# RAZORGAGE

## POSITIONERS • SOFTWARE • SYSTEMS

# AngleMaster Software Manual

The AngleMaster system comprises a RazorGage positioner combined with a third party angle adjustable saw.  The RazorGage positioner serves as a pusher feeding the material from right to left.  The system is not fully automatic.  The linear and anglular positions are controlled automatically but the operator must  ensure that the material is securely against the positioner stop extension, manually cycle the saw, and ensure that all drops and trim pieces are out of the way before advancing the material.

When the software starts up, the PRESS OK TO HOME screen appears.  When you press OK the positioner and the saw turret move to find HOME.  Then the MAIN SCREEN appears.  The MAIN SCREEN is only useful for moving the positioner and the saw turret to position for test cuts and calibration.  It is not useful for cutting angled parts to length.  The first step in getting your AngleMaster operational after the tables are leveled and aligned with the saw is calibration.  In order to properly cut the parts necessary for calibration, it is necessary to understand the way angles are measured on the machine.  On the next page, the AngleMaster coordinate system and terminology is explained.  On the pages after that, the calibration process is described.  Calibration consists of first setting the Home Offset of the saw turret, then adjusting the scale factor of the saw turret, and finally setting the pivot point of the saw turret.  After that one sets the Home Offset of the positioner and the Scale Factor of the Positioner.  These paramters are found in the setup screen which is accessed by pressing the SETTINGS button in the upper right corner of the MAIN SCREEN.  The parameters for the positioner are shown in the row labeled RG#1 and the parameters for the saw turret are shown in the row labeled RG#2.

