MedLine Pinch Roll

Available with or without a cutter
Please record your equipment’s model and serial number(s) and the date you received it in the spaces provided.

It’s a good idea to record the model and serial number(s) of your equipment and the date you received it in the User Guide. Our service department uses this information, along with the manual number, to provide help for the specific equipment you installed.

Please keep this User Guide and all manuals, engineering prints and parts lists together for documentation of your equipment.

Date:

Manual Number: UGE082-0814

Serial Number(s):

Model Number(s):

This User Guide is designed to be used with MedLine Pinch Roll units. The MedLine Pinch Roll can come equipped with a puller, or a puller and a cutter. The majority of the examples in this user guide show a Pinch Roll equipped with a cutter. However, in instances where the Pinch Roll is not equipped with a cutter, puller operation is the same, cutter information is simply omitted. For example, on a puller only model, the HMI screens would only show puller information.

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Purpose of the User Guide

This User Guide describes the Conair Pinch Roll (with or without cutter) and explains step-by-step how to install and operate this equipment.

Before installing this product, please take a few moments to read the User Guide and review the diagrams and safety information in the instruction packet. You also should review manuals covering associated equipment in your system. This review won’t take long, and it could save you valuable installation and operating time later.

How the Guide is Organized

Symbols have been used to help organize the User Guide and call your attention to important information regarding safe installation and operation.

⚠ Symbols within triangles warn of conditions that could be hazardous to users or could damage equipment. Read and take precautions before proceeding.

1 Numbers indicate tasks or steps to be performed by the user.

◆ A diamond indicates the equipment’s response to an action performed by the user.

☐ An open box marks items in a checklist.

• A circle marks items in a list.

◊ Indicates a tip. A tip is used to provide you with a suggestion that will help you with the maintenance and the operation of this equipment.

✉ Indicates a note. A note is used to provide additional information about the steps you are following throughout the manual.

Your Responsibility as a User

You must be familiar with all safety procedures concerning installation, operation, and maintenance of this equipment. Responsible safety procedures include:

• Thorough review of this User Guide, paying particular attention to hazard warnings, appendices, and related diagrams.
• Thorough review of the equipment itself, with careful attention to voltage sources, intended use and warning labels.
• Thorough review of instruction manuals for associated equipment.
• Step-by-step adherence to instructions outlined in this User Guide.
ATTENTION:
Read This So No One Gets Hurt

We design equipment with the user’s safety in mind. You can avoid the potential hazards identified on this machine by following the procedures outlined below and elsewhere in the User Guide.

⚠️ DANGER: Moving Parts; pinch hazard.

Emergency stop (E-stop) buttons are located at several accessible points on the operator side of the machine on top of the main plate at the upstream end. When pressed, it will disconnect power to the unit. The E-stop must be physically pulled up to reset the switch. To start the unit again after an E-stop has been pressed, the fault message seen in the control system must be cleared. The HMI must be reset before the unit can be restarted.

⚠️ WARNING: Improper installation, operation, or servicing may result in equipment damage or personal injury.

This equipment should be installed, adjusted, and serviced by qualified technical personnel who are familiar with the construction, operation, and potential hazards of this type of machine.

All wiring, disconnects, and fuses should be installed by qualified electrical technicians in accordance with electrical codes in your region. Always maintain a safe ground. Do not operate the equipment at power levels other than what is specified on the machine serial tag and data plate.

⚠️ WARNING: Voltage hazard

This equipment is powered by three-phase alternating current, as specified on the machine serial tag and data plate.

A properly sized conductive ground wire from the incoming power supply must be connected to the chassis ground terminal inside the electrical enclosure. Improper grounding can result in severe personal injury and erratic machine operation.

Always disconnect and lock out the incoming main power source before opening the electrical enclosure or performing non-standard operating procedures, such as routine maintenance. Only qualified personnel should perform troubleshooting procedures that require access to the electrical enclosure while power is on.
**WARNING: Pinch hazard**

Never remove or disable safety devices to sustain production. Operating without these devices could lead to hazardous conditions that can cause severe injury.

- Walk-through style roller guards which protect from injury, but also, allow side entry for ease of operation. Upper and lower guards independently protect the operator from being caught in the rollers or associated moving parts.

- The Emergency Stop button is located on the control panel and on top of the upper roller guard at the upstream end. Pressing either of these disconnects power to the entire unit. The Emergency Stop must be physically pulled up to reset the switch and start the Pinch Roll again.

- If equipped with a cutter, when the knife guard is opened, the knife guard switch stops the cutter.

- If equipped with a cutter, two proximity safety switches prevent cutter operation unless the cutter bushings are in place.

- If equipped with a cutter, the Stop button on the cutter control activates a circuit that stops the knife.

**WARNING: Sharp blades (if equipped with a cutter)**

Most injuries caused by knife blades occur when the cutter has been turned off. Handle blades with care at all times.

- Always lock out the cutter before opening the cutting chamber.
- Always wear cut-resistant gloves when the cutting chamber is open and when handling blades.

Conair cutters are equipped with several safety devices to ensure safe operation. Never remove or disable these devices to sustain production. Operating without these devices can cause severe injury.

- When the knife guard is opened, the knife guard switch stops the cutter.
- Two proximity-type safety switches prevent operation unless the cutter bushings are in place.
- Pressing STOP activates a circuit that stops the knife. (Do not attempt to change a blade or work in the cutting chamber with out locking out the power.)
How to Use the Lockout Device

⚠️ **CAUTION:** Before performing maintenance or repairs on this product, you should disconnect and lockout electrical power sources to prevent injury from unexpected energization or start-up. A lockable device has been provided to isolate this product from potentially hazardous electricity.

⚠️ **WARNING:** Before removing lockout devices and returning switches to the ON position, make sure that all personnel are clear of the machine, tools have been removed and all safety guards reinstalled.

Lockout is the preferred method of isolating machines or equipment from energy sources. Your Conair product is equipped with the lockout device pictured below. To use the lockout device:

1. **Stop or turn off the equipment.**

2. **Isolate the equipment from the electric power.** Turn the rotary disconnect switch to the OFF, or “O” position.

3. **Secure the device with an assigned lock or tag.** Insert a lock or tag in the holes to prevent movement.

4. **The equipment is now locked out.**

⚠️ **WARNING:** Before removing lockout devices and returning switches to the ON position, make sure that all personnel are clear of the machine, tools have been removed, and all safety guards reinstalled.

To restore power to the Pinch Roll, turn the rotary disconnect back to the ON position:

1. **Remove the lock or tag.**

2. **Turn the rotary disconnect switch to the ON or “I” position.**
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What is the Pinch Roll?

The Conair Pinch Roll pulls small- to medium-sized extruded products through sizing and/or cooling tanks. If equipped with a cutter, the Pinch Roll also cuts the product to lengths. Since the puller and cutter are mounted on the same chassis, alignment problems are minimized.

The puller portion’s servo drive system offers extremely accurate speed control. Different puller roller materials optimize performance with different types of extruded materials.

The cutter portion utilizes a position-controlled servo motor. Pinch Roll cutter units achieve park position repeatability less than 0.1 millisecond.
**Typical Applications**

Conair Pinch Rolls can process extrudable plastics and rubber both on- and off-line. Other extrudable materials—foods, ceramics, magnets, soaps, etc.—may also be processed depending on specific application requirements.

While the standard orientation is right-to-left, Pinch Rolls can also be made with a left-to-right orientation. (The illustrations in this User Guide represent the standard right-to-left configuration.)

Pinch Roll units with cutters are limited to a specific range of product sizes based on each unit’s cutting capacity. Pinch Roll cutters can operate over a range of speeds (depending on which options are included.)

Different materials, line speeds, temperatures and material cross-sections can result in different cutting torques. If you are changing any of these parameters, consult your Conair service personnel to be sure your equipment can handle the changes.

**Limitations**

- Because the maximum distance between the puller and cutter is only 6 inches (152.4 mm), the Pinch Roll with cutter is not suitable for larger rigid extruded parts.

- The unit is limited by the traction length (the length over which the extrudate is in contact with the puller rollers).

- The outer surface of the puller roller material will affect performance. Softer (low durometer) materials provide good “grab”, but will wear more quickly, and may damage if the product jams. Harder (high durometer) materials last longer, but may not grab the extrudate properly.

Contact Conair for specific roller material recommendations for your product.
How the Pinch Roll Works

Extruded material that has been sized and cooled enters the Pinch Roll from the upstream side. The extrudate passes through and is positioned by an appropriately sized bushing (Step 1).

Two opposing rollers move the extrudate through the puller (step 2). Roller are available in a variety of materials for your needs. Roller guards ensure operator safety while allowing visual inspection of the rollers. The roller speed is controlled by eye-level controls.

A threaded rod controls the distance between the upper and lower rollers. The top roller opens (raises) from a fixed center using an adjustment wheel, or an optional servo drive.

Rubber grommets or a 90-pound die spring (depending on machine size) allow the upper roller to 'give' slightly, preventing the puller from being damaged by small lumps of extrudate or other foreign objects.

After passing through the rollers, the pulled material exits the machine, or continues on to the cutter (if equipped). The cutter is mounted on linear slides that allow as much as 6 inches of movement. The cutter can be moved away from the puller for startup, then moved close to the puller to enhance delivery to the cutter bushings.

The cutter's servo motor, which is positionally controlled, operates the cutter head and a knife that is attached directly to the servo motor using a Transtorque coupling device. Two cutter bushings guide and support both the extrudate and the cutting knife. The extrudate passes through the cutter bushings and is cut by the rotating cutter head (step 3).

Cut pieces are collected or carried on to further processing by an optional conveyor (step 4). Conair's TAC/MTAC Take Away Conveyor is recommended for this.
How the Pinch Roll Works (continued)

1. Extruded material enters from the upstream side.
2. Rollers pull the extrudate through the puller to the cutter (if equipped).
3. The cutter blade(s) rotate and pass between the bushings, cutting the extrudate.
4. Cut pieces are collected or carried away on a conveyor.
Pinch Roll Features

The Pinch Roll units have these features:

- Swivel casters and lockdown screws
- Eye-level controls on an adjustable arm
- Clear knife guard
- Pinch roll adjustment
- E-Stop button
- Roller guard
- Servo motor
- Puller rolls
- Material inlet through cutter bushings
- Swivel casters and lockdown screws
## Specifications

### Models

<table>
<thead>
<tr>
<th>Performance characteristics</th>
<th>MedLine*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extrudate capacity inches (mm)</td>
<td>0.25 - 2.00 (6.4 - 50.8)</td>
</tr>
<tr>
<td>Blade drive motor (3000 rpm) cutter Hp (kW)</td>
<td>3.25 - 4.4 (2.4 - 3.3)</td>
</tr>
<tr>
<td>Servo puller drive motor Hp (kW)</td>
<td>1.0 - 3.25 (0.75 - 2.4)</td>
</tr>
</tbody>
</table>

### Dimensions inches (mm)

| A - Height | 71.0 (1803.4) |
| B - Height to centerline, ±2 (±50.8) | 42.0 (1067.0) |
| C - Width | 40.0 (1016.0) |
| D - Depth | 27.0 - 36.0 (685.8 - 914.4) |
| Belt width ±3/8 (±9.5) | 1.0 - 3.0 (25.4 - 76.2) |
| Belt traction length | 12.0 - 20.0 (304.8 - 508.0) |

### Reducer ratio/belt speed

- 28:1
- 16:1
- 7:1
- 5:1

### Available speeds† ft/min

- 1.4 to 140
- 2.5 to 250
- 5.5 to 550
- 10 to 700

### Weight lb (kg)

- Installed: 715.0 - 790.0 (324.0 - 358.4)
- Shipping: 700.0 - 800.0 (317.5 - 363.0)

### Electrical requirements

- Drive type (Puller) Single or dual servo with precision planetary gearhead
- 230V/3 phase/60Hz
  - Single servo: 13 - 20
  - Dual servo: 16 - 30
- 460V/3 phase/60Hz
  - Single servo: 7.5 - 12
  - Dual servo: 9.5 - 16.5

### Pinch Roll Puller Models

<table>
<thead>
<tr>
<th>Performance characteristics</th>
<th>3-1</th>
<th>4-2</th>
<th>6-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roller width inches (mm)</td>
<td>1.30 (33)</td>
<td>2.00 (51)</td>
<td>2.26 (57)</td>
</tr>
<tr>
<td>Roller diameter inches (mm)</td>
<td>3.20 (81)</td>
<td>4.12 (105)</td>
<td>6.06 (154)</td>
</tr>
<tr>
<td>Feed opening inches (mm)</td>
<td>4 (102)</td>
<td>3 (76)</td>
<td>3 (76)</td>
</tr>
<tr>
<td>Drive type</td>
<td>servo (single)</td>
<td>servo (single)</td>
<td>servo (dual)</td>
</tr>
<tr>
<td>Roller drive motor Hp (kW)</td>
<td>2 (1.5)</td>
<td>2 (1.5)</td>
<td>3.25 (2.4)</td>
</tr>
<tr>
<td>Roller speed* ft/min (m/min)</td>
<td>up to 250 (76)</td>
<td>up to 500 (152)</td>
<td>up to 1200 (366)</td>
</tr>
</tbody>
</table>

### Cutting Component Specifications

<table>
<thead>
<tr>
<th>Performance characteristics</th>
<th>0.25L</th>
<th>1.00L</th>
<th>2.00L</th>
<th>2.0H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extrudate capacity inches (mm) diameter</td>
<td>0.25 (6.35)</td>
<td>1.00 (25.4)</td>
<td>2.00 (50.8)</td>
<td>2.00 (50.8)</td>
</tr>
<tr>
<td>Bushing inches (mm) dia.</td>
<td>0.75</td>
<td>1.25</td>
<td>2.25</td>
<td>2.25</td>
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<tr>
<td>Blade drive motor Hp (kW)</td>
<td>3.25 (2.4)</td>
<td>3.25 (2.4)</td>
<td>4.4 (3.3)</td>
<td>4.4 (3.3)</td>
</tr>
<tr>
<td>High torque motor‡</td>
<td>N/A</td>
<td>4.4 (3.3)</td>
<td>STD</td>
<td>STD</td>
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<tr>
<td>Feed direction</td>
<td>right-to-left</td>
<td>right-to-left</td>
<td>right-to-left</td>
<td>right-to-left</td>
</tr>
</tbody>
</table>

### Cutter Head

- Aluminum 2-position: Yes
- Stainless steel 2-position‡: Yes
- Slide Base‡: Yes

### Specification Notes

- * Examples of possible speeds are shown. Belt speeds will vary depending on drive type (single or dual).
- † Dependent on material and wall thickness.
- ‡ Optional.
- Specifications may change without notice. Check with a Conair representative for the most current information.
Specifications (continued)

CONFIGURATION AND NAMING

The MedLine Series can be configured in many different ways to suit your application perfectly. All MedLine models have the same cabinet design. The MedLine can be a medical application puller/cutter combination, a medical puller, or a medical cutter.

The model name/number is determined by the configuration that is desired.

Pulling information
The first digit in the model name following the MDL (MedLine) distinguishes the difference between a belt puller and a pinch roll.

If the first digit is a number, the number represents the width of the puller belt. The second number represents the length of the belt.

If the third digit is the letter R, the puller utilizes a pinch roll puller. The first and second digits represent the pinch roll diameter and width, respectively.

If the unit is a cutter-only MedLine, this first number will be 0-00.

Cutting information
The second number represents the diameter capacity of the cutter. If the unit is a puller only MedLine, this second number will be 0.00.

Light or Heavy Duty. An L will appear in this space if this is a light-weight model. The H will appear if this is Heavy Duty.

MDL - : .

For example, a MDL1-12S:0.25 is a MedLine that has a puller with 1 inch wide belt, 12 inches long, driven by a single servo. It has a cutter capable of cutting 0.25 inch diameter material.

A MDL6-3RD:0.00 is a MedLine that has a pinch roll 6 inches in diameter, 3 inches wide, driven by dual servos. It has a no cutting head.

CONFIGURATION AND NAMING

The MedLine is used in-line, downstream from the extruder and tank, to pull, cut, or pull and cut product which can then be transferred to a Medical Take Away Conveyor or coiled onto a Conair ATC coiler.
Puller Optional Equipment

Digital belt gap sensor and readout
This option allows the operator to set a zero point, then measure roller gap (in thousandths of an inch) relative to this point.

Remote roller speed control
This option allows puller speed control by an external source. (Such as a Remote Digital Potentiometer.)

Different reducer ratios
A particular reducer ratio is selected at the time of purchase to optimize puller performance in a particular speed range.

