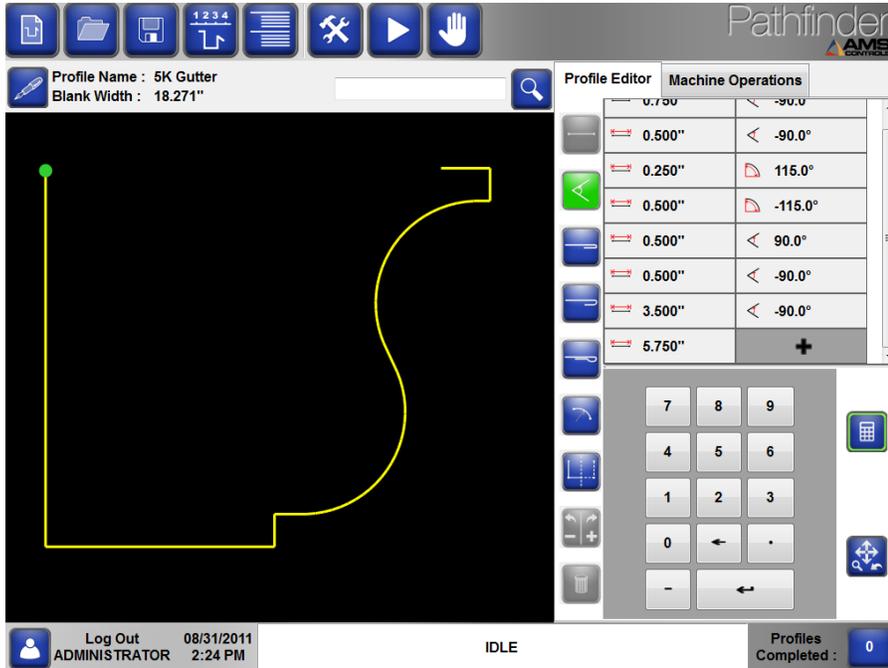


Figure 103: 5K Gutter Example – 5

Glossary of Terms

Air Gap

See Radius Adjustment.

Backgauge

Movable set of stops that a part is pushed against at the beginning of a bend. Some backgauges include multiple rows of fingers that can be electrically raised to increase the effective range of the backgauge. The position of the backgauge is referred to as the X value or dimension.

Batch Stop

Allows the user to easily repeat a sub-section of a profile's machine operations, thus partially completing several profiles at a time. Once a stack of partially formed profiles is made, the machine operator can then perform a tedious handling operation (like a flip or a rotate) on the entire stack all at once. Then he can continue running the remaining machine operations and complete each profile in the stack.

Bending Beam

The surface that swings up and bends the profile to the specified angle. The angle of the bending beam is referred to as the B value or dimension.

Caliper

A tool used to measure the distance between two opposing sides of an object.

Clamping Beam

The surface that is lowered to clamp the profile for the bending process and raised so the profile can be removed or repositioned. On some machines with automatic radius or thickness adjustments, the clamping beam can also be moved back and forth relative to the zero point of the backgauge. The vertical position of the clamping beam is referred to as the Z value or dimension.

Coining

See Stamping.

Encoder

An electrical mechanical device that can monitor motion or position.

E-Stop

An emergency stop button that provides a rapid way to disconnect power to protect machine operators. This may be a button or a pedal function.

Flip

Indicates that the machine operator needs to pull the sheet metal out of the machine and turn it over end-for-end and top-to-bottom, similar to the spinning of an airplane propeller.

Hem

A feature of a profile where the metal is bent back onto itself. The hem can either be completely flattened, open (to accept another profile) or in a tear-drop shape.

Overbend

The defined amount, in degrees, that a particular material must be bent past a specified angle in order to achieve that angle in the final profile.

Profile Library

A collection of programmed profiles stored in the controller or on a shared network.

Radius Adjustment

When dealing with heavier gauges, it becomes necessary to change the geometry of the clamping beam and bending beam in order to get a proper bend. This is accomplished by moving the clamping beam back and forth horizontally on some machines and by moving the bending beam vertically (when at the zero position) on others. Also known as **Air Gap**.

Radius Bend

A curving bend achieved by creating numerous small bends in close sequence to one another.

Rotate

Indicates that the machine operator needs to pull the sheet metal out of the machine, and exchange it end-for-end, but not top-to-bottom, similar to the spinning of a helicopter rotor. A Rotate operation between two bends forces the opposite edge of the sheet to be up against the backgauge for each bend.

Safety Stop

The distance where, during a clamping operation, the clamp stops and requires the operator to release and then press the foot pedal again to continue clamping or closing. Designed to prevent operator injuries.

Search Identifier

The number assigned by Pathfinder to each profile, if the user enables Profile Search Identifier under Search Settings. Search Identifiers can be used to quickly find frequently used profiles from the Profile Editor screen.

Shear

A type of cutting operation in which the metal object is cut by means of a moving blade and fixed edge or by a pair of moving blades that may be either flat or curved. The type of force that causes, or tends to cause, two contiguous parts of the same body to slide relative to each other in a direction parallel to their plane of contact.

Slitter

An optional feature of some machines used to trim coils down to the proper blank width.

Springback

The tendency of some materials to rebound partially after being bent. See Material Springback Compensation, page 43.

Stamping

An alternate machine process to produce a radius bend on a profile (multiple small bends). This is accomplished by leaving the bending beam in the correct angle and then using the bending beam to create the bend. This is much faster than the standard method (clamping the profile, swinging the bending beam up and back, unclamping the profile, etc.) but typically is not as effective. Also known as **Coining**.

Turn

A combination Flip and Rotate operation, the end result being that the profile is swapped top-to-bottom and front-to-back, but not end-for-end.

Upper Cheek

See Clamping Beam.

Upper Jaw

See Clamping Beam.