Saw Turret Home Offset describes the angle that is cut when the saw turret is at home.  If the Saw Turret Home Offset is not accurate, all angles cut will be off by the amount of the error.
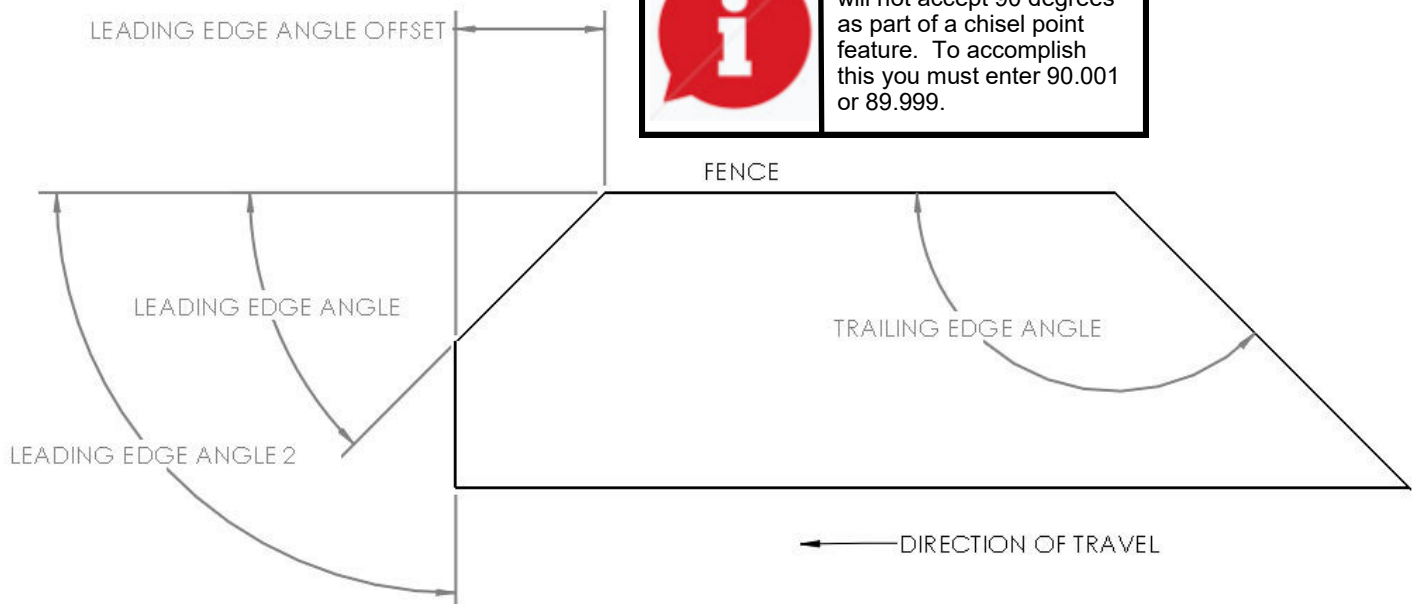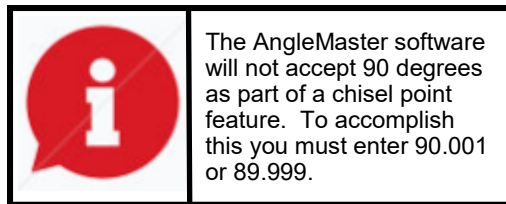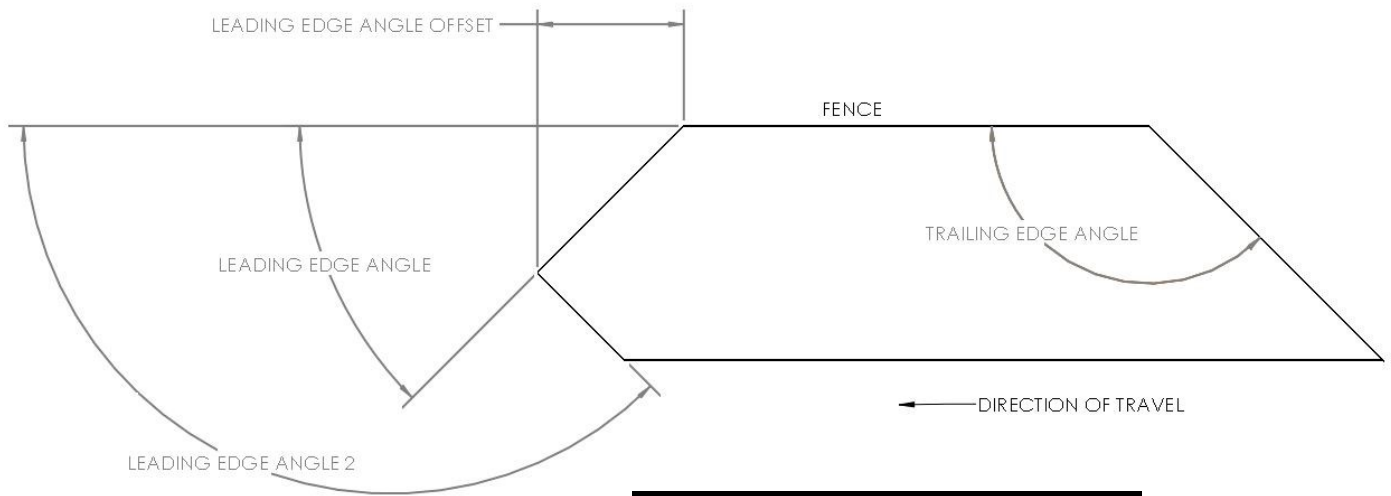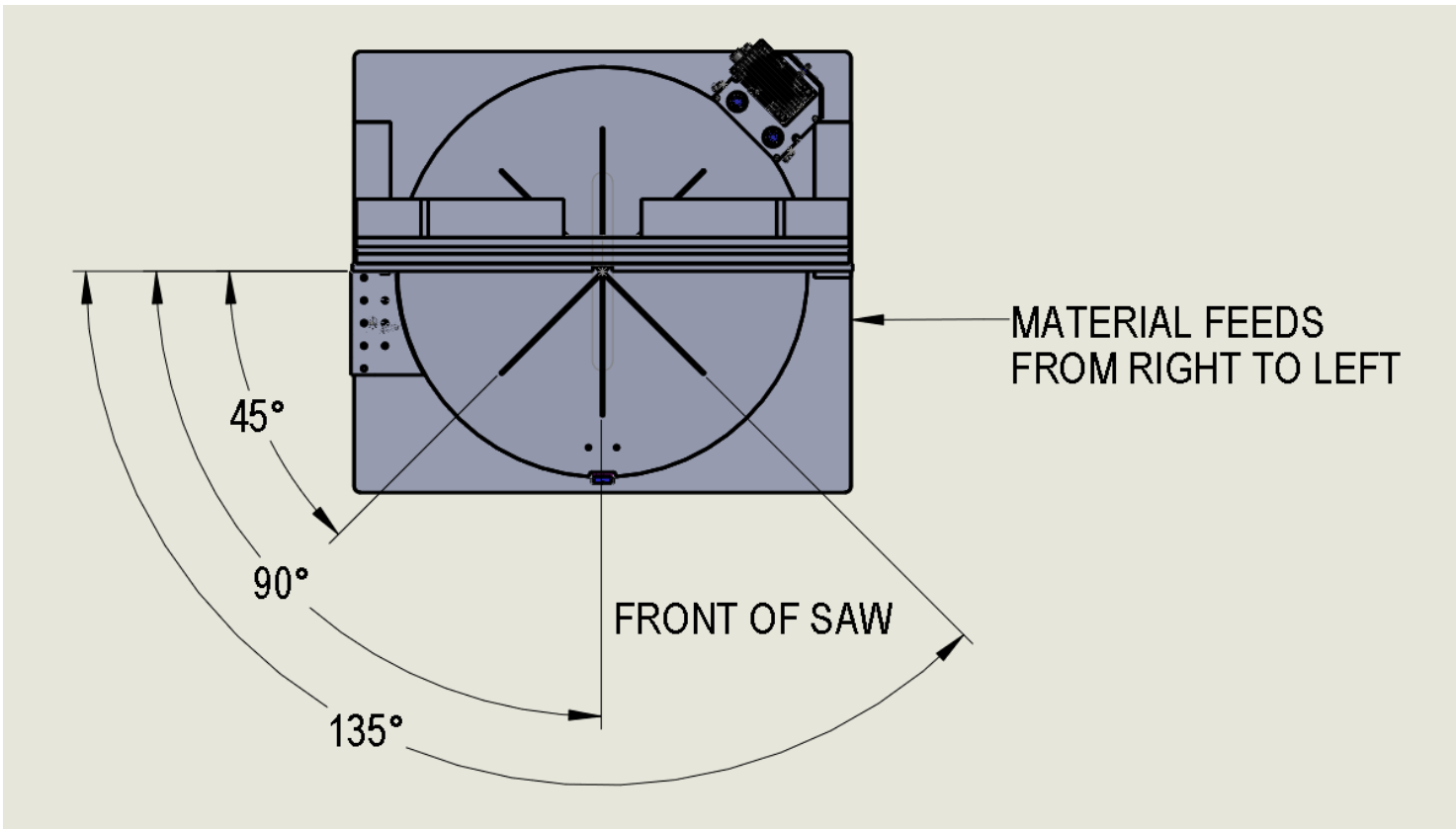
Saw Turret Scale Factor describes the motor counts per degree.  The more degrees in the angle, the more times an error in the scale factor is applied.  Therefore, if Saw Turret Scale Factor is off, the angle error will increase as the degree of angle increases.