Cutter Optional Equipment

Cutter Bushing Lubrication
This is a self-contained spray system, which includes a reservoir and air inlet for operation at 20-30 psig (1.4-2.1 bar) (air source not included). A flexible nozzle directs lubricant onto the extrudate as it enters the cutter bushings. This decreases bushing drag and helps lubricate the blade. This option is particularly recommended for processing sticky/soft (low durometer) materials.

Cutter Blade Wipe
The blade wipe system keeps the cutting blade clean by removing lubricant and particles from the blade. A reservoir chamber with a flexible drip tube feeds lubricant to a felt pad sandwiched between two pieces of stainless steel in the lubrication tray. The pad wipes and lubricates the knife before each cut.

(Continued)
Cutter Optional Equipment (continued)

End Sense
This option allows the use of an electric eye to produce a cut signal. Two types of electric eye brackets are included:

- A bracket for cutting parts 3.5-24 inches (8.9-61 cm) long. This bracket is mounted on the bushing holder, and uses a photo eye positioned above the extrudate for easy setup, alignment, and adjustment.

  NOTE: For this bracket and eye mounting, the part must be rigid enough not to sag or flex at the cut distance.

- A bracket for cutting parts up to 10 feet (3 m) long. This bracket mounts on a discharge conveyor. The electric eye is a through-beam type and can be adjusted to sense products that are at least 0.100 inch (2.5 mm) high (height of piece above the conveyor).

Cutting torque upgrades
Several options can be used to increase the cutting torque:

- Some cutters can be upgraded from a 2.46 HP to a 3.75 HP servo motor. (The larger servo motor is standard on SCE-4, 5 cutters.) Contact your Conair sales representative for more information.

- The standard aluminum cutter-head can be replaced with a heavier stainless steel one. When this option is picked, the maximum number of cuts per minute decreases. However inertia, and thus cutting torque, is increased significantly.

Follower Cutting Mode
Follower mode allows the operator to program the desired cut length and the number of blades. The controller then automatically follows the puller and adjusts the speed of the flywheel to maintain cut-length accuracy. This is known as an electronic gearlock system. The cut-length accuracy is maintained even if the puller changes speed.
Common Optional Equipment

Discharge Conveyor
A discharge conveyor offers support before, during, and after cutting, and facilitates the removal of cut parts. Discharge conveyors are available in the following sizes:

- 6 inches wide by 6 feet long (15.2 cm by 1.8 m)
- 6 inches wide by 12 feet long (15.2 cm by 3.7 m)
- 6 inches wide by 16 feet long (15.2 cm by 4.9 m)

Isolation Transformer
The isolation transformer protects sensitive electronics from incoming power, which helps prevent errors caused by electrical noise. It also protects equipment from electrical noise generated by the servo motor and associated amplifiers.

NOTE: An isolation transformer will not compensate for a ground that does not meet code requirements.

NOTE: Conair strongly recommends using an isolation transformer. Ensuring clean and proper power can help avoid the need for costly service calls.

Left-to-Right Machine Operation
This option changes the machine direction from the standard right to left extrusion flow.

Your Conair sales representative can analyze your needs and recommend the options that are right for your system.
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Unpacking the Boxes

The Conair Pinch Roll typically comes fully assembled in a single crate.

⚠️ **CAUTION: Lifting**

To avoid personal injury or damage to the machine, lift the unit using a forklift or hoist with straps that have been positioned at the machine's center of gravity.

1. Carefully uncrate the Pinch Roll and its components.

2. **Remove all packing material**, protective paper, tape, and plastic. Compare contents to the shipping papers to ensure that you have all the parts.

3. **Carefully inspect all components** to make sure no damage occurred during shipping. Check all wire terminal connections, bolts, and any other electrical connections, which may have come loose during shipping.

4. **Record serial numbers and specifications** in the blanks provided on the back of the User Guide's title page. This information will be helpful if you ever need service or parts.

5. **You are now ready to begin installation.** *See Preparing for Installation, Section 3.*
Preparing for Installation

1 You will need these tools for installation:

- wire strain relief
- 16 or 18 inch (406.4 or 457.2 mm) adjustable wrench
- set of Allen wrenches
- set of feeler gauges
- 1/2 inch open or box end wrench
- flashlight

2 Plan the location. Make sure the area where the Pinch Roll is installed has the following:

- A grounded power source.
  Check the machine’s serial tag for the correct amps, voltage, phase and cycles. All wiring should be completed by qualified personnel and should comply with your region’s electrical codes.

- Clearance for safe operation and maintenance.
  Make sure there is enough clearance around the servo cutter (if equipped) for maintenance and servicing. If the cutter portion has the optional slide base, be sure to check for clearance by extending the slide system in both directions.

⚠️ WARNING: Improper installation, operation, or servicing may result in equipment damage or personal injury.
This equipment should only be installed, adjusted, and serviced by qualified technical personnel who are familiar with the construction, operation, and potential hazards of this type of machine.

All wiring, disconnects, and fuses should be installed by qualified electrical technicians in accordance with electrical codes in your region. Always maintain a safe ground. Do not operate the equipment at power levels other than what is specified on the machine serial tag and data plate.
Positioning the Pinch Roll

1  **Move the Pinch Roll into position.** Place the Pinch Roll in position downstream of the last sizing or cooling tank.

⚠️ **CAUTION: Lifting**  
To avoid personal injury or damage to the machine, lift the unit using a forklift or hoist with straps that have been positioned at the center of gravity.

![Diagram of Pinch Roll](image)

2  **Align the Pinch Roll with the extrusion line, making sure that you leave proper clearance on all sides.**

![Diagram of Pinch Roll Alignment](image)
Positioning the Pinch Roll
(continued)

3 Measure the centerline height of the extrudate as it exits the extrusion die. Adjust all equipment on the extrusion line (sizing tank, cooling tanks, Pinch Roll) to this height.

4 Adjust the Pinch Roll’s floor lock/caster assembly to the center height of the extrusion line using a 16 or 18-inch adjustable wrench. Remove the weight from the casters by locking down the floorlocks.

IMPORTANT: Never leave the pinch roll on casters only.

5 Use a plumb line or laser to check for a straight line from the extrusion die through each line component to the cutter bushings. Adjust as necessary.

6 Adjust the Pinch Roll rollers to insure consistent product guidance.
Connecting the Main Power Source

⚠️ **WARNING: Electrical hazard**
Before performing maintenance or repairs on this product, disconnect and lock out electrical power sources to prevent injury from unexpected energization or start-up. A lockable device has been provided to isolate this product from potentially hazardous electricity.

⚠️ **WARNING: Improper installation, operation, or servicing may result in equipment damage or personal injury.**
This equipment should only be installed, adjusted, and serviced by qualified technical personnel who are familiar with the construction, operation, and potential hazards of this type of machine.

All wiring, disconnects, and fuses should be installed by qualified electrical technicians in accordance with electrical codes in your region. Always maintain a safe ground. Do not operate the equipment at power levels other than what is specified on the machine serial tag and data plate.

1. **Open the Pinch Roll’s electrical enclosure.** Turn the disconnect dial on the door to the OFF or “O” position and open the door.

2. **Insert the main power wire** through the knockout in the side of the enclosure. Secure the wire with a rubber compression fitting or strain relief.

3. **Connect the power wires** to the terminals indicated on the wiring diagram that came with your machine.

4. **Check every terminal screw** to make sure wires are secure. Gently tug each wire. If a wire is loose, use a screwdriver to tighten the terminal.

5. **Connect the ground wire** to the grounding point shown in the wiring diagram shipped with your unit.

**IMPORTANT:** Always refer to the wiring diagrams that came with your MedLine Pinch Roll before making electrical connections. The diagrams show the minimum size main power cable required for your equipment, and the most accurate electrical component information.
Installing the Cutter Blades (if equipped with a cutter)

⚠️ DANGER: Sharp Blades!
Most injuries caused by knife blades occur when the cutter has been turned off. Handle blades with care at all times.

- Always wear cut-resistant gloves when the cutting chamber is open and when handling blades.
- Always lock out power to the cutter before opening the cutting chamber.
- Always wait until the cutter head has completely stopped before opening the knife guard.

Conair Pinch Rolls are equipped with several safety devices to ensure safe operation. Never remove or disable these devices to sustain production. Operating without these devices can cause severe injury.

- When the knife guard is opened, the knife guard switch stops the cutter.
- Two proximity-type safety switches prevent operation unless the cutter bushings are in place.
- The Cutter “Stop” button activates a circuit that stops the cutter head.

For on-demand cutting, mount the blade at the “on-demand” position stamped on the cutter head. Contact your Conair sales representative for more information about choosing the appropriate blade for your material.

Attach blade to cutter head with blade screw.
Mounting the Cutter Bushings (if equipped)

⚠️ DANGER: Sharp blades
Always wear cut-resistant gloves when the cutting chamber is open and when handling blades. Never open cutting chamber without locking out the cutter power and waiting until the cutter head stops spinning.

1 Rotate the cutter head until the blade is positioned in the gap between where the bushings are located.

2 Slide the downstream bushing into position, positioning it up to and barely touching the blade (using a feeler gauge). NOTE: the blade should not be deflected.

3 Tighten the set screw against the flat side of the bushing to hold the bushing in position.

NOTE: For more information about setting and adjusting the gap for the bushings, see Appendix C, About Cutter Bushings.
**Mounting the Cutter Bushings** (continued)

4 **Slide the upstream bushing into position**, positioning it up but not touching the blade. Use the feeler gauge.

5 **Tighten the set screw system** against the flat side of the bushing to hold the bushing in position.

6 **Rotate the cutter head by hand** to make sure the bushings did not move, and the blade still passes through the gap between the bushings.

⚠️ **DANGER: Sharp blades**
Always wear cut-resistant gloves when the cutting chamber is open and when handling blades. Never open cutting chamber without locking out the cutter power and waiting until the cutter head stops spinning.
Setting the Roller Gap

The upper roller assembly is controlled by a threaded rod. Turn the hand wheel to move the top roller up and down.

1 **Using the hand wheel on the threaded rod**, turn to move the upper roller up and down. Be careful not to adjust the roller too far down, as this will squeeze the product too much. Tension should be such that the rollers make solid contact, without squeezing the product.

**NOTE:** On some Pinch Roll units, the Pinch Roll gap is adjusted by a servo drive, which is operated within the control of the unit.
Preparing for Testing

1 **Make sure all components** are installed according to assembly drawings. Make sure that all bolts have been checked for tightness.

2 **Check that the Pinch Roll is firmly locked** into position with the anchoring screws.

3 **Check that all wiring conforms to electrical codes**, and all wiring covers are in place.

⚠ **DANGER: Pinch Hazard!**

Never remove or disable safety devices to sustain production. Operating without these devices could lead to hazardous conditions that can cause severe injury. Take all necessary precautions when working around moving parts to prevent body parts and clothing from being pulled into the machine.
Testing the Installation

1 Turn on the main disconnect. Plug in the main power cord and turn on the main disconnect. The display should fully illuminate and startup. The emergency stop reset light illuminates.

2 Check that the “Emergency Stop” buttons are in the out, extended position.

   NOTE: If the E-Stop button is pushed in or bushings are not in place and tight there will be no power applied to the amplifier and the operator interface will display “starting commands” for an extended period of time.

3 Press and hold in emergency stop reset button for about 3 seconds. If all safety switches are good then light will be extinguished or go out.

4 Open the knife guard (if equipped with a cutter). The emergency stop reset should illuminate.

If the Pinch Roll is not working properly at any time, turn it off immediately and refer to the Troubleshooting section of this User Guide.

If you do not encounter any problems, proceed to the Operation section.
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Operation

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NOTE: The display screens shown are for a Pinch Roll equipped with a puller and a cutter. If your unit is not equipped with a cutter, those portions of the screen will not be visible.

This initial startup screen appears for the first three seconds while the equipment initializes.
How to Navigate the Control Screens

Navigate through the Pinch Roll Control Screens by touching any black text which opens a screen or pop up window. The colored text is not selectable and represents current data being displayed.

NOTE: The display screens shown are for a Pinch Roll equipped with a puller and a cutter. If your unit is not equipped with a cutter, those portions of the screen will not be visible.
How to Navigate the Control Screens

Example of Pop Up Keypad
The main page is displayed automatically upon power up after the system is done initializing. The main page is where most machine control functions are performed. The page is divided in half allowing for both puller and cutter control functions. The upper portion is the puller control section. From here the puller can be started and stopped. Touch the green start button to start the puller. Touch the red stop button to stop the puller. The running indicator directly above the start/stop buttons indicates current state of the puller. This will display “Running” after touching the start button. After touching the stop button, this indicator will display “Stopping” while the puller is decelerating to a stop. After the puller has come to a complete stop it will display “Stopped”.

Directly above the running indicator is the currently selected control mode of the puller. The mode in conjunction with the “Local/Remote” button determines the source of the speed reference for the puller. There are 3 control modes available: “Local/Remote – Ethernet”, “Local/Remote – Analog”, “Local/Remote – Pulse”. To select a mode, touch the control mode indicator. A popup window will appear allowing selection. Mode selection is only allowed when the puller is stopped.

When the “Local/Remote” button is in the “Local” position the speed reference comes from the value shown on the main page. To change the local speed, touch the value. A keypad will appear allowing data entry into this parameter. When the button is in the “Remote” position the speed reference comes from the remote source as selected by the control mode. The value of the remote source is displayed directly below the “Remote” position. On either side of the local speed reference are a “+” (increment) button and a “-” (decrement) button. These buttons allow changing the local setpoint by the local scroll amounts. The local scroll values are shown to right of the local speed. A large and small scroll value can be selected by touching the radio button selector. The scroll values can be changed by touching the scroll values.

The puller has a built in length counter. The length counter can be enable/disabled, and turned on/off. To access this, touch the length value in the display.
Cutter Section: (if equipped)

The cutter stop/start buttons and the cutter running indicator function similar to the puller buttons/indicator. The cutter has 5 modes of operation. The currently selected mode is displayed directly above the running indicator. The cutter mode can only be changed when the cutter is stopped. To change the mode touch the current mode indicator. A popup window will appear allowing mode selection. The cutter is capable of two styles of cutting, “Demand” and “Continuous”. In demand the cut is triggered by one of three sources. The 3 sources of demand cutting are: “Encoder”, “Timer” and “End Sense”. In Continuous style of cutting, the flywheel runs at a constant speed. Depending on the cutter mode selection, the flywheel can be synchronized to the line speed. The flywheel will automatically adjust speed to maintain a constant cut length.

A manual cut button allows triggering a cut from the HMI. This is only active in the “Demand” style of cutting.

The cutter has a built-in part counter. The part counter can be enable/disabled, and turned on/off. To access this, touch the count value in the display.

Cutter flywheel speeds, accel/decel and blade count can be accessed from the main page. Touch the “Speeds” button in the cutter section.
**MedLine Pinch Roll Control**

**Instructions Menu Screen**

The menu page is the root page for screen navigation. The menu page is divided into two main sections: one section for the puller pages and the other for the cutter pages. The row of buttons at the top of the menu page allow access to pages that are not specific to either the puller or cutter.

**Main page:**  This will take you back to the main page.

**Units of Measure page:**  This page allows customer to set the units of measure to English or Metric.

**Recipes page:**  This page allows access to the recipe storage system. The current setup of the machine running parameters can be save to a recipe file. The system allows storage of 100 recipes. The running parameters can be changed by loading a saved recipe file.

**System Security page:**  This page takes you to the security settings. A user login will be required to change any settings.

**Language page:**  This page takes you to the language settings. A user login will be required to change any settings.

**Forward/Backward arrows:**  These arrows move you back and forward through the 2 pages of menu options.

**About page:**  This page displays the version information of the Crimson programming software used to create the HMI pages. It also displays Conair’s contact information. Touchscreen calibration is accessed from this page.

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**NOTE:** The display screens shown are for a Pinch Roll equipped with a puller and a cutter. If your unit is not equipped with a cutter, those portions of the screen will not be visible.
**MedLine Pinch Roll Instructions Menu Screen (continued)**

**Puller Ramps page:** This page allows access to the puller acceleration and deceleration parameters. The acceleration and deceleration controls how quickly the puller will change from one speed setting to another.

**Puller Feed Constant page:** This page allows access to the puller feed constant parameters. The feed constant scales the speed units (i.e. ft/min) to motor rpm.

**Puller Tuning page:** This page allows access to the puller servo tuning parameters. These parameters will affect how tightly the puller servo controls the speed of the servo motor. These parameters are adjusted at the factory and generally do not need to be adjusted by the customer.

**Puller Digital Pot page:** For pullers that are equipped with a digital potentiometer, used for speed setpoint adjustment, this screen allows for setup and scaling of the digital potentiometer.

**Puller Remote Scroll page:** This page allows access to the puller remote speed scroll parameters. The puller speed can be adjusted by means of dry contact closures provided by the customer. The speed of the puller can be adjusted up or down by these contacts. The amount of speed adjustment can be set by these parameters.