The Pivot Point describes the location of the turret pivot point relative to the center of the blade and the forward facing surface of the fence.  If angles are all correct, kerf is correct, and positioner scale factor is correct but parts still come out the wrong length and the error varies with angle, then the pivot point is usually to blame.
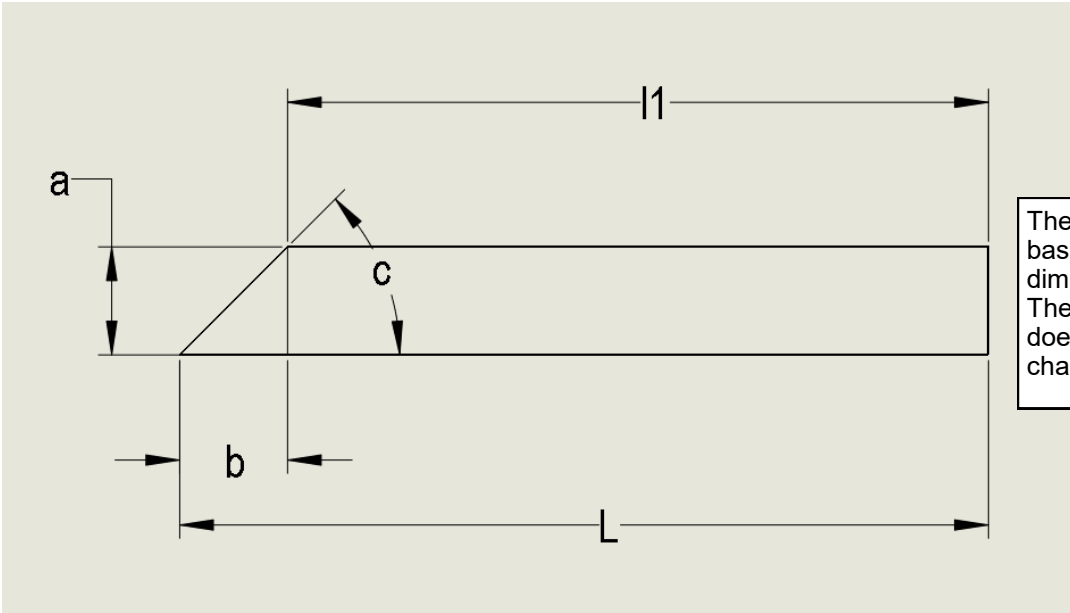
The positioner Home Offset is the distance from the saw blade to the positioner's stop extension face when the positioner is at HOME and the saw is at 90 degrees.  If this value is off, then, on a pusher system, the only length affected is the leading edge trim cut.

The Postioner Scale Factor describes the number of motor counts per inch of travel.  If short parts are accurate but error increases proportionately as part length increases, then the problem is likely the Positioner Scale Factor

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### Main Screen

RazorGage #1 On Target

Saw

NOTE: Position does not account for angle position.