**Puller Analog Input page:** This page allows access to the puller analog input scaling parameters. The puller speed can be controlled by a 0-10 vdc analog input provided by the customer. These parameters can be adjusted to match the actual minimum and maximum analog value provided.

**Puller Analog Output page:** This page allows access to the puller analog output scaling parameters. The puller provides two 0-10 vdc analog outputs, one is proportional to actual puller speed, the other proportional to motor running torque. These parameters can adjust the minimum and maximum voltage of the analog outputs.

**Puller Gearing page:** For dual puller servo’s the top beam servo is geared (slaved) to the bottom beam servo. This screen allows for adjustment of the gear ratio between the two servos.

**Puller Master Setup page:** This page allows access to the master encoder input scaling parameters. The puller speed can be controlled by a quadrature encoder input signal provided by the customer. These parameters scale encoder pulses to puller speed.

**Puller Control Status page:** This page allows access to the puller servo control module status. The information displayed on this page would be used to help troubleshoot problems encountered with the puller.

**NOTE:** The pages shown are for a Pinch Roll equipped with a puller and a cutter. If your unit is not equipped with a cutter, those screens will not be applicable or visible.
**MedLine Pinch Roll Instructions Menu Screen (continued)**

**Puller Drive Status page:** This page allows access to the puller servo drive module status. The information displayed on this page would be used to help troubleshoot problems encountered with the puller.

**Puller Input Status page:** This page allows access to the puller servo control digital input status. The information displayed on this page would be used to help troubleshoot problems encountered with the puller.

**Puller Output Status page:** This page allows access to the puller servo control digital output status. The information displayed on this page would be used to help troubleshoot problems encountered with the puller.

**Cutter Batch Config page:** This page allows access to the cutter batch configuration parameters. The cutter provides part batch counting and blowoff control. Up to 4 batches and 4 blowoff’s are available. One batch counter is always enabled. The other 3 can be enabled/disabled from this page. Each batch counter can be assigned to any 1 blowoff.

**Cutter Batch 1 & 2 page:** This page allows access to the cutter batch counters 1 & 2 parameters. Each batch counter has an associated cut length. If more than 1 batch counter is enabled, the cutter switches to the next batch counter enabled and switches the cut length. This allows cutting batches of different length products automatically. Each batch counter has a preset and warning preset parameter.

**Cutter Batch 3 & 4 page:** This page allows access to the cutter batch counters 3 & 4 parameters. Each batch counter has an associated cut length. If more than 1 batch counter is enabled, the cutter switches to the next batch counter enabled and switches the cut length. This allows cutting batches of different length products automatically. Each batch counter has a preset and warning preset parameter.

**Cutter Quality Setup page:** This page allows access to the quality input setup parameters. The quality input is a “dry contact” input from a customer supplied gauge. This input tells the cutter whether good or bad product is passing through the cutter. This input works in conjunction with the blowoffs for product separation at the conveyor. A quality mode can be set that tells the cutter that all product is “good”, “bad” or “gauge”. “Gauge” mode tells the cutter that the product state comes from the quality input.

*NOTE: The pages shown are for a Pinch Roll equipped with a puller and a cutter. If your unit is not equipped with a cutter, those screens will not be applicable or visible.*
Cutter Blowoff 1 & 2 page: This page allows access to the blowoff 1 & 2 parameters. The blowoff outputs can operate in either “on demand” or “continuous” mode. “On demand” mode is active whenever the cutter is in either “Encoder”, “Timer” or “End Sense” mode. “Continuous” mode is active whenever the cutter is in “Flywheel” or “Follower” mode. The blowoff’s work in conjunction with the quality input. This allows good and bad product to be separated at the takeaway conveyor.

Cutter Blowoff 3 & 4 page: This page allows access to the blowoff 3 & 4 parameters. The blowoff outputs can operate in either “on demand” or “continuous” mode. “On demand” mode is active whenever the cutter is in either “Encoder”, “Timer” or “End Sense” mode. “Continuous” mode is active whenever the cutter is in “Flywheel” or “Follower” mode. The blowoff’s work in conjunction with the quality input. This allows good and bad product to be separated at the takeaway conveyor.

Scrap Mode Setup page: This page allows access to the scrap mode setup parameters. Scrap mode works in conjunction with the quality input. Scrap mode allows the cutter to make bad, (scrap), product a different length than good product. The cutter can be configured to stop cutting or to cut a scrap length. Scrap mode can be turned on or off.

Cutter Conveyor Setup page: This page allows access to the conveyor setup parameters. The cutter can control the speed of a conveyor by way of a 0-10 vdc analog signal. This page allows scaling of the analog signal to speed units.

Cutter Tuning page: This page allows access to the cutter servo tuning parameters. These parameters will affect how tightly the cutter servo controls the speed and position of the servo motor. These parameters are adjusted at the factory and generally do not need to be adjusted by the customer.

NOTE: The pages shown are for a Pinch Roll equipped with a puller and a cutter. If your unit is not equipped with a cutter, those screens will not be applicable or visible.
Cutter Home Setup page: This page allows access to the cutter flywheel homing parameters. When the cutter is first powered up a zero, (home), position needs to be established for the flywheel. When the emergency stop circuit is reset and no faults exist, the cutter will automatically home. Cutters that have a gear reducer attached to the motor will use a proximity sensor as the home input. Cutters that do not have a gear reducer will use the motor encoder marker pulse as the home input. When the homing procedure begins the flywheel will turn at a slow speed until the home sensor is detected. After finding the home sensor the flywheel will move an “offset” distance and stop. This offset distance from the home sensor is the zero, or park position of the flywheel. The cutter remembers this zero position until powered down.

Cutter Master Setup page: This page allows access to the master encoder input scaling parameters. The cutter uses a quadrature encoder input signal to measure product length. These parameters scale encoder pulses to product length.

Cutter Status Select page: This page allows access to the cutter Control, Input, Drive, and Output status pages. The information displayed on these pages would be used to help troubleshoot problems encountered with the cutter. Within the Cutter Status Select page are the following pages:

Cutter Control Status page: This page allows access to the cutter servo control module status. The information displayed on this page would be used to help troubleshoot problems encountered with the cutter.

Cutter Drive Status page: This page allows access to the cutter servo drive module status. The information displayed on this page would be used to help troubleshoot problems encountered with the cutter.

Cutter Input Status page: This page allows access to the cutter servo control digital input status. The information displayed on this page would be used to help troubleshoot problems encountered with the cutter.

Cutter Output Status page: This page allows access to the cutter servo control digital output status. The information displayed on this page would be used to help troubleshoot problems encountered with the cutter.

**NOTE:** The pages shown are for a Pinch Roll equipped with a puller and a cutter. If your unit is not equipped with a cutter, those screens will not be applicable or visible.
Control Function Flow Charts

NOTE: The pages shown are for a Pinch Roll equipped with a puller and a cutter. If your unit is not equipped with a cutter, those portions of the screens will not be applicable or visible.
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Control Function Flow Charts

**Ramps**
- Acceleration: 20 fpm/sec
- Deceleration: 20 fpm/sec

**Puller Feed Constant**
- Feed constant: 0.4000 in/rev
- Motor direction: cw
- Motor direction: ccw

**Puller Tuning**
- Following error: 0.0001 ft
- Inertia ratio: 0.0:1
- Response: 50 Hz
- Friction: 0.0%
- Integral time: Off
- Feedfowards: Off
- Feedback (RMS): 4.6%
- Shunt (RMS): 0.0%

**Puller Analog Input**
- Measured: -0.002 volts
- Scaled: 1.000
- Expected minimum: 0.000 volts
- Expected maximum: 10.000 volts

**Puller Remote Scrolls**
- Speed scroll: +/- 1.00 fpm
- Analog ratio scroll: +/- 0.0001
- Pulse ratio scroll: +/- 0.0001
- Scroll delay: 1.000 secs
NOTE: The pages shown are for a Pinch Roll equipped with a puller and a cutter. If your unit is not equipped with a cutter, those screens will not be applicable or visible.
Control Function Flow Charts

These screens appear in on demand mode.
- Encoder
- End sense
- Timer

These screens appear in continuous mode.
- Flywheel
- Follower

NOTE: The pages shown are for a Pinch Roll equipped with a puller and a cutter. If your unit is not equipped with a cutter, those screens will not be applicable or visible.
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Control Function Descriptions

Main Page
The main page is displayed automatically upon power up after the system is done initializ- ing. The main page is where most machine control functions are performed. The page is divided in half allowing for both puller and cutter control functions.

Date and Time Page
This page displays a pop up screen with the current date and time.
Control Function Descriptions

**Puller Mode Select Page**
This page allows you to select the mode for the puller. Modes can only be changed when the puller is off.

**Puller Main Top Half Page**
This page displays and controls the main functions of the puller. From here, the machine is started and stopped, local or remote mode is selected, the length counter is displayed and reset, the mode is displayed and can be changed, the speed can be adjusted, and the scroll settings can be changed.

*NOTE:* The pages shown are for a Pinch Roll equipped with a puller and a cutter. If your unit is not equipped with a cutter, those screens will not be applicable or visible.
Control Function Descriptions

NOTE: The pages shown are for a Pinch Roll equipped with a puller and a cutter. If your unit is not equipped with a cutter, those screens will not be applicable or visible.

Puller Analog Mode Page
Notice here that under the Mode selection of the puller, “Local/Remote - Analog” has been selected and the puller is operating in that mode.

Puller Pulse Mode Page
Notice here that under the Mode selection of the puller, “Local/Remote - Pulse” has been selected and the puller is operating in that mode. Note that in pulse mode, trim can be enabled or disabled.
Control Function Descriptions

Puller Speed Edit Page
This page allows access to the puller speed by pushing the number area of the speed section bringing up a keypad. The desired speed can be entered via the keypad.

Puller Length Counter Page
Pushing this square will bring up the Length Counter screen. The length counter can be turned on/off or reset there.

NOTE: The pages shown are for a Pinch Roll equipped with a puller and a cutter. If your unit is not equipped with a cutter, those screens will not be applicable or visible.
Control Function Descriptions

Cutter Mode Select Page
This page will open the mode selection screen for the cutter. Mode changes can occur only when the cutter is turned off.

Cutter End Sense Mode Page
This page uses a proximity switch, mechanical switch, or some type of sensing device that triggers the cut.
Control Function Descriptions

Cutter Timer Mode Select Page
This page will allow the cutting to occur on a timed basis not a length basis.

Cutter Flywheel Mode Page
This page shows the blade holder/flywheel will turn at a consistent RPM. The RPM will be entered on the main operating screen and can be changed to change the resulting cut length.

NOTE: The pages shown are for a Pinch Roll equipped with a puller and a cutter. If your unit is not equipped with a cutter, those screens will not be applicable or visible.
Control Function Descriptions

![Cutter Follower Mode Page](image1)

**Cutter Follower Mode Page**
This page is similar to flywheel mode, except that the operator will enter a desired length and the cutter program will do the calculations of how fast the blade holder/flywheel must turn to get the desired part length with current observed master roller speed. The program will constantly try to correct part length with any motor variations.

![Cutter Part Counter Page](image2)

**Cutter Part Counter Page**
This screen will appear when the part counter box is pushed on the main operating screen. It will show the counted good and bad parts if a signal is being sent from a laser gauge system. The counter can be turned on/off here. The part count can also be reset from here. Pushing the close button will take you back to the main operating screen.

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**NOTE:** The pages shown are for a Pinch Roll equipped with a puller and a cutter. If your unit is not equipped with a cutter, those screens will not be applicable or visible.
Control Function Descriptions

Cutter Data Entry Page
Notice that whenever you select a setting that can be changed, a pop-up keypad will appear. Once the setting has been adjusted, press the green arrow (return) key to enter the setting and return to the page.

Cutter Data Entry Number Keypad

NOTE: The pages shown are for a Pinch Roll equipped with a puller and a cutter. If your unit is not equipped with a cutter, those screens will not be applicable or visible.
Operation

Control Function Descriptions

Menu Page
The menu page is the root page for screen navigation. The menu page is divided into two main sections: one section for the puller pages and the other for the cutter pages. The row of buttons at the top of the menu page allow access to pages that are not specific to either the puller or cutter.

Units of Measure Page
Selecting “inches” sets length units to inches and speed units to feet/min (FPM). Selecting “centimeters” sets length units to centimeters and speed units to meter/min (MPM).

NOTE: The pages shown are for a Pinch Roll equipped with a puller and a cutter. If your unit is not equipped with a cutter, those screens will not be applicable or visible.
Control Function Descriptions

Recipes

The recipe page allows access to the recipe storage/retrieval system. Up to 100 recipe files are available and are numbered 1 thru 100. Each recipe file can be given a name up to 40 characters. Five recipe file numbers/names are displayed at once. To view other recipe file names touch the “Pg Up” or “Pg Dn” buttons. The recipe files are scrolled five at a time.

Three recipe function can be performed. They are “Load from selected”, “Delete selected” and “Save to selected”. To perform one of these functions a recipe file must first be selected. To select a recipe from the recipe file, touch the name of the desired recipe from the list of five currently displayed. The recipe name and number will appear as the selected recipe file. The name of the selected recipe can be changed by touching the selected recipe name.

NOTE: The pages shown are for a Pinch Roll equipped with a puller and a cutter. If your unit is not equipped with a cutter, those screens will not be applicable or visible.
Control Function Descriptions

Recipe Name Edit Page
When you touch a recipe name (black text), you are able to name or rename that recipe. Use the keypad to enter the recipe name. When completed, press the green (return) arrow to enter your settings and return to the full screen.

Recipe Save Page
The “Save to selected” function is available anytime. This function will save the active parameters to the selected recipe file.
Control Function Descriptions

Recipe Save Complete Page
This screen will display briefly when the recipe has been successfully saved. If this screen does not display, try to save the your selected recipe again.

Recipe Load Page
The “Load from selected” function is only available when the cutter is stopped. This function will load the parameters from the recipe file into the active parameters.
Control Function Descriptions

Recipe Load Complete Page
This screen will display when the recipe has been successfully loaded. If this screen does not display, try to load the your selected recipe again.

Recipe Delete Page
The “Delete selected” function is available anytime. This function will set the name of the selected recipe file to “Empty”. The actual parameter values in the recipe file are not deleted.
Recipe Delete Complete Page
This screen will display when the recipe has been successfully deleted. If this screen does not display, try to delete your selected recipe again.

Security System Page
This screen will display to show what current security level is logged in. From this page, security assignments can be established, and the user and log on and log off.
Control Function Descriptions

Security Assign 1 Page
This screen will show what access rights are granted to the security level selected.

Puller Assign 1 Page
This screen will show what access rights are granted to the security level selected.
Control Function Descriptions

Puller Security Assign 2 Page and Puller Security Assign 3 Page
This screen will show what access rights are granted to the security level selected.

About Page
This page displays the version information of the Crimson programming software used to create the HMI pages. It also displays Conair’s contact information. Touchscreen calibration is accessed from this page.
Control Function Descriptions

**Touch Calibrate Page**
The HMI touchscreen can be calibrated on this page. Selecting this page begins the calibration procedure. The user is guided to touch various points on the screen to complete the procedure.

**Touch Calibrate Success Page**
This screen displays briefly when calibration of the touch screen was successful.
Control Function Descriptions

Touch Calibration Failure Page
This screen will display when touch calibration has failed. Typically, this message is a result of a long time delay during calibration, or a touch screen failure.

Puller Ramps Page
This page allows access to the puller acceleration and deceleration parameters. The acceleration and deceleration controls how quickly the puller will change from one speed setting to another.

Acceleration: 20 fpm/sec
Deceleration: 20 fpm/sec

Acceleration: This parameter controls the rate at which the puller accelerates up to speed.
Deceleration: This parameter controls the rate at which the puller decelerates to a stop.
Control Function Descriptions

Puller Feed Constant Page
This page allows access to the puller feed constant parameters. The feed constant scales the speed units (i.e. ft/min) to motor rpm.

Feed Constant: This parameter scales one motor revolution to the selected units of measure.

Puller Tuning Page
This page allows access to the puller servo tuning parameters. These parameters will affect how tightly the puller servo controls the speed of the servo motor. These parameters are adjusted at the factory and generally do not need to be adjusted by the customer.
Control Function Descriptions

Puller Remote Scrolls
This page allows access to the puller remote speed scroll parameters. The puller speed can be adjusted by means of dry contact closures provided by the customer. The speed of the puller can be adjusted up or down by these contacts. The amount of speed adjustment can be set by these parameters.

Puller Analog Input Page
This page allows access to the puller analog input scaling parameters. The puller speed can be controlled by a 0-10 vdc analog input provided by the customer. These parameters can be adjusted to match the actual minimum and maximum analog value provided.
Control Function Descriptions

Puller Analog Output Page
This page allows access to the puller analog output scaling parameters. The puller provides two 0-10 vdc analog outputs, one is proportional to actual puller speed, the other proportional to motor running torque. These parameters can adjust the minimum and maximum voltage of the analog outputs.

Puller Control Status Page
This page allows access to the puller servo control module status. The information displayed on this page would be used to help troubleshoot problems encountered with the puller.
Control Function Descriptions

Puller Master Setup Page
This page allows access to the master encoder input scaling parameters. The puller speed can be controlled by a quadrature encoder input signal provided by the customer. These parameters scale encoder pulses to puller speed.

Puller Drive Status Page
This page allows access to the puller servo drive module status. The information displayed on this page would be used to help troubleshoot problems encountered with the puller.
Control Function Descriptions

Puller Drive Status View Fault Bits Page
This screen will show what fault bits are active. This would be useful during a service call.

Puller Input Status Page
This page allows access to the puller servo control digital input status. The information displayed on this page would be used to help troubleshoot problems encountered with the puller.
Control Function Descriptions

Puller Output Status Page
This page allows access to the puller servo control digital output status. The information displayed on this page would be used to help troubleshoot problems encountered with the puller.

Cutter Batch Configuration Page
This page allows access to the cutter batch configuration parameters. The cutter provides part batch counting and blowoff control. Up to four batches and four blowoff’s are available. One batch counter is always enabled. The other three can be enable/disabled from this page. Each batch counter can be assigned to any one blowoff.
Control Function Descriptions

**Cutter Batch 1 & 2 Page**

- **Cut length 1:** Cut length of pieces associated with batch #1.
- **Cut length 2:** Cut length of pieces associated with batch #2.
- **Preset:** Value at which the batch counter rolls over.
- **Warning preset:** Value at which a warning message will appear on the main screen, indicating that the batch counter is nearing the preset value.
- **Reset button:** Pressing this button will zero the batch counter. This button is active at any time.

**Cutter Batch 3 & 4 Page**

This page allows access to the cutter batch counters 3 & 4 parameters. Each batch counter has an associated cut length. If more than one batch counter is enabled, the cutter switches to the next batch counter enabled and switches the cut length. This allows cutting batches of different length products automatically. Each batch counter has a preset and warning preset parameter.
Control Function Descriptions

Quality Setup Page
This page allows access to the quality input setup parameters. The quality input is a “dry contact” input from a customer supplied gauge. This input tells the cutter whether good or bad product is passing through the cutter. This input works in conjunction with the blowoffs for product separation at the conveyor. A quality mode can be set that tells the cutter that all product is “good”, “bad” or “gauge”. “Gauge” mode tells the cutter that the product state comes from the quality input.

Blowoff 1 & 2 Page
This page allows access to the blowoff 1 & 2 parameters. The blowoff outputs can operate in either “on demand” or “continuous” mode. “On demand” mode is active whenever the cutter is in either “Encoder”, “Timer” or “End Sense” mode. “Continuous” mode is active whenever the cutter is in “Flywheel” or “Follower” mode. The blowoffs work in conjunction with the quality input. This allows good and bad product to be separated at the takeaway conveyor.
Control Function Descriptions

Cutter Blowoff 3 & 4 Page
This page allows access to the blowoff 3 & 4 parameters. The blowoff outputs can operate in either “on demand” or “continuous” mode. “On demand” mode is active whenever the cutter is in either “Encoder”, “Timer” or “End Sense” mode. “Continuous” mode is active whenever the cutter is in “Flywheel” or “Follower” mode. The blowoff’s work in conjunction with the quality input. This allows good and bad product to be separated at the takeaway conveyor.

Cutter Conveyor Setup Page
This page allows access to the conveyor setup parameters. The cutter can control the speed of a conveyor by way of a 0-10 vdc analog signal. This page allows scaling of the analog signal to speed units.
Control Function Descriptions

Cutter Tuning Page
This page allows access to the cutter servo tuning parameters. These parameters will affect how tightly the cutter servo controls the speed and position of the servo motor. These parameters are adjusted at the factory and generally do not need to be adjusted by the customer.

Cutter Home Setup Page
This page allows access to the cutter flywheel homing parameters. When the cutter is first powered up a zero, (home), position needs to be established for the flywheel. When the emergency stop circuit is reset and no faults exist, the cutter will automatically home. Cutters that have a gear reducer attached to the motor will use a proximity sensor as the home input. Cutters that do not have a gear reducer will use the motor encoder marker pulse as the home input. When the homing procedure begins the flywheel will turn at a slow speed until the home sensor is detected. After finding the home sensor the flywheel will move an “offset” distance and stop. This offset distance from the home sensor is the zero, or park position of the flywheel. The cutter remembers this zero position until powered down.
Control Function Descriptions

Cutter Control Status Page
This page allows access to the cutter servo control module status. The information displayed on this page would be used to help troubleshoot problems encountered with the cutter.

Cutter Scrap Mode Setup Page
This page allows access to the scrap mode setup parameters. Scrap mode works in conjunction with the quality input. Scrap mode allows the cutter to make bad, (scrap), product a different length than good product. The cutter can be configured to stop cutting or to cut a scrap length. Scrap mode can be turned on or off.
Control Function Descriptions

Cutter Scrap Mode Setup 2 Page
This screen allows the user to turn the scrap mode on or off, choose the scrap select setting, and set the scrap length.

Cutter Master Setup Page
This page allows access to the master encoder input scaling parameters. The cutter uses a quadrature encoder input signal to measure product length. These parameters scale encoder pulses to product length.
Control Function Descriptions

Cutter Drive Status Page
This page allows access to the cutter servo drive module status. The information displayed on this page would be used to help troubleshoot problems encountered with the cutter.

Cutter Drive Status View Fault Bits Page
This screen will show the fault bits. This information is useful during a service call.
**Control Function Descriptions**

**Cutter Input Status Page**
This page allows access to the cutter servo control digital input status. The information displayed on this page would be used to help troubleshoot problems encountered with the cutter.

**Cutter Output Status Page**
This page allows access to the cutter servo control digital output status. The information displayed on this page would be used to help troubleshoot problems encountered with the cutter.
**Notes:**

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Maintenance

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Maintenance Features

The MedLine Pinch Roll needs regular, scheduled maintenance for peak performance. Among the features that require maintenance are:

- Puller rollers
- Cutter blades (if equipped)
- Blade mounting hardware (if equipped)
- Cutter bushings (if equipped)
- Knife guard hardware (if equipped)
- Floor locks
- Optional slide rail system
- Electrical cables, terminals and control lights
- Equipment alignment

Warnings and Cautions

To maintain the best performance of the Pinch Roll, it must be cleaned and inspected regularly. Maintenance includes a daily, weekly, quarterly, and semiannual (every 6 months) schedule.

Use this maintenance schedule as a guide. You may need to shorten the time of the maintenance schedule, depending on how often you use the servo cutter, and the types of material flowing through it. Follow all precautions and warnings when working on the equipment.

⚠️ **WARNING:** Improper Installation, operation, or servicing may result in equipment damage or personal injury.

This equipment should only be installed, adjusted, and serviced by qualified technical personnel who are familiar with the construction, operation, and potential hazards of this type of machine.

All wiring, disconnects, and fuses should be installed by qualified electrical technicians in accordance with electrical codes in your region. Always maintain a safe ground. Do not operate the equipment at power levels other than what is specified on the machine serial tag and data plate.

⚠️ **DANGER:** Pinch Hazard!

Never remove or disable safety devices to sustain production. Operating without these devices could lead to hazardous conditions that can cause severe injury. Take all necessary precautions when working around moving parts to prevent body parts and clothing from being pulled into the machine.
Warnings and Cautions (continued)

⚠️ **WARNING: Voltage hazard**
This equipment is powered by alternating current, as specified on the machine serial tag and data plate. Do not operate the equipment at power levels other than what is specified on the machine serial tag and data plate.

A properly sized conductive ground wire from the incoming power supply must be connected to the chassis ground terminal inside the electrical enclosure. Improper grounding can result in severe personal injury and erratic machine operation.

Before performing maintenance or repairs on this product, disconnect and lock out electrical power sources to prevent injury from unexpected energization or start-up. A lockable device has been provided to isolate this product from potentially hazardous electricity.

⚠️ **DANGER: Sharp Blades! (if equipped with a cutter)**
Most injuries caused by knife blades occur when the cutter has been turned off. Handle blades with care at all times.

- Always wear cut-resistant gloves when the cutting chamber is open and when handling blades.
- Always lock out power to the cutter before opening the cutting chamber.
- Always wait until the cutter head has completely stopped before opening the knife guard.

MedLine cutters are equipped with several safety devices to ensure safe operation. Never remove or disable these devices to sustain production. Operating without these devices can cause severe injury.

- When the knife guard is opened, the knife guard switch stops the cutter.
- Two proximity-type safety switches prevent operation unless the cutter bushings are in place.
- The cutter stop button activates a circuit that stops the knife.
Preventative Maintenance Schedule

• Daily
  □ Checking puller rollers for wear
    If a roller shows sign of cracks, tears, or other damage, replace it. See Replacing Rollers, Section 5.
  □ Inspecting cutter blade(s) (if equipped with cutter)
    Clean, sharpen or replace as needed. See Inspecting the Cutter Blades, Section 5.
  □ Inspecting the blade mounting hardware (if equipped with cutter)
    Check the blade-securing bolt and the holding pins. See Inspecting Blade Hardware, Section 5.
  □ Inspecting cutter bushing screws (if equipped with cutter)
    Check that the cutter bushing screws are secure. See Inspecting the Cutter Bushing Screws, Section 5.
  □ Checking the closure latch on the knife guard (if equipped with cutter)
    See Checking the Closure Latch, Section 5.
  □ Inspecting unit alignment
    Proper alignment with other equipment on the line is critical for optimum performance. Use a plumb line or laser to check for a straight line from the extrusion die to the cutter bushings.
  □ Checking floor locks
    See Checking Floor Locks, Section 5.

• Weekly
  □ Cleaning the blade lubrication tray (if equipped with cutter). See Cleaning the Lubrication Tray, Section 5.
  □ Lubricating shafts on slide rail system
    See Lubricating the Linear Rail, Section 5.
  □ Checking shafts and grease fittings
    Lubricate all shafts and grease fittings as needed. See Checking the Grease Locations, Section 5.
  □ Verify operation of all energizing stop buttons and safety sensors.
Preventative Maintenance Schedule (continued)

- Monthly
  - Checking hardware on the knife guard (if equipped with cutter)
    Inspect the hardware on the knife guard (fasteners on hinge and the clear blade guard window). Tighten as needed.
  - Checking bushing holder proximity switches (if equipped with cutter)
    Inspect the proximity switch set screws. Adjust as needed. See Adjusting the Cutter Proximity Switches, Section 5.
  - Cleaning the clear blade guard window (if equipped with cutter)
    Clean using glass cleaner or plain water. Other materials may cause premature loss of clarity or crazing.
  - Checking the metal draw latch (if equipped with cutter)
    Inspect the latch on knife guard for wear and proper tension. Readjust or replace as needed.

- Semi-annual (every six months)
  - Inspecting electrical terminals
    Check all electrical terminals for tightness; adjust as needed. See Checking Electrical Connections, Section 5.
  - Checking torque on Trantorque coupling device
    Check the tightness (torque) of the Trantorque coupling device with a torque gauge. This device connects the cutter head to the Micron reducer shaft. See Checking Torque, Section 5.
  - Checking all electrical cables
    Inspect all electrical cables for cuts and abrasions. Replace as needed. See Checking Electrical Connections, Section 5.
  - Inspecting control panel lights
    Check to make sure no LEDs or lights are burned out on the control panel. Replace as needed.
Inspecting Cutter Blades (if equipped with cutter)

Blades become dull over time depending on the material being cut, cut rate, blade speed, and blade material and thickness. Check blades regularly for sharpness as well as scratches, nicks, burrs, and material buildup. Clean, or replace as needed. See Installation Section entitled, Installing Cutter Blades.

⚠️ DANGER: Sharp Blades!
Most injuries caused by knife blades occur when the cutter has been turned off. Handle blades with care at all times.

- Always wear cut-resistant gloves when the cutting chamber is open and when handling blades.
- Always lock out power to the cutter before opening the cutting chamber.
- Always wait until the cutter head has completely stopped before opening the knife guard.

Inspecting Blade Hardware (if equipped with cutter)

The blade-securing bolts should use both a lock washer and flat washer, and be tightened enough to fully compress the lock washer.

⚠️ WARNING:
Do not operate the MedLine Pinch Roll without washers and blade-securing bolt securely in place.
Inspecting Bushing Retaining System (if equipped with cutter)

Check the bush retaining system that secures the cutter bushings. If bushings move during cutting, cutting blades, and possibly the drive chain, could be damaged.

Checking the Closure Latch (if equipped with cutter)

Check the latch and adjust it so the knife guard closes completely. This prevents false triggering of the safety switch.

Checking Floor Locks

It is best to remove the weight from the casters for optimum stability during cutting cycles. Check to see if the floor locking mechanism is properly adjusted.
Cleaning Particulate Trap (if equipped with cutter)

The Particulate Trap is built into the cutter assembly. Depending on cut rate and type of material and lubrication, the area will need to be cleaned on a regular basis. Open the knife guard and, using a shop vac or other similar equipment, remove all liquid and solids from the cutting chamber and around the bushings.

Lubricating the Linear Rail

Check the shafts on the linear rail system. Even though these rails are stainless steel, it is recommended that a light oil (WD-40 or similar) be applied to the shafts as needed. Wipe off any excess.
Checking Grease Locations
Lubricate all shafts and grease fittings as needed.

**NOTE:** Use regular grease for all locations except thread rods, vertical shafts, and vertical shaft drive boxes. For thread rods use FDA silicone or grease.
Adjusting the Cutter Proximity Switches

Follow all warnings and cautions listed at the beginning of the Maintenance section of this User Guide.

1. **Be sure the main power is disconnected** and the cutter is locked out.

2. **Loosen the bushing retaining system** that holds the cutter bushings.

3. **Remove the cutter bushings.**

4. **Check the depth of the proximity switch** face for each bushing. It should be recessed no more than 0.010 inches, but should not interfere with the bushings themselves.

5. **Use a wrench to check the tightness** of each proximity switch.  

   **NOTE:** You can damage the proximity switch if you over-tighten.

6. **Replace cutter bushings** and check for proper cutting blade alignment. *See Installation Section entitled, Mounting the Cutter Bushings and Appendix C and D.*

7. **Plug in the power cord** and turn the main power disconnect to the “ON” position if all other maintenance is completed.

**NOTE:** You can damage the proximity switch if you over-tighten.
Checking Electrical Connections

⚠️ **WARNING: Electrical Hazard**
Before performing any work on this product, disconnect and lock out electrical power sources to prevent injury from unexpected energization or start-up. A lockable device has been provided to isolate this product from potentially hazardous electricity.

⚠️ **WARNING: Improper Installation, operation, or servicing may result in equipment damage or personal injury.**
This equipment should only be installed, adjusted, and serviced by qualified technical personnel who are familiar with the construction, operation, and potential hazards of this type of machine.

All wiring, disconnects, and fuses should be installed by qualified electrical technicians in accordance with electrical codes in your region. Always maintain a safe ground. Do not operate the equipment at power levels other than what is specified on the machine serial tag and data plate.

1. **Be sure the main power is disconnected and the cutter is locked out.**
   Always disconnect and lock out the main power source before opening the unit or servicing.

2. **Turn the main power disconnect to the off position** before opening the electrical enclosure on the back of the cutter, or the back of the control. This is a safety device to prevent you from opening the doors if the power is still on.
Checking Electrical Connections
(continued)

3 Open the electrical enclosure.

4 Inspect all wires and connections. Look for loose wires, burned contacts, and signs of over-heated wires. Have a qualified electrician make any necessary repairs or replacements.

5 Close the electrical enclosure door.

6 Inspect the exterior power cords. Cords should not be crimped, exposed, or rubbing against the frame. If the main power cord runs along the floor, make sure it is not positioned where it could rest in pooling water or could be run over and cut by wheels or casters.
Checking the Roller Gap

The upper and lower rollers are controlled by a common threaded rod. Turn the hand wheel to move the rollers up and down.

The roller gap should be set to the dimensions of the extruded product, being careful not to make the gap so small that the pressure causes distortion in the product.

The upper and lower roller assemblies are controlled by a common threaded rod. The upper and lower rollers move away from each other or toward each other as the hand wheel is turned.

1. **Turn the hand wheel** until the gap between the rollers reaches the desired distance.