Current Position: 0.000

Target Length:

| 7 | 8 | 9 | RAZORGAGE SETUP SCREEN |
| 4 | 5 | 6 | AUTOLIST SCREEN |
| 1 | 2 | 3 | MANUAL PARTS |
| . | 0 | ← BackSpace | Move to Target Positions |

Fence          Fence

Saw Blade→

| 45 | 60 | 90 | 120 | 135 |

UNLOAD

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### RazorGage Setup Screen

**RG #1 Positioner**

| Stroke= 48.000 | Scale= 3466.000 | Speed= 35.000 | Accel= 45.000 | Decel= 45.000 | Run Current= 100% | Unload= 5.000 | Load= 48.000 |
| Saw Kerf= 0.125 | Offset= 0.000 | Invert Direction = False | Move to Lower Limit | Move to Upper Limit | Home the RazorGage | Run Laser Routine | Run Break-In |

Return to Main

Controls Test

**RG #2  Saw**

| Stroke= 160.000 | Scale= 1041.896 | Speed= 10.000 | Accel= 45.000 | Decel= 45.000 | Run Current= 100% | Unload= 5.000 | Load= 48.000 |
| Offset= 0.000 | Invert Direction = False | Move to Lower Limit | Move to Upper Limit | Home the RazorGage | Run Break-In |

■ Metric

45°

90°

135°

FRONT OF SAW

MATERIAL FEEDS
FROM RIGHT TO LEFT

LEADING EDGE ANGLE OFFSET

FENCE

LEADING EDGE ANGLE

TRAILING EDGE ANGLE

LEADING EDGE ANGLE 2

DIRECTION OF TRAVEL

The AngleMaster software will not accept 90 degrees as part of a chisel point feature.  To accomplish this you must enter 90.001 or 89.999.

LEADING EDGE ANGLE OFFSET

FENCE

LEADING EDGE ANGLE

TRAILING EDGE ANGLE

LEADING EDGE ANGLE 2

DIRECTION OF TRAVEL

# Effect of Width & Angle on Overall Part Length



The move l1 is calculated based on the nominal dimensions entered. Therefore its value doesn't change in the chart below.

| L Nominal | a | c | b | l1 | L Actual | |
|---|---|---|---|---|---|---|
| 30 | 4 | 45 | 4 | 26 | 30.000 | |
| **c Nominal** | 3.995 | 45 | 3.995 | 26 | 29.995 | |
| **45** | 3.996 | 45 | 3.996 | 26 | 29.996 | |
| | 3.997 | 45 | 3.997 | 26 | 29.997 | |
| | 3.998 | 45 | 3.998 | 26 | 29.998 | |
| | 3.999 | 45 | 3.999 | 26 | 29.999 | |
| | 4 | 45 | 4 | 26 | 30.000 | L variation as 'a' (width) changes |
| | 4.001 | 44 | 4.143157 | 26 | 30.143 | |
| | 4.002 | 44.1 | 4.129744 | 26 | 30.130 | |
| | 4.003 | 44.2 | 4.116375 | 26 | 30.116 | |
| | 4.004 | 44.3 | 4.103051 | 26 | 30.103 | |
| | 4.005 | 44.4 | 4.089771 | 26 | 30.090 | |
| | 4 | 44.5 | 4.07043 | 26 | 30.070 | |
| | 4 | 44.6 | 4.056244 | 26 | 30.056 | |
| | 4 | 44.7 | 4.042109 | 26 | 30.042 | |
| | 4 | 44.8 | 4.028023 | 26 | 30.028 | |
| | 4 | 44.9 | 4.013987 | 26 | 30.014 | |
| | 4 | 45 | 4 | 26 | 30.000 | |
| | 4 | 45.1 | 3.986062 | 26 | 29.986 | |
| | 4 | 45.2 | 3.972172 | 26 | 29.972 | L variation as 'c' (angle) changes |
| | 4 | 45.3 | 3.95833 | 26 | 29.958 | |
| | 4 | 45.4 | 3.944536 | 26 | 29.945 | |
| | 4 | 45.5 | 3.930789 | 26 | 29.931 | |
| | 4 | 45.6 | 3.917089 | 26 | 29.917 | |
| | 4 | 45.7 | 3.903437 | 26 | 29.903 | |
| | 4 | 45.8 | 3.88983 | 26 | 29.890 | |
| | 4 | 45.9 | 3.87627 | 26 | 29.876 | |
| | 4 | 46 | 3.862755 | 26 | 29.863 | |

# Calibrating the AngleMaster

**Press RazorGage Setup Screen button on Main Screen**

RazorGage by Technical Services v6.4.52    Serial Number: Demo Version

## RazorGage Setup Screen

| RG #1 | Stroke= 384.000 | Scale= 3464.890 | Speed= 50.000 | Accel= 45.000 | Decel= 45.000 | Run Current= 100% | Unload= |
|---|---|---|---|---|---|---|---|
| | Saw Kerf= 0.200 | Offset= 0.750 | Direction = Right | Move to Lower Limit | Move to Upper Limit | | Home the RazorGage | Run La... Routi... |
| RG #2 | Stroke= 95.000 | Scale= 1041.896 | Speed= 60.000 | Accel= 90.000 | Decel= 90.000 | Run Current= 100% | Unload= |
| | | Offset= 42.500 | Direction = Right | Move to Lower Limit | Move to Upper Limit | | Home the RazorGage | |

RazorGage #1 On Target

Current Position: 0.000

Saw #2 On Target

Current Position: 0.00    Target Angle:

| 4 | 5 | 6 |
| 1 | 2 | 3 |
| . | 0 | ← BackSpace |

RAZORGAGE SETUP SCREEN

AUTOLIST SCREEN

MANUAL PARTS

Move to Target Positions

Fence    Fence

Saw Blade

UNLOAD

| 45 | 60 | 90 | 120 | 135 |

**Press this button to Home RazorGage#2**

With RazorGage #2 at home, measure this angle and enter it as the Offset for RazorGage #2

After the saw has homed, cut a part, measure the angle on the part as it relates to the angle shown in the diagram, & enter it as Offset for RazorGage #2.  Press the Offset= xx.xx button on the setup screen to enable the keypad for entering the offset. The password is 5239. Make a few cuts at this angle and measure to ensure you have it set accurately.

## CUT 1

Now go to the main screen and enter an angle of 45 degrees and wait for the saw to finish moving. Find the widest stock you can cut at that 45 degree angle and find a piece that is approximately 36" long. Place the stock on the saw with about 12" of the stock to the left of the point at which the blade intersects the fence and cut it into two pieces as shown at right.

## CUT 2
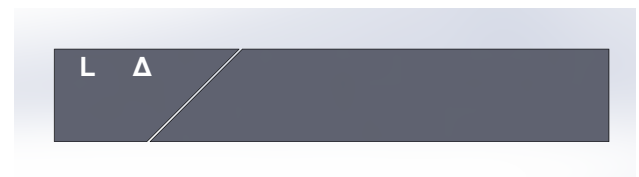
Take the piece on the left and mark it with an "L" on the the top and make a mark to indicate the face that was against the fence and put that piece aside. Now move the saw to 135 degrees, place the remainder of the stock to the right of the blade and make the 135 degree cut as shown at right. Now mark the top of this piece with an "R" and indicate the face that was against the fence.
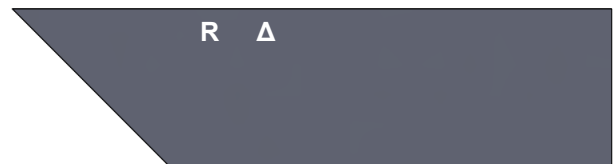
Now flip the parts as shown at right and compare the faces of the two angle cut surfaces. By trial and error, adjust the scale factor and repeat this process until the faces are flush.
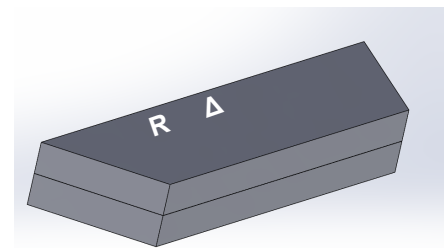
RazorGage by Technical Services  v6.4.52     Serial Number: Demo Version

### RazorGage Setup Screen

| RG #1 | Stroke= 384.000 | Scale= 3464.890 | Speed= 50.000 | Accel= 45.000 | Decel= 45.000 | Run Current= 100% | Unload= 5.000 | Load= 48.000 | Return to Main |
| | Saw Kerf= 0.200 | Offset= 0.750 | Direction = Right | Move to Lower Limit | Move to Upper |  | Home the Razor Gage | Run Laser Routine | Run Break-In | Help |
| RG #2 | Stroke= 95.000 | Scale= 1041.896 | Sp | Adjust scale factor here | | h Current= 100% | Unload= 5.000 | Load= 48.000 | PC Software Manual |
| | Offset= 42.500 | Direction = Right | Move to Lower Limit | M | Limit | | ome the Razor Gage | | Run Break-In | Timer 1 = 500ms |

Adjust scale factor here

# Calibrating Saw Pivot Point

**Main Screen**

RazorGage #1 On Target

NOTE: This position does not account for angle position.

Current Position: 0.000
Target Length:

Saw #2 On Target

Current Position: 0.00
Target Angle:

Fence

Saw Blade--

| 7 | 8 | 9 | RAZORGAGE SETUP SCREEN |
| 4 | 5 | 6 | AUTOLIST SCREEN |
| 1 | 2 | 3 | MANUAL PARTS |

45  60  90

Click Autolist

Click Settings

**AutoList - Pusher**

SETTINGS  MAIN

| OPEN FILE | QTY + | QTY - | ENTER QTY | OFFSET = NONE | | ENTER LENGTH | USE LENGTH 78 |
| CLOSE FILE | NEXT GROUP | PREV GROUP | GROUPING LIST |

Total QTY for All Parts:   Part Grouping 0 of 0

Profile Name

| QUANTITY | MATERIAL | WIDTH | PART | LENGTH | ROOM NAME | ROOM NUM |

File Name

**Anglemaster AutoList Parameters Screen**

OPTIMIZE
☑ OPTIMIZE ON ENTER LENGTH (STOP MODE)
☑ USE FIRST FIT METHOD (RECOMMENDED)

◉ NO PRINTER

Click Pivot Point

DONE
LABELS
CONFIGURE
SORTING
PIVOT POINT

**Saw Pivot Point Offsets**

Saw Bl

Fence

positive

positive

Click Calibration

Calibration

DONE

**Pivot Point Calibration**

To Calibrate: Move to a position of your choice. Cut 3 pieces, 1 with the angle at 90deg, 1 with the angle at 45deg and 1 with the angle at 135deg. Make these cuts using the RazorGage as a stop, NOT as a pusher.