**NOTE:** On some Pinch Roll units, roller gap is set by the control, and uses a servo motor to open and close the gap.
Replacing the Rollers

To replace puller rollers:

1 Turn the rotary disconnect to the OFF position.

2 Open the upper and lower roller guards by removing the screw that holds them in place. They are on hinges and will swing open.

3 Remove the eight (8) bolts on the front of the roller that hold the roller in place. There are typically 8 of these bolts that hold each wheel to the drive.

4 If necessary, use a puller (using the threaded hole in the center of the wheel) to pull the roller off of the shaft.

5 Reverse the process to install the new roller. Be sure to insert all eight bolts and tighten each of the eight (8) bolts a little at a time, working your way around the roller to make sure that the roller is on correctly.

6 Adjust roller gap by using the hand wheel to increase or decrease the gap.

**NOTE:** Some Pinch Roll units use an optional servo drive to increase and decrease the roller gap. In this case, the gap is adjusted using the touch screen control.
Checking Torque (if equipped with cutter)

⚠️ **WARNING: No Lubricants!**
Do NOT use lubricants on the Trantorque coupling device.

⚠️ **WARNING: Sharp Blades!**
Always wear cut-resistant gloves when the cutting chamber is open and when handling blades. Never open cutting chamber without locking out the cutter power and waiting until the cutter head has stopped completely. Handle blades with care at all times.

The Trantorque coupling device connects the servo motor to the cutter head. It is important that it is tightened to the proper torque.

1 **Carefully remove the cutter blade.**

2 **Check to make sure both the shaft and component bore** of the Trantorque coupling device are completely free of paint, grease, oil, and dirt. If necessary, clean the surfaces with a non-petroleum based solvent, such as isopropyl alcohol.

3 **Use a torque wrench** to make sure the nut is tightened to the proper installation torque (2000 in-lb or 225 N-m). Do not overtighten; it can cause damage to the unit.
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Troubleshooting

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Before Beginning

You can avoid most problems by following the recommended installation, operation and maintenance procedures outlined in this User Guide. If you have a problem, this section will help you determine the cause and tell you how to fix it.

Before you begin troubleshooting:

- Find any wiring, parts, and assembly diagrams that were shipped with your equipment. These are the best reference for correcting a problem. The diagrams will note any custom features or options not covered in this User Guide.

- Verify that you have all instructional materials related to the puller. Additional details about troubleshooting and repairing specific components are found in these materials.

- Check that you have a manual for other equipment connected in the system. Troubleshooting may require investigating other equipment attached to, or connected with the puller.

A Few Words of Caution

⚠️ WARNING: Improper installation, operation or servicing may result in equipment damage or personal injury.

This equipment should only be installed, adjusted, and serviced by qualified technical personnel who are familiar with the construction, operation, and potential hazards of this type of machine.

All wiring, disconnects, and fuses should be installed and adjusted by qualified electrical technicians in accordance with electrical codes in your region. Always maintain a safe ground. Do not operate the equipment at power levels other than what is specified on the machine serial tag and data plate.

⚠️ WARNING: Electrical hazard

Before performing maintenance or repairs on this product, disconnect and lock out electrical power sources to prevent injury from unexpected energization or start-up. A lockable device has been provided to isolate this product from potentially hazardous electricity.
A Few Words of Caution (continued)

⚠️ **DANGER: Sharp Blades!**
Most injuries caused by knife blades occur when the cutter (if equipped) has been turned off. Handle blades with care at all times.

- Always wear cut-resistant gloves when the cutting chamber is open and when handling blades.
- Always lock out power to the cutter before opening the cutting chamber.
- Always wait until the cutter head has stopped completely before opening the knife guard.

MedLine Pinch Rolls are equipped with several safety devices to ensure safe operation. Never remove or disable these devices to sustain production. Operating without these devices can cause severe injury.

- When the knife guard is opened, the knife guard switch stops the cutter.
- Two proximity-type safety switches prevent operation unless the cutter bushings are in place.
- The Cutter Stop button activates a circuit that stops the knife.
Identifying the Cause of a Problem

The Troubleshooting section covers problems directly related to the operation and maintenance of the MedLine Pinch Roll. This section does not provide solutions to problems that originate with other equipment. Additional troubleshooting help can be found in manuals supplied with the other equipment.

The main problems you will see with the MedLine Pinch Rolls are:

- **Puller operation problems**, which focus on problems that are clearly related to the pullers mechanical components and electrical control system.

- **Cutter operation problems (if equipped)**, which focus on problems that are clearly related to the operation of the cutter’s mechanical components and electrical control system.

- **Product quality concerns**. Extrudate quality problems may be related to Pinch Roll operation. Of course, other sections of the extrusion line also influence the quality of the extruded product. This section does not provide solutions to problems originating with other equipment on the extrusion line.

- **Puller Fault Messages**

- **Cutter (if equipped) Fault Messages**

Additional troubleshooting help can be found in the documentation manuals included with this User Guide.
## Puller Operation Problems

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<tr>
<th><strong>Symptom</strong></th>
<th><strong>Possible cause</strong></th>
<th><strong>Solution</strong></th>
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<tr>
<td>The puller ‘creaks’ while running.</td>
<td>The roller gap is too tight.</td>
<td>Check the roller gap; loosen if necessary.</td>
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<td>The bearings are failing.</td>
<td>Replace the bearings.</td>
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<td>The puller does not start.</td>
<td>The Emergency Stop button is pushed in.</td>
<td>Pull out the Emergency Stop button. (Make sure it clicks into position.)</td>
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# Cutter (if equipped) Operational Problems

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<th>Symptom</th>
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<tr>
<td>Servo drive is without power</td>
<td>The Emergency Stop button is pushed in.</td>
<td>Pull out the Emergency Stop button.</td>
</tr>
<tr>
<td>After pressing Start, the cutter head rotates and stops in wrong position</td>
<td>Master safety relay not energized</td>
<td>Check to see if:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Bushings are in place.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- The blade guard is closed.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Master Safety relay (ISC) has failed. Replace relay.</td>
</tr>
<tr>
<td>Master safety relay does not energize</td>
<td>A safety switch has failed.</td>
<td>Check connections and replace if needed.</td>
</tr>
<tr>
<td>Pressing the Manual Cut button does not produce a cut when in an on-demand mode</td>
<td>Cutter should home automatically. Cutter may need to be reset.</td>
<td>Reset machine.</td>
</tr>
<tr>
<td>Guard circuit is open.</td>
<td>The servo amplifier motion program is not running.</td>
<td>Check to see if:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Bushings are in place.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- The blade guard is closed.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Loose connection to guard circuit. Tighten connection.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Guard switch is bad, replace switch.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Bussing proximity is bad, replace switch.</td>
</tr>
<tr>
<td>There is a loose connection.</td>
<td>Stop, then restart the cutter. If necessary, reboot the main power.</td>
<td>Check the wiring between the push button and input three on the servo drive and tighten the connection.</td>
</tr>
</tbody>
</table>
Cutter Operational Problems (continued)

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Possible Cause</th>
<th>Solution</th>
</tr>
</thead>
</table>
| Measurement display does not change value. | Emergency Stop button is pressed<br/Input from encoder failed.<br/Encoder failed.<br/The blade home proximity switch failed or the connection is loose.<br/The HMI servo homing is not set or needs adjusted.<br/Guard circuit is open. | Pull out Emergency Stop button.<br/Check encoder cable for continuity.<br/Connect any loose wires. |}
| After pressing Start on the cutter, the cutter head rotates and stops in the wrong position. | Emergency Stop button is pressed<br/The blade home proximity switch failed or the connection is loose.<br/The HMI servo homing is not set or needs adjusted. | Pull out Emergency Stop button.<br/Check connections and replace switch if needed. |}
| Master safety relay does not energize. | Emergency Stop button is pressed<br/Guard circuit is open. | Pull out E-Stop button. |
## Cutter Operational Problems (continued)

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Possible Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>In encoder or timer modes, the display shows the count which resets, but a cut does not occur at the point of reset.</td>
<td>There is a problem with the servo amplifier.</td>
<td>See Checking the Servo Amplifier.</td>
</tr>
<tr>
<td>Blade speed does not change when new speed is entered into the control.</td>
<td>There is a loose connection.</td>
<td>Check wiring for loose connections.</td>
</tr>
<tr>
<td>Cutter mode selection does not change cut mode.</td>
<td>There is a communication failure between the control and drive.</td>
<td>Check wiring for loose connections and tighten.</td>
</tr>
<tr>
<td>The park (home) position is drifting, i.e. the blade parks further away from the original park site.</td>
<td>The coupling between the servo motor and the Micron reducer has slipped.</td>
<td>See Checking the Motor/reducer assembly, Section 6.</td>
</tr>
<tr>
<td></td>
<td>The Trantorque coupling has slipped.</td>
<td>Refer to the Trantorque instructions, Section 5.</td>
</tr>
</tbody>
</table>
## Product Quality Problems (continued)

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Possible Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annular rings present on the extrudate.</td>
<td>The puller is too close to the cutter.</td>
<td>If the extrudate is interrupted (stopped during processing), annular rings can develop, especially on a thin-walled product. Slightly increase the distance between the puller and the cutter, and test the product until the distance is correct.</td>
</tr>
<tr>
<td>Burrs at cut site.</td>
<td>The bushings do not provide enough support during cutting.</td>
<td>Change bushing design to make more supportive.</td>
</tr>
<tr>
<td></td>
<td>The bushing gap is too wide.</td>
<td>Check that bushing gap is 0.001-0.003 in. (0.025 - 0.076 mm) larger than blade. Adjust if necessary.</td>
</tr>
<tr>
<td></td>
<td>The blade speed is too low.</td>
<td>Increase blade speed or decrease the cut path area.</td>
</tr>
<tr>
<td></td>
<td>The blade is too thick.</td>
<td>Use a thinner blade or add heat to extrudate.</td>
</tr>
<tr>
<td><strong>Symptom</strong></td>
<td><strong>Possible Cause</strong></td>
<td><strong>Solution</strong></td>
</tr>
<tr>
<td>------------------</td>
<td>--------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Hairs or strings.</td>
<td>Blade speed is too low.</td>
<td>Increase the blade speed or decrease the blade cut path area (blade width).</td>
</tr>
<tr>
<td></td>
<td>The blade is too thick.</td>
<td>Excessive blade thickness can cause frictional heat. Use a thinner blade.</td>
</tr>
<tr>
<td></td>
<td>The blade is wrong for the application.</td>
<td>Change angle of the blade attack or the blade style to decrease the cut path area.</td>
</tr>
<tr>
<td></td>
<td>Material is building up on the blade and wiping off on the cut site.</td>
<td>Use blade lubrication (water, etc.) or change lubricants. <em>See Appendix D.</em> Consider a blade wiping system.</td>
</tr>
<tr>
<td></td>
<td>There are imperfections on the blade.</td>
<td>The cutting edge should not have grind marks, burrs or other imperfections. Check the blade and replace if necessary.</td>
</tr>
<tr>
<td></td>
<td>A hole or slot in the blade cut path is causing a 'cheese grater' effect.</td>
<td>Change to a different blade design. <em>See Appendix B.</em></td>
</tr>
<tr>
<td></td>
<td>The extrudate is too cold.</td>
<td>If the extrudate is too cold, it can fracture during cutting. Raise the extrudate's temperature.</td>
</tr>
<tr>
<td>Symptom</td>
<td>Possible Cause</td>
<td>Solution</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>-------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Cracks at cut site.</td>
<td>The extrudate is too cold.</td>
<td>If the extrudate is too cold, it can fracture or whiten during cutting. Raise the extrudate's temperature.</td>
</tr>
<tr>
<td></td>
<td>The blade speed is too high.</td>
<td>High blade speeds can cause too much impact. Lower the blade speed.</td>
</tr>
<tr>
<td></td>
<td>The bushings are not providing enough support during cutting.</td>
<td>Change the bushing design to make them more supportive.</td>
</tr>
<tr>
<td></td>
<td>The cutting blade is too sharp.</td>
<td>A blade that is too sharp can fracture some materials, especially rigid PVC and nylon. Slightly dull the blade.</td>
</tr>
<tr>
<td></td>
<td>If using Nylon, it may be cooling too quickly.</td>
<td>If nylon is cooled too quickly, its molecular structure may become unstable, leading to poor physical properties. Try more gradual cooling.</td>
</tr>
<tr>
<td>Symptom</td>
<td>Possible Cause</td>
<td>Solution</td>
</tr>
<tr>
<td>---------</td>
<td>----------------</td>
<td>----------</td>
</tr>
<tr>
<td>Cut is not square.</td>
<td>The blade speed is too low.</td>
<td>Low blade speeds can cause excessive blade interruption. Increase blade speed or decrease the blade cut path area.</td>
</tr>
<tr>
<td></td>
<td>The blade is misaligned.</td>
<td>Check that blade is 90 degrees relative to the bushing holder.</td>
</tr>
<tr>
<td></td>
<td>The cutter bushings are not properly gapped.</td>
<td>If the cutter bushings are not properly gapped, the blade may be free to move with the extrudate. Check and adjust if necessary. See Section 3 and Appendix C.</td>
</tr>
<tr>
<td></td>
<td>The knife bevel is not symmetric.</td>
<td>If the knife bevel is asymmetric, the blade will tend to move in the direction of the smaller bevel. Be sure that the bevel is symmetric. NOTE: You can use this to your advantage with some rigid products.</td>
</tr>
<tr>
<td></td>
<td>For rigid products the puller is too close to the cutter.</td>
<td>There must be enough space between the puller and cutter to allow for the extrudate to stop during cutting.</td>
</tr>
</tbody>
</table>
**Product Quality Problems** (continued)

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Possible Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of cut is incorrect.</td>
<td>Encoder, input device problem.</td>
<td>Check encoder, input device and clean. Check encoder connection. Turn machine off then back on. If the problem persists, contact Conair’s service department.</td>
</tr>
<tr>
<td></td>
<td>There is a problem with the puller roller gripping part.</td>
<td>Check roller gap and tighten roller gap to part if slipping. Adjust the puller as necessary. See <em>Setting the Roller Gap</em> and <em>Adjusting Roller Tension</em> in the Installation section of this user guide.</td>
</tr>
</tbody>
</table>
## Puller Fault Messages  
(continued)

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Possible Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>0. No Message</td>
<td>No faults.</td>
<td>Press the E-Stop reset pushbutton.</td>
</tr>
<tr>
<td>1. Waiting for the emergency stop circuit to clear.</td>
<td>Release the emergency stop pushbutton. Check 1SR for proper operation.</td>
<td></td>
</tr>
<tr>
<td>2. Waiting for the servo system ready input to turn on.</td>
<td>Check the servo power supply (1PM) for fault indications.</td>
<td>Correct any faults.</td>
</tr>
<tr>
<td>3. Waiting for 1CB not tripped input to turn on.</td>
<td>ICB circuit breaker not on.</td>
<td>Turn on 1CB circuit breaker.</td>
</tr>
<tr>
<td>4. Waiting for the drive ok status bit to turn on.</td>
<td>Check the drive status page for fault indications.</td>
<td>View fault bits for fault indications.</td>
</tr>
<tr>
<td>5. Waiting for the drive faults bitmap to clear.</td>
<td>Check the drive status page for fault indications.</td>
<td>View fault bits for fault indications.</td>
</tr>
<tr>
<td>6. Waiting for the module faults bitmap to clear.</td>
<td>Check the drive status page for fault indications.</td>
<td>View fault bits for fault indications.</td>
</tr>
<tr>
<td>7. Waiting for the drive enable status bit to turn on.</td>
<td>Check the drive status page for fault indications. Check 1MC contactor for proper operation. Check 1MC aux contact for proper operation.</td>
<td>Check drive enable input for presence of 24 vdc.</td>
</tr>
<tr>
<td><strong>Symptom</strong></td>
<td><strong>Possible Cause</strong></td>
<td><strong>Solution</strong></td>
</tr>
<tr>
<td>------------</td>
<td>-------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>8. Waiting for the power stage enabled status bit to turn on.</td>
<td>Check drive status page for fault indications.</td>
<td>Check drive enable input for presence of 24 vdc.</td>
</tr>
<tr>
<td>9. Waiting for the power supply ready status bit to turn on.</td>
<td>Check the servo power supply (1PM) for fault indications. Check incoming supply voltage.</td>
<td>Check 24 vdc supply voltage to the servo power supply (1PM).</td>
</tr>
<tr>
<td>10. Waiting for the top beam not faulted input to turn on.</td>
<td>Top beam (roller) servo drive is in a faulted state.</td>
<td>Check the top beam drive status page for fault indications and then check the “View fault bits” page for further fault indications.</td>
</tr>
<tr>
<td>20. An emergency stop pushbutton was pressed.</td>
<td>Release the emergency stop pushbutton.</td>
<td>Press the E-Stop reset pushbutton.</td>
</tr>
<tr>
<td>21. The drive enable status input has turned off.</td>
<td>Check 1MC contactor for proper operation. Check 1MC aux contact for proper operation.</td>
<td>Check drive enable input for presence of 24 vdc.</td>
</tr>
<tr>
<td>22. The servo system ready input has turned off.</td>
<td>Check the cutter drive status page for fault indications. View the fault bit page for error indications.</td>
<td>Check the servo power supply (1PM) for fault indications.</td>
</tr>
<tr>
<td>23. The servo system ready input has turned off.</td>
<td>1CB circuit breaker has tripped. Check servo drives for overload condition. Check trip setting on 1CB for proper setting.</td>
<td>Reset 1CB.</td>
</tr>
<tr>
<td>Symptom</td>
<td>Possible Cause</td>
<td>Solution</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>24. A puller drive fault was detected.</td>
<td>Check the puller drive status page for fault indications. View fault bits</td>
<td>Check the servo power supply (1PM) for fault indications.</td>
</tr>
<tr>
<td></td>
<td>for fault indications.</td>
<td>View fault bits for fault indications.</td>
</tr>
<tr>
<td>25. A puller drive fault bit was detected on.</td>
<td>Check the puller drive status page for fault indications. View fault bits</td>
<td>View fault bits for fault indications.</td>
</tr>
<tr>
<td></td>
<td>for fault indications.</td>
<td></td>
</tr>
<tr>
<td>26. A puller control module fault bit was detected on.</td>
<td>Check the puller drive status page for fault indications. View fault bits</td>
<td>View fault bits for fault indications.</td>
</tr>
<tr>
<td></td>
<td>for fault indications.</td>
<td></td>
</tr>
<tr>
<td>27. The drive has entered current foldback.</td>
<td>Check puller drive train for freedom of movement. Adjust settings to</td>
<td>Wait for foldback RMS to fall below 50% before restarting.</td>
</tr>
<tr>
<td></td>
<td>reduce load on puller.</td>
<td></td>
</tr>
<tr>
<td>28. The top beam drive has faulted.</td>
<td>Check the top beam drive status page for fault indications.</td>
<td></td>
</tr>
</tbody>
</table>
# Cutter Fault Messages