Measure the lengths along the **fence side**, and enter below. Click calculate to have the pivot point offsets computed.

Length at 90deg [____]

Length at 45deg [____]

Important - The part cut with the saw set at 45 degrees must be measured on the short side at indicated here.

Length at 135deg [____]

Important - The part cut with the saw set at 135 degrees must be measured on the long side at indicated here.

Calculate New Offsets

After entering the lengths of the parts as measured along the fence press CALIBRATE NEW OFFSETS to calculate and display the offsets then press USE THESE OFFSETS to load the values into the machine.

Fence Offset [____]

Saw Blade Offset [____]

Use These Offsets     Cancel
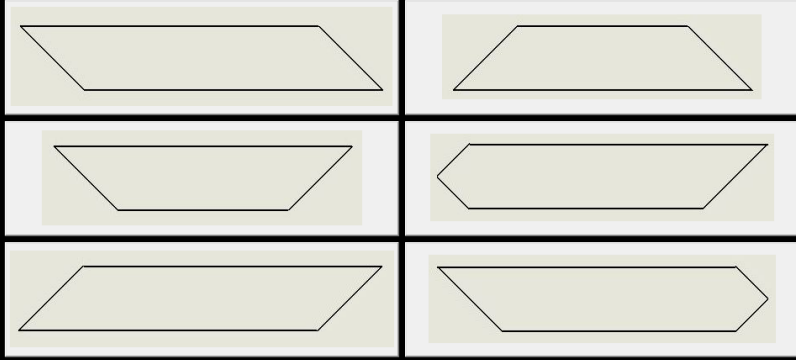
To cut manual parts, click the MANUAL PARTS button on the Main Screen and then enter the STOCK LENGTH, which is the length of the material you're loading into the machine, and the STOCK WIDTH, which is the ACTUAL, NOT NOMINAL, width of the material. If you enter 3" as the stock width but the actual width is 2.995, then finished part length on a 45 degree part will be off by .005" even if all other aspects of the machine are perfect.
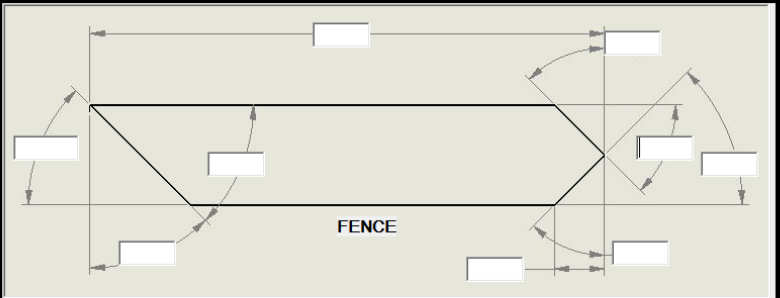
After entering STOCK WIDTH, click PART STYLES. The SELECT A PART SHAPE screen will appear. Click the part shape that matches your part and enter the angles and length on the drawing. The drawing has multiple dimensioning schemes to describe each feature. This is done because we never know how the draftsman will dimension an angle so we give you multiple ways to enter it. DON'T ENTER A VALUE IN EACH BOX. Just enter one value to describe each angle. Leave the unused boxes blank. The software will warn you if you don't fill in enough information.

Click ADD THE PART when you're done and the MANUAL PARTS SCREEN will come back. It will have all the information filled out. Now click CUT THE PART and follow the onscreen prompts.

The other screen offered in the AngleMaster software is the AutoList Screen. The Autolist allows you to open a cutlist, enter the length of your stock, and then it will find the parts in the cutlist that best utilize the available material and create a cutting solution. You press GO and the RazorGage positioner will advance the material to the trim cut, then to each subsequent location, adjusting the saw as needed to cut the parts to the required leading and trailing edge angles and length. To operate the Autolist screen, click AUTOLIST from the MAIN SCREEN. When the AUTOLIST screen appears, click OPEN FILE and click the file to open. When the file opens it will be sorted into groups according to the sorting criteria established in the Autolist Settings/Sorting screen. Usually groups are sorted by material type but more criteria can be added such as color, job number, room number, or all of the above. To start the operation, just click the GROUPING LIST button and choose the material type (group) you want to run. Then the parts from that group will be displayed. Click the ENTER LENGTH button and enter the stock length and then just follow the prompts to run the parts from that stick. For a complete tutorial on AUTOLIST, watch our COMPLETE AUTOLIST TUTORIAL on our YouTube channel.