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Possible Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>0. No Message.</td>
<td>System still loading.</td>
<td>Wait a few seconds. If fault remains, reset the control.</td>
</tr>
<tr>
<td>1. Waiting for the emergency stop circuit to clear.</td>
<td>Release the emergency stop pushbutton. Check 1SR for proper operation.</td>
<td>Press the E-Stop reset pushbutton.</td>
</tr>
<tr>
<td>2. Waiting for the cutter guard safety circuit to clear.</td>
<td>Check the cutter guard switch for proper operation. Check 2SR for proper operation.</td>
<td>Press the E-Stop reset pushbutton.</td>
</tr>
<tr>
<td>3. Waiting for the cutter bushing safety circuit to clear.</td>
<td>Check the bushing prox switches for proper operation. Check 3SR for proper operation.</td>
<td>Press the E-Stop reset pushbutton.</td>
</tr>
<tr>
<td>4. Waiting for 1CB not tripped input to turn on.</td>
<td>1CB breaker not turned on.</td>
<td>Turn on 1CB circuit breaker.</td>
</tr>
<tr>
<td>5. Waiting for 1MC power enable contactor on input to turn on.</td>
<td>Check 1MC contactor for proper operation.</td>
<td>Check 1MC aux contact for proper operation.</td>
</tr>
<tr>
<td>6. Waiting for the servo system ready input to turn on.</td>
<td>Servo system still loading or an error is keeping system from loading.</td>
<td>Check the servo power supply (1PM) for fault indications.</td>
</tr>
<tr>
<td>7. Waiting for the drive ok status bit to turn on.</td>
<td>Check the drive status page for fault indications.</td>
<td>View fault bits for fault indications.</td>
</tr>
</tbody>
</table>
## Cutter Fault Messages (continued)

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Possible Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>8. Waiting for the drive faults bitmap to clear.</td>
<td>Check the drive status page for fault indications.</td>
<td>View fault bits for fault indications.</td>
</tr>
<tr>
<td>9. Waiting for the module faults bitmap to clear.</td>
<td>Check the drive status page for fault indications.</td>
<td>View fault bits for fault indications.</td>
</tr>
<tr>
<td>10. Waiting for the drive enable status bit to turn on.</td>
<td>Check the drive status page for fault indications. Check 2MC contactor for proper operation. Check 2MC aux contact for proper operation.</td>
<td>Check drive enable input for presence of 24 vdc.</td>
</tr>
<tr>
<td>11. Waiting for the power stage enabled input to turn on.</td>
<td>Check drive status page for fault indications.</td>
<td>Check drive enable input for presence of 24 vdc.</td>
</tr>
<tr>
<td>12. Waiting for the power supply ready input to turn on.</td>
<td>Check the servo power supply (1PM) for fault indications. Check incoming supply voltage.</td>
<td>Check 24 vdc supply voltage to the servo power supply (1PM).</td>
</tr>
<tr>
<td>13. Waiting for 2CB not tripped input to turn on.</td>
<td>2CB breaker not on.</td>
<td>Turn on 2CB circuit breaker.</td>
</tr>
<tr>
<td>14. Waiting for the puller drive healthy input to turn on.</td>
<td>Check the puller drive status page for fault indications.</td>
<td>Follow recommended procedure to handle fault.</td>
</tr>
<tr>
<td>20. An emergency stop pushbutton was pressed.</td>
<td>Release the emergency stop pushbutton.</td>
<td>Press the E-Stop reset pushbutton.</td>
</tr>
</tbody>
</table>
## Cutter Fault Messages (continued)

<table>
<thead>
<tr>
<th><strong>Symptom</strong></th>
<th><strong>Possible Cause</strong></th>
<th><strong>Solution</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>21. The cutter guard safety circuit was detected open.</td>
<td>Check the cutter guard switch for proper operation. Check 2SR for proper operation.</td>
<td>Press the E-Stop reset pushbutton.</td>
</tr>
<tr>
<td>22. The cutter bushing safety circuit was detected open.</td>
<td>Check the bushing prox switches for proper operation. Check 3SR for proper operation.</td>
<td>Press the E-Stop reset pushbutton.</td>
</tr>
<tr>
<td>23. 1CB circuit breaker has tripped.</td>
<td>Check servo drives for overload condition. Check trip setting on 1CB for proper setting.</td>
<td>Reset 1CB.</td>
</tr>
<tr>
<td>24. 1MC power enable contactor has turned off.</td>
<td>Check 1MC contactor for proper operation.</td>
<td>Check 1MC aux contact for proper operation.</td>
</tr>
<tr>
<td>25. The servo system ready input has turned off.</td>
<td>Check the cutter drive status page for fault indications. View the fault bit page for error indications.</td>
<td>Check the servo power supply (1PM) for fault indications.</td>
</tr>
<tr>
<td>26. The drive enable status input has turned off.</td>
<td>Check 2MC contactor for proper operation. Check 2MC aux contact for proper operation.</td>
<td>Check drive enable input for presence of 24 vdc.</td>
</tr>
<tr>
<td>27. The drive has entered current foldback.</td>
<td>Check cutter drive train for freedom of movement. Adjust settings to reduce cut rate.</td>
<td>Wait for foldback RMS to fall below 50% before restarting.</td>
</tr>
<tr>
<td>28. A cutter drive fault was detected.</td>
<td>Check the cutter drive status page for fault indications. View fault bits for fault indications.</td>
<td>Check the servo power supply (1PM) for fault indications.</td>
</tr>
</tbody>
</table>
## Cutter Fault Messages (continued)

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Possible Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>29. A cutter drive fault bit was detected on.</td>
<td>Check the cutter drive status page for fault indications.</td>
<td>View fault bits for fault indications.</td>
</tr>
<tr>
<td>30. A cutter control module fault bit was detected on.</td>
<td>Check the cutter drive status page for fault indications.</td>
<td>View fault bits for fault indications.</td>
</tr>
<tr>
<td>31. 2CB circuit breaker has tripped.</td>
<td>Check puller drive for overload condition. Check trip setting on 2CB for proper setting.</td>
<td>Reset 2CB.</td>
</tr>
<tr>
<td>32. The puller drive healthy input has turned off.</td>
<td>Check the puller drive status page for fault indications.</td>
<td>Check the puller drive status page for fault indications.</td>
</tr>
</tbody>
</table>
Replacing Safety and Proximity Switches (if equipped)

Three safety switches are included in PINCH ROLL cutter sections: a keyed safety switch on the knife guard, and a proximity switch on each cutter bushing. A failure in any of these switches prevents the puller/cutter from running.

- **Safety Switch**
  If you suspect a problem with the keyed safety switch on the knife guard, check for loose or damaged wires. Replace the switch if wires appear to be undamaged.

- **Proximity Switches**
  The proximity switches on the cutter bushings have LEDs that light when the bushing is sensed. If an LED does not light when both the bushing are in place:

  1. **Check for loose or damaged wires.**
  2. **Remove the cutter bushing** and make sure the proximity switch is properly positioned, i.e. 0.010 inches {0.254 mm} from the bushing surface.
  3. **Remove the proximity switch** by loosening the bushing retaining system. Test it by bringing an object close to the sensor when the power is turned on. If the LED does not light, replace the proximity switch.

**NOTE:** Proximity sensors are typically only used on units with gear reducers. Most MedLine Pinch Roll Cutters will not have a proximity sensor, as homing is done with the control. Contact Conair Customer Service 1 800 458 1960. From outside of the United States, call: 814 437 6861.
Checking the Servo Amplifier

The servo amplifier is equipped with a digital readout that can be seen through the viewing window on the electrical enclosure. This display shows amplifier status and error messages. Refer to the supplier's documentation included with this User Guide.

NOTE: Make sure you look for servo amplifier messages before you shut off the power, because fault message will be lost.

Adjusting Proximity Switches

The home position proximity switch should be 0.010” (0.254 mm) from the 5/16” thread rod on the cutter head for proper operation.

1 Open the knife guard.

2 Locate the 1/4 inch thread rod on the cutter head. It should be 0.010 inch (0.254 mm) from the proximity switch sensor when it passes that location. If necessary, loosen the jam nuts, readjust the distance, and re-tighten the jam nuts.

DANGER: Sharp Blades!

Always wear cut-resistant gloves when the cutting chamber is open and when handling blades. Never open cutting chamber without locking out the cutter power.

Most injuries caused by knife blades occur when the cutter has been turned off. Handle blades with care at all times.

3 If the proximity switch does not sense the cutter head after this adjustment, remove the switch and test it outside the cutter. Replace if necessary.
Checking the Motor/Reducer Assembly

1  Open the knife guard.

2  Remove the cutter head by loosening the Trantorque assembly. Refer to the manufacturer's guide included with this User Guide for information about the Trantorque assembly.

3  Locate the four bolts holding the motor/reducer assembly to the cutter. Remove them and carefully remove the assembly from the cutter.

4  Refer to the Micron installation and maintenance information included with this User Guide to check and adjust the motor/reducer assembly.

Checking the Encoder

When the encoder is working properly, the measurement displayed will count up to the preset and reset to zero.

1  Check all connections.

2  Check the encoder cable for damage. If necessary, replace.

3  Check the connector that attaches the cable to the encoder. Internal wiring may be shorted out if this connector is not handled properly.

4  Check the encoder itself. There should be no play in the shaft.

   **NOTE:** For reactor pullers only.

5  If all else fails, contact Conair Customer Service. *See Appendix A.*

**WARNING: Delicate equipment**
The encoder is a delicate piece of equipment. Any rough handling can damage fragile parts.
We’re Here to Help

Conair has made the largest investment in customer support in the plastics industry. Our service experts are available to help with any problem you might have installing and operating your equipment. Your Conair sales representative also can help analyze the nature of your problem, assuring that it did not result from misapplication or improper use.

How to Contact Customer Service

To contact Customer Service personnel, call:

![Conair Customer Service Contact Information]

- **From outside the United States, call:** 814-437-6861
- You can commission Conair service personnel to provide on-site service by contacting the Customer Service Department. Standard rates include an on-site hourly rate, with a one-day minimum plus expenses.

**Before You Call...**

If you do have a problem, please complete the following checklist before calling Conair:

- Make sure you have all model, control type from the serial tag, and parts list numbers for your particular equipment. Service personnel will need this information to assist you.
- Make sure power is supplied to the equipment.
- Make sure that all connectors and wires within and between control systems and related components have been installed correctly.
- Check the troubleshooting guide of this manual for a solution.
- Thoroughly examine the instruction manual(s) for associated equipment, especially controls. Each manual may have its own troubleshooting guide to help you.
- Check that the equipment has been operated as described in this manual.
- Check accompanying schematic drawings for information on special considerations.

Additional manuals and prints for your Conair equipment may be ordered through the Customer Service or Parts Department for a nominal fee. Most manuals can be downloaded free of charge from the product section of the Conair website.

www.conairgroup.com

**NOTE:** Normal operating hours are 8:00 am - 5:00 pm EST. After hours emergency service is available at the same phone number.

From outside the United States, call: 814-437-6861
**Equipment Guarantee**

Conair guarantees the machinery and equipment on this order, for a period as defined in the quotation from date of shipment, against defects in material and workmanship under the normal use and service for which it was recommended (except for parts that are typically replaced after normal usage, such as filters, liner plates, etc.). Conair’s guarantee is limited to replacing, at our option, the part or parts determined by us to be defective after examination. The customer assumes the cost of transportation of the part or parts to and from the factory.

**Performance Warranty**

Conair warrants that this equipment will perform at or above the ratings stated in specific quotations covering the equipment or as detailed in engineering specifications, provided the equipment is applied, installed, operated and maintained in the recommended manner as outlined in our quotation or specifications.

Should performance not meet warranted levels, Conair at its discretion will exercise one of the following options:

- Inspect the equipment and perform alterations or adjustments to satisfy performance claims. (Charges for such inspections and corrections will be waived unless failure to meet warranty is due to misapplication, improper installation, poor maintenance practices or improper operation.)

- Replace the original equipment with other Conair equipment that will meet original performance claims at no extra cost to the customer.

- Refund the invoiced cost to the customer. Credit is subject to prior notice by the customer at which time a Return Goods Authorization Number (RGA) will be issued by Conair’s Service Department. Returned equipment must be well crated and in proper operating condition, including all parts. Returns must be prepaid.

Purchaser must notify Conair in writing of any claim and provide a customer receipt and other evidence that a claim is being made.

**Warranty Limitations**

Except for the Equipment Guarantee and Performance Warranty stated above, Conair disclaims all other warranties with respect to the equipment, express or implied, arising by operation of law, course of dealing, usage of trade or otherwise, including but not limited to the implied warranties of merchantability and fitness for a particular purpose.
Cutter Blade Selection and Use

Cutter blade characteristics such as material, design, and thickness can have a large effect on cut quality.

Blade materials

Blue tempered spring steel is most commonly used because of its cost and availability over a wide range of thicknesses (0.010-0.062 inch \(0.254-1.575\) mm). It is a very tough material with an HRC value of approximately 48-51 and fair wear characteristics.

Razor blade stainless steel is becoming very popular due to its HRC value of 57-58, which leads to improved wear resistance. This material retains good toughness, but will chip or break. It is available in 0.010-0.062 inch \(0.254-1.575\) mm thicknesses. Because it is non-corrosive, stainless steel is a good choice for medical cutting applications, and may even be coated with Teflon to enhance cut quality.

A-2 is a good grade of tool steel with an HRC of 60. Its minimum thickness (0.031 inch \(0.787\) mm) forces the blade manufacturer to grind it down for thinner applications, which adds cost. A-2 is more wear resistant than stainless, but is also more brittle.

M-2 is an excellent grade of tool steel with an HRC of 63-66. It is one of the best materials for coating with titanium nitride for improved wear resistance. (However, coatings generally cause some slight loss of sharpness.) 0.025 inch \(0.635\) mm material is available, which covers many applications without the need for secondary grinding operations.

D-2 is another excellent tool steel with an HRC range of 58-60. It is tougher than M-2 but has slightly less wear resistance. Its minimum thickness (0.035 inch \(0.889\) mm) and the need for specialized grinding materials, make it a relatively expensive material. It is the material of choice for cutting Kevlar-reinforced hose.

CPM 10-V is a form of carbide developed especially for the high speed punch industry. With an HRC of 60-62 and a toughness that far exceeds D-2, it is by far the best cutting blade material. Because its minimum thickness is 0.035 inch \(0.889\) mm, and it requires the use of diamond grinding wheels, CPM 10-V is the most expensive of the blade materials.
Cutter Blade Selection and Use (continued)

Blade Design

**Straight-edge knives** have a straight cutting surface. A chopping action (which has cutting forces parallel to the cut) is typically obtained with straight-edge blades.

Because the blade is mounted on a rotary arm, some slicing action (which has additional force vectors at various angles to the cutting edge) is obtained, but generally not through the entire cutting action. If a slicing action is required, the angle of attack can be modified by mounting the blade on a 30-45 degree angle as close to the cut site as possible. In many cases the bushings must be modified to allow the blade holder to have close proximity to the cut site. This offers the steepest angle of attack throughout the entire cutting process. Generally straight knives can be obtained in thicknesses from 0.004-0.060 inch \(0.102-1.524\) mm depending on the application.

**Curved-edge knives** offer increased slicing throughout the entire cutting action. They are generally used for cutting rubber preforms, rubber hose, flexible foams, and other materials that require slicing. Blade lubrication is often used to enhance the cut and minimize blade and bushing buildup.

As a general rule, curved-edge knives offer improved cut quality on rigid materials if additional heat can be used. However if used on cold rigid materials, curved knives have a tendency to produce wavy or angled cuts.

A curved edge knife can sometimes cut larger cross section profiles and tubing with the same horsepower as a straight edge blade. However, the use of a curved blade increases product interruption. To overcome this effect, use a variable speed rotary knife cutter to vary the blade speed to obtain the desired cut quality.

**Piercing blade (bat-wing, woodpecker) knives** are specifically designed for cutting thin wall tubing. Their shape minimizes penetration marks caused by the flattening action of the blade prior to penetration of the extrudate. These are the most expensive type of blade, and the most susceptible to breakage. Because the point is exposed and not fully supported by the bushings, it may deflect into the bottom of the bushing bore and break off. For these reasons, piercing blade knives are usually used as a last resort.

Some rigid materials require warming when this type of blade is used because the impact of the point can cause cracking or whitening.
Cutter Blade Selection and Use (continued)

Blade thickness

Because material is displaced rather than removed in rotary knife cutting, think of the blade as a wedge. The thicker the blade, the greater the displacement. This displacement can cause fracture in rigid profiles and tubing, which is often observed as a whitening on all or a portion of the cut. You can reduce this fracturing by reducing the thickness of the blade. (This effect can also be minimized by heating the profile or tube. However, if heat is used to enhance cut quality, the bushings must be supportive enough to minimize distortion.)

If the cutting blade is too thin, it may actually deflect within the bushing bore. This can lead to "S" shaped cuts or premature blade breakage.

Optimizing blade speed

Flexible extrudates generally require a very fast blade speed with a slicing action for best results. This is due to the fact that even minimal interruption can cause a blade jam on a product that has little or no internal strength.

On the other hand, rigid extrudates may require different blade speeds to obtain the desired cut quality. What's needed for a particular application depends on blade style, internal heat, and blade thickness. Speeds as slow as 300 rpm may be required if a curved blade is used with little or no heat.

Improving cut quality by adding heat to certain materials

All rigid extrudates can have their cut quality improved by the addition of heat. A few of the most common materials and the respective temperatures are listed below:

- Rigid PVC: 110°-125° F (43°-52° C)
- Styrene ABS: 120°-135° F (49°-57° C)
- Polypropylene: 160°-200° F (71°-93° C)

It is important to remember that as the temperature approaches the glassification zone, the degree of support offered by the bushing becomes more important.
Calculating Blade Interruption

**Blade interruption** is the length of time which the blade interrupts the extrudate during the cutting process. Knowing blade interruption allows you to optimize blade speed and design for specific applications.

You can calculate blade interruption for your application if you know:

- the cutting blade width
- blade speed (cutter rpm)
- extrudate cross section.

The rotary knife cut path circumference is fixed for each cutter model:

<table>
<thead>
<tr>
<th>Model</th>
<th>Bushing Diameter</th>
<th>Knife Cut Path Diameter</th>
<th>Knife Cut Path Circumference</th>
</tr>
</thead>
<tbody>
<tr>
<td>2L</td>
<td>2.25&quot; (3.75 cm)</td>
<td>14&quot; (35.6 cm)</td>
<td>44.0&quot; (111.8 cm)</td>
</tr>
<tr>
<td>2</td>
<td>2.25&quot; (5.72 cm)</td>
<td>14&quot; (35.6 cm)</td>
<td>44.0&quot; (111.8 cm)</td>
</tr>
<tr>
<td>3L</td>
<td>3.25&quot; (8.26 cm)</td>
<td>15&quot; (38.1 cm)</td>
<td>47.1&quot; (119.6 cm)</td>
</tr>
<tr>
<td>3</td>
<td>3.25&quot; (8.26 cm)</td>
<td>15&quot; (38.1 cm)</td>
<td>47.1&quot; (119.6 cm)</td>
</tr>
<tr>
<td>4L</td>
<td>4.25&quot; (10.80 cm)</td>
<td>14&quot; (35.6 cm)</td>
<td>44.0&quot; (111.8 cm)</td>
</tr>
<tr>
<td>4</td>
<td>4.25&quot; (10.80 cm)</td>
<td>14&quot; (35.6 cm)</td>
<td>44.0&quot; (111.8 cm)</td>
</tr>
<tr>
<td>5</td>
<td>5.25&quot; (13.34 cm)</td>
<td>15&quot; (38.1 cm)</td>
<td>47.1&quot; (119.6 cm)</td>
</tr>
</tbody>
</table>

As an example, calculate the blade interruption (in milliseconds) for an 2 cutter running 1/4" (0.250") OD tubing. The blade speed is 718 rpm and the cutting blade is 15/16" (0.937") width at the point where it passes through the extrudate, and the cut path circumference is 44.0" for the cutter 2.

Calculate the blade interruption time. The interruption time starts when the blade makes its first contact with the extrudate and ends when the blade is totally clear of the product (i.e. no longer interrupting it). Because we know the blade travel speed, we can calculate the interruption time if we know how far the blade travels during period of interruption. This distance is equal to the sum of the extrudate outer diameter and the blade width at the point of contact.

\[
\text{Blade interruption} = \left( \frac{\text{Product OD} + \text{Blade width}}{\text{Knife circumference}} \right) \times 60,000
\]

\[
\text{time, msec} = \left( \frac{\text{Product OD} + \text{Blade width}}{\text{Knife circumference}} \right) \times 60,000
\]
Calculating Blade Interruption (continued)

To calculate interruption time:

\[
\frac{(0.937 \text{ in. } + 0.250 \text{ in.})}{44.0 \text{ in.}} \times 60,000 \text{ msec/rev} = 2.25 \text{ msec}
\]

Knowing the interruption time and the line speed, you can calculate the amount of production deflection that must be accommodated during cutting. To calculate the amount of extrudate deflection between the cutter and puller, multiply line speed by interruption time:

\[
\text{Blade Interruption} \times \text{Line speed} \times \frac{12}{60,000} \text{ in.}
\]

2.25 msec × 60 fpm × 0.0002 = 0.027 in.

In this example the puller and cutter must be set up to allow for 0.027" of product deflection during cutting. Failure to do this can lead to puller stoppage (which can form annular rings on the product), and poor-quality cuts (hairs or fuzz and angular cuts).
## Conair Cutter Blades

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Blade Type</th>
<th>Bushing Size</th>
<th>Blade Thickness</th>
<th>Blade Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>3515-02285</td>
<td>Razor</td>
<td>2 inch* (5.08 cm)</td>
<td>0.015 in. (0.38 mm)</td>
<td>Stainless Steel</td>
</tr>
<tr>
<td>3515-00975</td>
<td>Razor</td>
<td>2 inch* (5.08 cm)</td>
<td>0.025 in. (0.64 mm)</td>
<td>Stainless Steel</td>
</tr>
<tr>
<td>3515-30088</td>
<td>Straight</td>
<td>2 inch (5.08 cm)</td>
<td>0.010 in. (0.25 mm)</td>
<td>Stainless Steel</td>
</tr>
<tr>
<td>3515-30096</td>
<td>Straight</td>
<td>2 inch (5.08 cm)</td>
<td>0.015 in. (0.38 mm)</td>
<td>Stainless Steel</td>
</tr>
<tr>
<td>3515-30104</td>
<td>Straight</td>
<td>2 inch (5.08 cm)</td>
<td>0.020 in. (0.51 mm)</td>
<td>Stainless Steel</td>
</tr>
<tr>
<td>3515-30016</td>
<td>Straight</td>
<td>2 inch (5.08 cm)</td>
<td>0.025 in. (0.64 mm)</td>
<td>Stainless Steel</td>
</tr>
<tr>
<td>3515-30085</td>
<td>Curved</td>
<td>2 inch (5.08 cm)</td>
<td>0.010 in. (0.25 mm)</td>
<td>Stainless Steel</td>
</tr>
<tr>
<td>3515-30072</td>
<td>Curved</td>
<td>2 inch (5.08 cm)</td>
<td>0.015 in. (0.38 mm)</td>
<td>Stainless Steel</td>
</tr>
<tr>
<td>3515-30080</td>
<td>Curved</td>
<td>2 inch (5.08 cm)</td>
<td>0.020 in. (0.51 mm)</td>
<td>Stainless Steel</td>
</tr>
<tr>
<td>3515-30032</td>
<td>Curved</td>
<td>2 inch (5.08 cm)</td>
<td>0.025 in. (0.64 mm)</td>
<td>Stainless Steel</td>
</tr>
<tr>
<td>3515-30128</td>
<td>Straight</td>
<td>3 inch (7.62 cm)</td>
<td>0.020 in. (0.51 mm)</td>
<td>Stainless Steel</td>
</tr>
<tr>
<td>3515-30024</td>
<td>Straight</td>
<td>3 inch (7.62 cm)</td>
<td>0.025 in. (0.64 mm)</td>
<td>Stainless Steel</td>
</tr>
<tr>
<td>3515-30024-1</td>
<td>Straight</td>
<td>3 inch (7.62 cm)</td>
<td>0.025 in. (0.64 mm)</td>
<td>Spring Steel</td>
</tr>
<tr>
<td>3515-30136</td>
<td>Straight</td>
<td>3 inch (7.62 cm)</td>
<td>0.032 in. (0.81 mm)</td>
<td>Stainless Steel</td>
</tr>
<tr>
<td>3515-30136-1</td>
<td>Straight</td>
<td>3 inch (7.62 cm)</td>
<td>0.032 in. (0.81 mm)</td>
<td>Spring Steel</td>
</tr>
<tr>
<td>7130320101</td>
<td>Curved</td>
<td>3 inch (7.62 cm)</td>
<td>0.015 in. (0.38 mm)</td>
<td>Spring Steel</td>
</tr>
<tr>
<td>7130320102</td>
<td>Curved</td>
<td>3 inch (7.62 cm)</td>
<td>0.025 in. (0.64 mm)</td>
<td>Spring Steel</td>
</tr>
<tr>
<td>7130320103</td>
<td>Curved</td>
<td>3 inch (7.62 cm)</td>
<td>0.032 in. (0.81 mm)</td>
<td>Spring Steel</td>
</tr>
<tr>
<td>7130320301</td>
<td>Straight</td>
<td>4 inch (10.16 cm)</td>
<td>0.025 in. (0.64 mm)</td>
<td>Spring Steel</td>
</tr>
<tr>
<td>7130320302</td>
<td>Straight</td>
<td>4 inch (10.16 cm)</td>
<td>0.032 in. (0.81 mm)</td>
<td>Spring Steel</td>
</tr>
<tr>
<td>7130320201</td>
<td>Curved</td>
<td>4 inch (10.16 cm)</td>
<td>0.025 in. (0.64 mm)</td>
<td>Spring Steel</td>
</tr>
<tr>
<td>7130320202</td>
<td>Curved</td>
<td>4 inch (10.16 cm)</td>
<td>0.032 in. (0.81 mm)</td>
<td>Spring Steel</td>
</tr>
<tr>
<td>7130320501</td>
<td>Straight</td>
<td>5 inch (12.70 cm)</td>
<td>0.025 in. (0.64 mm)</td>
<td>Spring Steel</td>
</tr>
<tr>
<td>7130320502</td>
<td>Straight</td>
<td>5 inch (12.70 cm)</td>
<td>0.032 in. (0.81 mm)</td>
<td>Spring Steel</td>
</tr>
<tr>
<td>7130320401</td>
<td>Curved</td>
<td>5 inch (12.70 cm)</td>
<td>0.025 in. (0.64 mm)</td>
<td>Spring Steel</td>
</tr>
<tr>
<td>7130320402</td>
<td>Curved</td>
<td>5 inch (12.70 cm)</td>
<td>0.032 in. (0.81 mm)</td>
<td>Spring Steel</td>
</tr>
</tbody>
</table>

* Bore size = 0.025
All About Cutter Bushings

Rotary knife cutter bushings are probably the most ignored aspect of cutting. Yet, they are probably the most important ingredient to obtaining clean, square, accurate cuts with minimal jamming and broken blades.

This appendix contains information about several aspects of cutter bushings:

- bore characteristics
- bushing length
- shear surface characteristics
- the bushing gap

Cutter bushing bore size

The cutter bushing bore size affects both the cutting process and the overall extrusion process.

Bushings with relatively large bores are often used to facilitate start-up and minimize bushing inventory. While this practice is acceptable for start-up, it will lead to premature blade failure because the bushings do not properly support the blade. For optimum cut quality, make sure the bore adequately supports the tube or profile.

When the blade first makes contact with the tube or profile, it pushes the part until it assumes the size and/or shape of the bushing bore. In the case of tubes this causes two marks on the tube (penetration marks) that show where the tube flattened before the blade actually penetrated it. The tighter the bushing bore size to tube size, the closer the marks become, making them less obvious.

If the bushing bore is too tight, excessive extrudate interruption or even jamming may occur. In turn, this can cause internal air blockage in free extruded flexible materials and thus extrudate size fluctuations. In the case of rigid profiles or tubes, roller puller slippage may occur during the cutting if the bushings are improperly configured. This can cause annular rings around the extrudate and size fluctuations.

- For rigid profiles or tubes, allow 0.010-0.020 inch clearance over the OD tolerance. Anything tighter than 0.010 inch will be difficult to process. For easier startup, allow as much as 1/4 inch above a rigid profile because the blade will force the profile to the bottom of the cutting bushing where the shearing action occurs. However, if perfect squareness is required, the clearance above the profile should be minimized to prevent bowing. Supportive bushings become more important if heat is used to minimize whitening (fracturing).
All about Cutter Bushings (continued)

- If you are cutting a square or rectangular profile, whether rigid or flexible, a round bushing bore will not offer proper support and will often lead to an "S" shaped cut. A flat bottomed bushing will offer excellent support and enhance the shearing action of the blade.

- In the case of flexible extrudates, allow 0.010-0.050 inch clearance depending on durometer and surface; the softer durometers and tacky surfaces require the most clearance. In the case of softer durometer materials, bushing lubrication may be required to minimize drag and material build-up between the cutter bushing faces.

Cutter bushing bore surface quality

The internal surface of the cutter bushing must be smooth and glass-like when cutting flexible extrudates, otherwise excessive drag causes jamming and can lead to variations in cut-to-length accuracy.

- When cutting flexible materials, have the internal surface machined to resemble glass. In many cases, medical processors will actually have the ID of their bushings either honed or burnished for best results.

- When cutting clear extrudates, it is also very important to have a smooth internal surface to minimize scratches. In some cases it may be necessary to make a Teflon or Delrin insert to further minimize drag and/or scratching.

- Bushing lubrication can also help minimize bushing drag.

- Be sure to have a lead-in angle machined into the entrance of the upstream cutter bushing. The transition from the bore to the lead-in angle should not be abrupt as it to can cause variable drag.
All about Cutter Bushings (continued)

Cutter bushing shear surface quality

Similar to a dull pair of scissors, if the cutter bushing shear surface is not sharp the tube or profile is not supported to the side of the blade and the cut will not be clean. In some cases, the entrance of the downstream cutter bushing is slightly radiused to minimize jamming. While this practice helps accommodate bushing bores that are not quite aligned, it has a negative effect on cut quality.

- The shear surface of both the upstream and downstream cutter bushings should be sharp and bored to the same size. NOTE: In high speed cutting applications, the downstream bushing is sometimes bored 0.005” larger than the upstream bushing to minimize jamming. Deburr the edge after the boring operation, but be careful to remove only the burr and not the edge.

- Leave a minimum land of 1/8 - 1/4 inches on the face of the cutter bushing beyond the bore. Angle the rest of the bushing face with a 10-15 degree lead-in.
All About Cutter Bushings

Cutter bushing length

⚠️ CAUTION: Blade hazard

In order to comply with OSHA regulations, the distance from the sidewall of the cutter to the blade (through the bushing) must be long enough to prevent fingers from reaching the blade.