# RazorGage
## POSITIONERS • SOFTWARE • SYSTEMS

# How to Define Leading & Trailing Angle Fields in AngleMaster Software
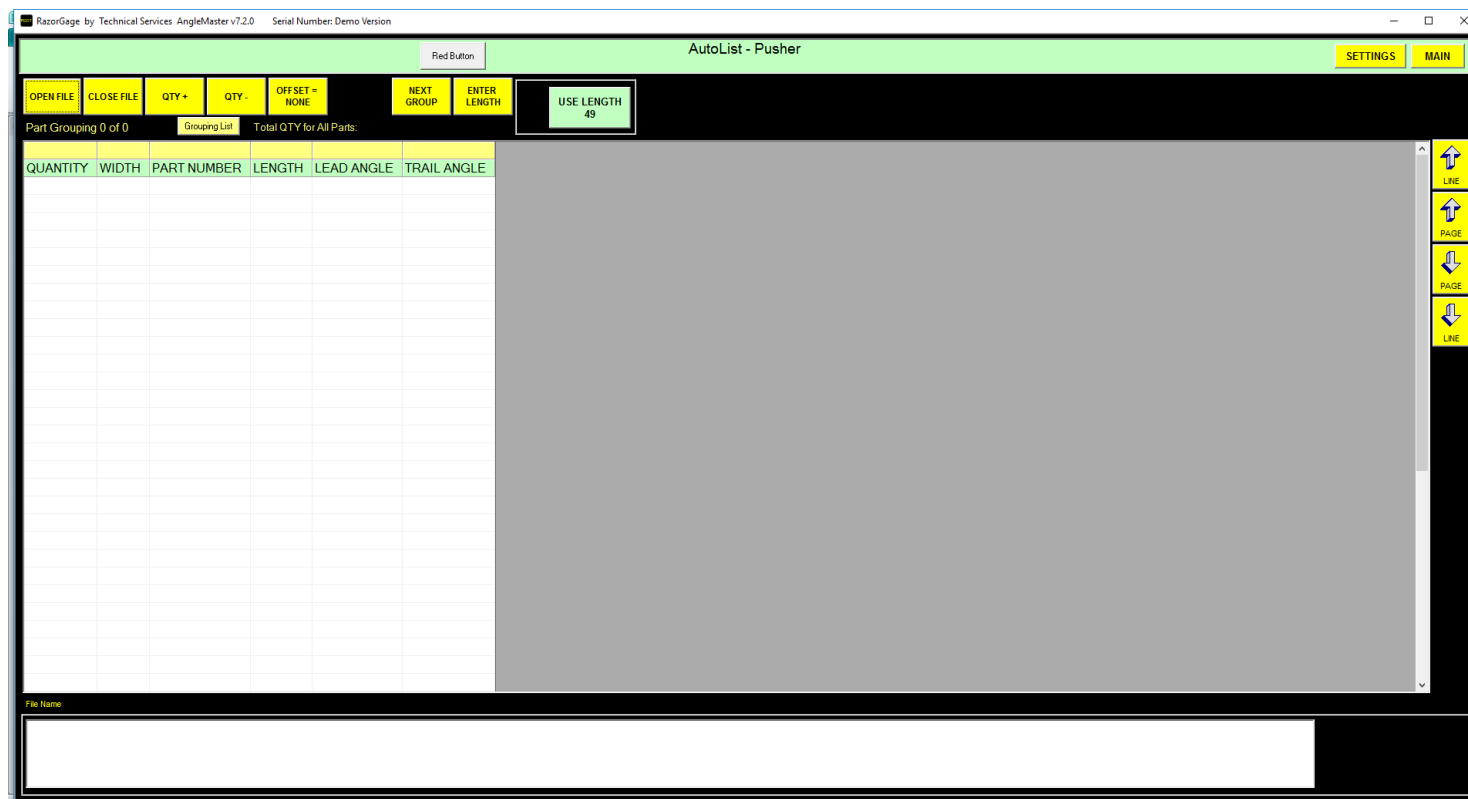


From the Autolist Screen click SETTINGS

That will show the screen below. Click CONFIGURE.

In order for the software to position the saw at the proper angle for each part, the software must be told which columns in the cutlist contain the various angle data. We tell the software this by selecting the column from pull down menus on the right of the Parts Configuration Screen.

The pull down menus contain a list of the columns available in the cutlist. This list contains the DB Name of the columns which is different than the name you see in the table that shows up on the Autolist screen. The names you see on the Autolist screen are called the Grid Labels. The Grid Labels are column headings that make sense to the operator. Internally, however, the software refers to the columns by the DB Name. When we tell the software which column contains Leading Edge Angle, for example, we must use the DB Name instead of the Grid Label. In the example below, find the second pull down list from the top on the right side of the screen. That pull down list is labeled LEAD ANGLE DB_NAME. When you click on the arrow on the right side of the box you'll see a list of all the DB_Names in the RazoGage database file (.rdb file). The grid to the left of the pull down menus has a column on the far left labeled DB Name. The column on the right of the grid is labeled Grid Label. Look down the Grid Label column until you see the label LEAD ANGLE. Then go over to the left column to find the corresponding DB Name. Select that name from the pull down to assign the LEAD ANGLE column. Do this same procedure for LEAD ANGLE OFFSET, LEAD ANGLE 2, and TRAIL ANGLE. IMPORTANT: NOT ALL CUTLISTS WILL CONTAIN A COLUMN FOR LEAD ANGLE OFFSET AND LEAD ANGLE 2. If you cutlist doesn't contain these columns, just choose NONE from the pull down menu.