On flexible extrudates, it is important to minimize the length of the cutter bushings. It is very difficult to push flexible extrudates through since it tends to compress as it is pushed, causing a marginal increase in the tube diameter. For this reason, bushing lubrication may be necessary to minimize drag as the length of the bushings increase. A discharge conveyor may also be helpful in removing longer cut parts. The exit bushing may be funneled to allow the cut part to drop out faster while still maintaining minimal bushing length for safety.

- For flexibles, the upstream cutter bushing should offer total support to the extrudate as close to the nip point of the puller as possible. In this way the part is not able to move from side to side or bow from the weight of the tube, which can, in turn, cause variable drag. You use the strength of the tube to push itself.

- The bore length of the exit bushing should not be shorter than 1 1/2 times the diameter of the tube with the remainder of the bushing length being tapered. On sticky flexible extrudates, the parts will actually stick back together if the new part has to push the cut part out very far.

For rigid extrudates, the length of the cutter bushings can result in a square cut or an angular cut. The cutter bushings support the extrudate keeping it from moving from side to side and bowing from the weight of the profile itself. Many processors make their bushings short to minimize cost of EDM which is determined by depth of cut.

- For rigid extrudates, a general rule is to make the length of the cutting bushings equal to two times the largest outside dimension. NOTE: In the case of full profile cutter bushings where maximum support is offered, the bushing length may be shortened depending on actual clearance.

- Be sure to have a lead-in angle machined into the entrance of the upstream cutter bushing. The transition from the bore to the lead-in angle should not be abrupt as it to can cause variable drag.
All About Cutter Bushings (continued)

Adjusting the cutter bushing gap

If the bushing gap is too big, material is dragged down between the bushings creating a burr, especially with flexibles. This may lead to jamming within the bushings where the upstream side of the cut extrudate actually hits against the downstream bushing surface. This is especially apparent with flexibles with non-concentric walls where a slight bow is present.

• Locate the downstream bushing such that it touches the blade without deflecting it. Lock it in place and rotate the blade to check proper gap.

• Locate the upstream cutter bushing with 0.001-0.002 inch of the blade and lock it in place. Rotate the blade through the set bushings to insure proper gap. NOTE: Because blades are rarely perfectly flat, it is possible that a swishing sound will be heard.

• If hairs are present on only the upstream cut end of a tube or profile, it may be necessary to allow a 0.002-0.005 inch gap on the downstream bushing to allow the blade to slightly move with the extrudate during the cutting cycle and not cause excessive frictional heat which actually melts the extrudate. NOTE: Blade/bushing lubrication can also help to solve this problem.
Blade and Bushing Lubrication

Blade and bushing lubrication can nearly always improve the quality of cutting.

Description of the cutting process

Unlike sawing, a rotary knife cutter displaces material rather than removing it. When the knife blade first contacts the extrudate, it pushes it against the opposite side of the cutter bushings. If there is too much clearance the extrudate may crack or distort before cutting even begins. Tubing may develop two distinctive marks related to the compression of the tube.

Once the blade penetrates the part, material is displaced to either side of the blade. This displacement will vary in degree and visibility depending on the type of material, temperature, blade thickness, blade style, and blade speed. As the material is displaced, heat is generated and passed to the blade surface.

Flexible materials (flexible PVC, urethanes, and even LDPE) will generally compress during cutting, leaving little or no sign of displacement. The cut will appear uniformly glossy and free of fracture. However, a closer look will show very fine lines on the cut face. With flexible materials, these lines will typically show an arc or "S" pattern which can be attributed to compression of the part as the blade passed through.

Rigid materials such as rigid PVC and styrene will tend to fracture during cutting. The cut surface changes from glossy to dull, and finally becomes whitened and rough. Whitening occurs when cutting changes to fracturing: the cut begins to extend in front of the cutting blade, which acts as a wedge. At this point, you can only hope the fracture is controlled, allowing for a square cut.

Friction and heat during cutting

Because most rotary knife cutters don't travel with the flow of the extrusion line, forward motion is interrupted as the blade passes through the plastic tube or profile. This interruption causes friction, which generates heat in the cutting blade. As the temperature of the blade increases, plastic is melted at the cut site. This melted plastic can adhere to and coat the cutting blade, especially on the upstream side, and be transferred to the next part in the form of hairs or tissue-like film. This will be especially noticeable on the top inside of the tube or profile.
Blade and Bushing Lubrication  (continued)

If the blade has a rough surface where the extrudate rubs against it, material will accumulate on the blade in a cheese grater fashion. This scratched material will also be passed from the blade to the next cut and be seen as hairs or flakes.

Some of the more flexible materials, such as silicones, soft urethanes and flexible PVCs, also exhibit drag against the blade during the cutting cycle. The part will actually stick to the side of the blade and drag down between the bushings. Typically a small "C" shaped tail of the tube will accumulate in the bottom of the cutting chamber. This tail actually tore off the tube rather than cut due to the excessive drag against the blade.

The generation of heat during cutting can also lead to parts that stick to each other. They may appear to be welded together, and an extra operation may be required to separate them. This can be a real problem in materials such as latex, silicone, PP, and flexible PVC.

Benefits of using lubricants

The primary benefit of using a cutting lubricant is reducing friction. If the cutting blade is coated with a film of lubricant, the coefficient of friction between the blade and the plastic tube or profile is reduced, reducing the generation of frictional heat.

Lubricants also minimize the tendency for material to stick to the blade, thus minimizing the potential for material to be wiped on the next cut part. The co-efficient of friction is reduced with varying degrees, depending on the type of lubricant, which in turn limits the increase in blade temperature. Over time this can lead to an increase in blade life because the cutting edge will last longer at cooler operating temperatures.

While lubricants can also help minimize problems caused by rough or poorly ground blades and cutter bushings, it is generally better to solve the problem than mask it with lubricants.
Blade and Bushing Lubrication (continued)

Common cutting lubricants
Commonly used general purpose lubricants include:
- Tap water
- Dish washing liquid (Joy, etc)
- Glycol (anti-freeze, coolant)
- Water-soluble silicone cutting oils
- Diesel fuel
- Mold release
- Mineral oil

Medical grade lubricants:
- Distilled water
- Isopropanol (isopropyl alcohol)
- Mixtures of isopropanol and water

Lubrication systems
The most basic blade lubrication system for rotary knife cutters is using a stainless steel tray filled with the lubricant. Because the cutting blade passes through the tray during every cutting cycle, the blade is lubricated before each cut. This approach limits material buildup on blade and bushing surfaces for most applications. Care must be taken to maintain the lubricant level within the tray. Clean out accumulated cut residue on a regular basis.

Spray mist systems can be used to lubricate either the blade or the extrudate as it enters the cutter bushings. These systems allow the application of a minimum amount of lubricant with good consistency. If the mist is applied to the product as it enters the cutter bushings, the lubricant will minimize the drag between the bushing bore and the tube or profile, as well as wet the blade and bushing faces. With flexible and/or sticky materials this can improve both cut quality and cut-to-length accuracy.

The last method of blade lubrication (and the oldest) is the blade wipe system. Felt, sponge, or some other absorbent material is mounted so the rotary knife blade will pass through it, with interference, before making a cut. Typically a gravity drip or wick system is used to keep the absorbent material wet with lubricant. These systems not only lubricate the blade, but also wipe off residue before each cut. However, the operator must constantly observe the condition of the pads as they wear quickly and lose their function. Another concern (especially in medical applications) is what happens to wear particles from the pads. This material frequently ends up on the blade itself, and is then transferred to the very product it is meant to protect from contamination.
Choosing Roller Materials

When considering puller performance, an important concern is the type of Pinch Roll roller material. To select the proper material, you must consider the extrudate's tendency to deform under pressure. For example, thin wall profiles and tubing are prone to deformation, so you need lower pressures to deliver the required pulling force without deformation and slippage.

Various roller materials are available. Contact your Conair Sales representative for more information.
## Puller Control Settings

This table shows the settings for each control parameter set at the factory. The parameters are set either to the default setting, or to a setting specific to your requirements (Customer column). If you change any value, record it in this column. Keep these values up-to-date so you can easily restore your puller to normal operation if the memory is corrupted.

<table>
<thead>
<tr>
<th>Code</th>
<th>Parameter</th>
<th>Range</th>
<th>Default</th>
<th>Customer</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Primary Setpoint 1</td>
<td>0000-9999</td>
<td></td>
<td></td>
</tr>
<tr>
<td>02</td>
<td>Primary Setpoint 2</td>
<td>0000-9999</td>
<td></td>
<td></td>
</tr>
<tr>
<td>03</td>
<td>Secondary Setpoint 1</td>
<td>0000-9999</td>
<td></td>
<td></td>
</tr>
<tr>
<td>04</td>
<td>Secondary Setpoint 2</td>
<td>0000-9999</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05</td>
<td>Jog Setpoint</td>
<td>0000-9999</td>
<td></td>
<td></td>
</tr>
<tr>
<td>06</td>
<td>Output Setpoint</td>
<td>0000-9999</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Minimum Limit</td>
<td>0000-9999</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Maximum Limit</td>
<td>0000-9999</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Low Alarm</td>
<td>0000-9999</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>High Alarm</td>
<td>0000-9999</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Error Alarm 1, ramped</td>
<td>0000-9999</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Error Alarm 2, scaled</td>
<td>0000-9999</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Acceleration Time</td>
<td>000.0-600.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Deceleration Time</td>
<td>000.0-600.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Lag Pulse Limit</td>
<td>0-9999</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Lead Pulse Limit</td>
<td>0-9999</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Engineering units (primary setpoint)</td>
<td>000.0-9999</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Engineering units (secondary setpoint)</td>
<td>000.0-9999</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Engineering units (primary display)</td>
<td>000.0-9999</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>Engineering units (secondary display)</td>
<td>000.0-9999</td>
<td></td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>Recovery multiplier</td>
<td>0-100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>PPR (external reference input)</td>
<td>1-9999</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>PPR (feedback input)</td>
<td>1-9999</td>
<td></td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>PPR (auxiliary input)</td>
<td>1-9999</td>
<td></td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>Max RPM (external reference input: primary mode)</td>
<td>1-9999</td>
<td></td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>Max RPM (feedback: primary mode)</td>
<td>1-9999</td>
<td>1750</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>Max RPM (auxiliary input: primary mode)</td>
<td>1-9999</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTE:** Refer to the downstream extrusion product area of the Conair website for a complete list of drive manuals and for more detailed drive information. www.conairgroup.com
## Puller Control Settings

<table>
<thead>
<tr>
<th>Code</th>
<th>Parameter</th>
<th>Range</th>
<th>Default</th>
<th>Customer</th>
</tr>
</thead>
<tbody>
<tr>
<td>36</td>
<td>Max RPM (external reference input: secondary mode)</td>
<td>1-9999</td>
<td></td>
<td></td>
</tr>
<tr>
<td>37</td>
<td>Max RPM (feedback: secondary mode)</td>
<td>1-9999</td>
<td></td>
<td></td>
</tr>
<tr>
<td>38</td>
<td>Max RPM (auxiliary input: secondary mode)</td>
<td>1-9999</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Scaling Format Selection and Control**

| 60   | Output format                                  | 1-2            |         |          |
| 61   | Primary scaling mode                           | 0-3            | 01      |          |
| 62   | Secondary scaling mode                         | 0-3            |         |          |
| 63   | Primary display mode                           | 1-2            | 01      |          |
| 64   | Secondary display mode                         | 1-2            |         |          |

**Tuning**

| 65   | Gain                                          | 0-9999         |         |          |
| 66   | Reset (integral)                              | 0-9999         |         |          |
| 67   | Rate (derivative)                             | 0-9999         |         |          |
| 68   | Trim authority                                | 0-100          |         |          |
| 69   | Rate threshold                                | 0-100          |         |          |

**Serial Communications**

| 70   | Device addresses                              | 1-32           |         |          |
| 71   | Baud rate                                     | 1-6            |         |          |
| 72   | Character format                              | 1-3            |         |          |
| 73   | Control mask                                  | 0-255          |         |          |

**Alarms and Limits**

| 74   | Zero speed logic                              | 0-1            |         |          |

**Scaling Format Selection and Control**

| 75   | Primary mode positive offset                  | 0-9999         |         |          |
| 76   | Primary mode negative offset                  | 0-9999         |         |          |
| 77   | Secondary mode positive offset                | 0-9999         |         |          |
| 78   | Secondary mode negative offset                | 0-9999         |         |          |

**Setpoint Control**

| 79   | Setpoint mask                                 | 0-2            |         |          |

**Analog Input/Output**

| 80   | Analog output function select                 | 0-99           |         |          |
| 81   | Analog output range                           | 0-9999         |         |          |
| 82   | Analog output zero                            | 0-2048         |         |          |
| 83   | Analog output span                            | 2048-4095      |         |          |
| 84   | Analog input function select                  | 0-7            |         |          |
| 85   | Analog input zero                             | 0-2048         |         |          |
| 86   | Analog input zero                             | 2048-4095      |         |          |

**NOTE:** Refer to the downstream extrusion product area of the Conair website for a complete list of drive manuals and for more detailed drive information.

www.conairgroup.com
Advanced Procedure: PID Tuning

PID (Proportional, Integral, Differential) tuning is the process of setting the control algorithm parameters (codes 65-69) to achieve optimum performance. While each puller is tuned before shipment to optimize performance over the entire speed range, customers may wish to tune the puller for their specific operating conditions.

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>65</td>
<td><strong>Gain</strong> - small number</td>
<td>1. Set Reset (66) and Rate (67) to zero.</td>
</tr>
<tr>
<td></td>
<td>increase the contribution</td>
<td>2. Set Trim Authority (68) to 100.</td>
</tr>
<tr>
<td></td>
<td>of the Proportional component.</td>
<td>3. Reduce the Gain setting until the system becomes unstable.</td>
</tr>
<tr>
<td></td>
<td>Zero eliminates the Gain contribution.</td>
<td>4. Increase Gain slightly to restabilize the system.</td>
</tr>
<tr>
<td>66</td>
<td><strong>Reset</strong> - small numbers</td>
<td>Decrease the value of Reset until overshoot is observed.</td>
</tr>
<tr>
<td></td>
<td>increase the contribution</td>
<td>Overshoot occurs when the feedback goes over the desired setpoint before setting to the desired value.</td>
</tr>
<tr>
<td></td>
<td>of the Integral component.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Zero eliminates the Reset contribution.</td>
<td></td>
</tr>
<tr>
<td>67</td>
<td><strong>Rate</strong> - small numbers</td>
<td>1. Decrease the value of Rate</td>
</tr>
<tr>
<td></td>
<td>increase the contribution</td>
<td>2. Increase rate slightly to restabilize the system.</td>
</tr>
<tr>
<td></td>
<td>of the Derivative component.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Zero eliminates the Rate contribution.</td>
<td></td>
</tr>
<tr>
<td>68</td>
<td><strong>Trim Authority</strong> -</td>
<td>Start with trim authority set at 100. If stable operation cannot be achieved, reduce this parameter and repeat the tuning procedure.</td>
</tr>
<tr>
<td></td>
<td>determines how much of the output is</td>
<td></td>
</tr>
<tr>
<td></td>
<td>influenced by Gain, Reset and Rate,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>and how much is determined</td>
<td></td>
</tr>
<tr>
<td></td>
<td>by feed-forward.</td>
<td></td>
</tr>
<tr>
<td>69</td>
<td><strong>Rate threshold</strong> -</td>
<td>If unstable operation occurs only at very low feedback frequencies, slightly increase the parameter.</td>
</tr>
<tr>
<td></td>
<td>sets the amount of differential error</td>
<td></td>
</tr>
<tr>
<td></td>
<td>required before the Rate term</td>
<td></td>
</tr>
<tr>
<td></td>
<td>influences the control output.</td>
<td></td>
</tr>
</tbody>
</table>

**NOTE:** Refer to the downstream extrusion product area of the Conair website for a complete list of drive manuals and for more detailed drive information. www.conairgroup.com
Using the Digital Belt Gap Sensor

The digital belt gap sensor uses a linear scale attached to both rollers to measure the relative distance between the rollers. The relative distance is shown in thousandths of an inch (.001). The sensor has five buttons:

- **(On/Off) -** Turns the device on and off.
- **(Mode) -** Press to choose the readout in decimals, fractions, or millimeters.
- **(+) -** Press to move up one engineering unit.
- **(0) -** Press to zero the reading. Because all measurements are relative, the sensor can be set to zero at any time by pressing this button.
- **(-) -** Press to move down one engineering unit.

Readings displays are shown on the digital display.

For more information, refer to the belt gap sensor manual.
Adjusting the Pneumatic Upper Roller Actuator

You can adjust the opening and closing speed of the air cylinder assembly that operates the upper roller boom assembly by adjusting the air pressure or exhaust pressure.