# RazorGage
## POSITIONERS • SOFTWARE • SYSTEMS

# AngleMaster Software
# Nesting Methods

If conditions are right the AngleMaster software will make one cut to achieve the trailing edge angle of one piece with the leading edge angle of the next piece. In order for this to happen the ORDER PARTS ON STICK BY SEQ_NUMBER UNCHECK TO ORDER BY LENGTH box must be checked. To find the screen at right, click the SETTINGS button in the upper right corner of the AUTOLIST screen. As indicated by the label, parts are cut according to sequence number. If you did not included a column for sequence number in your cutlist, the Parts List Processor applies a sequence number for you. The sequence number automatically applied may not provide you with the nesting results you're looking for as, in order for parts to be nested, they must fall in place so that the angles match. The software does not actively try to make conditions right for angle nesting.



Anglemaster AutoList Parameters Screen

OPTIMIZE
☑ OPTIMIZE ON ENTER LENGTH (STOP MODE)
☑ USE FIRST FIT METHOD (RECOMMENDED)
   MAXIMUM ITERATIONS 10000
   Recommended: 10000
☐ ORDER PARTS ON STICK BY SEQ_NUMBER. UNCHECK TO ORDER BY LENGTH.

PRINTER
◉ NO PRINTER
◉ PAPER LABEL PRINTER

DONE
LABELS
CONFIGURE
SORTING
PIVOT POINT

◉ PUSHER  ◉ GRIPPER   LOAD-OUT OFFSET 3
TRIM AT START 0   FIRST MOVE SPEED 10
TRIM AT END 0   IN-BOARD CLAMP WARNING POSITION 1.5
PUSHER WIDTH 8

CURTAIN WALL STYLE
☐ PRE-OPTIMIZED - CUT GROUP IN SEQUENCE

1. When running a standard cut list ("ORDER PARTS ON STICK BY SEQ_NUMBER UNCHECK TO ORDER BY LENGTH " box is NOT checked) the parts are placed in the clear span by order of length (Longest First). All of the parts are 'nested' together meaning that, when possible, the trailing cut of one part is shared with the leading edge cut of the next part. **Chisel point parts (two angles on the leading edge) will not be included with other parts in the optimized cutting solution when this box is checked. They will be put in the cutting solution one at a time.**

   For example,
   A) If the trailing angle of one part is the same as the leading angle of the next part, then no additional move is made.
   B) If the trailing angle of one part is less than the leading angle of the next part, then a small move is made.
   Note: the parts are not re-arranged to be nested.



Kerf Only
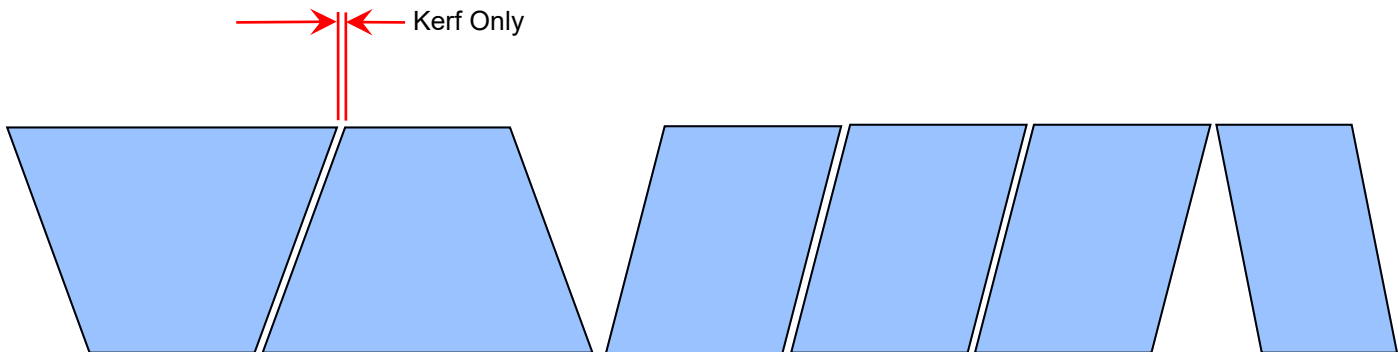
2. If the "Pre-Optimized - Cut Group In Sequence" box is checked, it is placed into "Curtain Wall" mode.
   In this mode, each part is treated like a rectangle so the parts are not "nested" in the way they are above.
   The "Part Gap" parameter adds an additional distance (minus the kerf) between the two 'rectangles'
   The "No Part Gap for 90-90" checkbox ignores the "Part Gap" parameter when two 90's are side by side.



Part Gap - kerf

Parts are treated as rectangles.