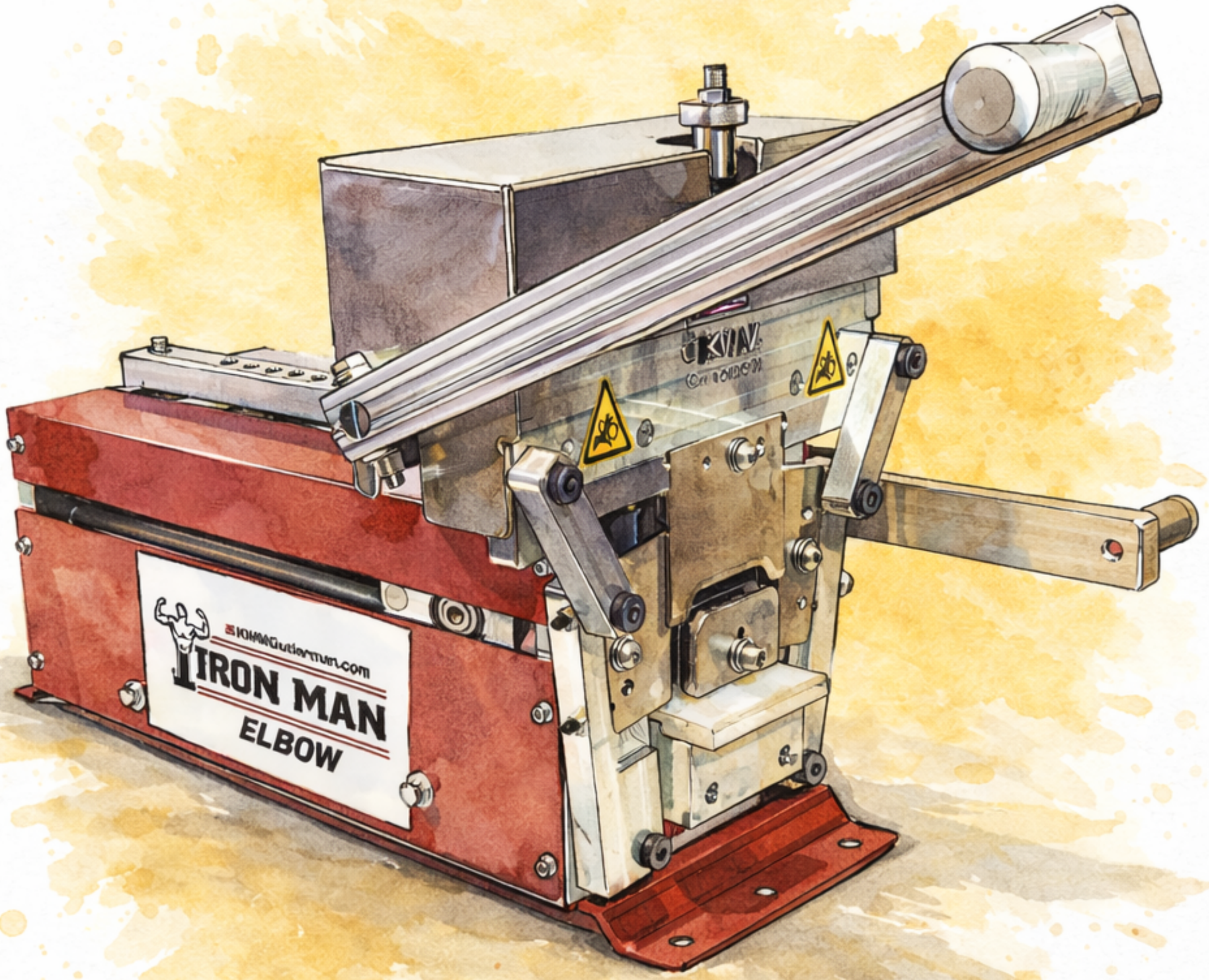
Ironman Elbow



Owner's Manual

795 S. Larkin Ave.
Rockdale, IL 60436
(815) 725-9205
www.kwmgutterman.com

KWM® Gutterman INC.

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1. INTRODUCTION

Thank you for your purchase of the Ironman Elbow Machine from KWM Gutterman. We appreciate your business and are confident that this machine will provide reliable performance and consistent results for years to come.

The Ironman Elbow Machine is designed to efficiently form downspout elbows from pre-cut blanks. With proper setup and operation, the machine produces clean, repeatable crimps for a variety of common downspout sizes and configurations.

This manual provides important information regarding the safe setup, operation, adjustment, and maintenance of the machine. It is essential that all operators read and understand this manual prior to use in order to ensure safe operation and optimal performance.

If you have any questions or require assistance, please contact KWM Gutterman at (815) 725-9205

At your service we remain.

2. Safety First

2.1 General Safe Operation
Read and fully understand this Operator's Manual before operating the machine.

Wear appropriate clothing at all times. Steel-toe boots are recommended. Avoid loose clothing and jewelry. Keep long hair, loose garments, and gloves away from all moving parts. Ensure handles are kept dry, clean, and free from oil and grease.

Safety glasses and leather gloves must be worn during operation.

Do not operate this machine without proper training.

2.2 Machine Safety Requirements

During operation, pinch points exist between the knives and mandrel. Contact with these areas can result in serious injury, including amputation of fingers or hands. Operators shall use extreme caution at all times, particularly when working near the knives and mandrel.

The machine shall be properly mounted prior to use to reduce the risk of injury. The mounting surface must be stable, level, and capable of supporting the full weight of the machine. If mounted on a table or stand, the table or stand must be securely anchored to the floor.

This machine is intended for single-operator use only. The design requires the operator to maintain control of the machine with both hands during operation. Use by multiple operators increases the risk of injury and is strictly prohibited. Bystanders shall be kept clear of the operating area at all times.

In the event of a machine crash (see Section 11), use extreme caution when clearing the obstruction. Crashes may create hazardous conditions, including sharp or jagged metal edges. Operators shall wear appropriate personal protective equipment (PPE), including safety glasses and cut-resistant or leather gloves, when clearing a crash.

Safety equipment with part numbers should you need to reorder them:

Safety Feature	Qnty	Part #
Top Exit Cover	1	EL0801
Top Left Cover	1	EL0802-L
Top Right Cover	1	EL0802-R
Center Assembly Bumper Block	2	EL0204
Triangle Pinch Point Decal	2	9608
Rectangle Pinch Point Decal	1	9578

Three (3) safety covers are installed—two enclosing the advance assembly and one enclosing the crimping assembly. These guards are designed to prevent operator contact with moving components and to restrict the entry of foreign objects into the machine.

***Bumper Blocks — Two (2) bumper blocks are mounted to the advance plate and are designed to prevent actuation of the crimp handle when the advance assembly is in its fully forward position. If the advance assembly is moved backward, the crimp stops will not function as intended, increasing the risk of serious injury.**

WARNING: This machine shall not be operated unless all safety covers are properly installed and secured in place.

Despite the presence of safety features, this machine contains exposed knives that present a potential hazard. To alert operators to these risks, warning labels have been applied to the safety covers. Three (3) finger pinch hazard labels are located on the front of the machine and the top front safety cover.
If safety covers are replaced, the corresponding warning labels will be provided and must be applied to the replacement covers. Refer to the illustration below for proper label placement.
If any warning labels are missing, damaged, or illegible, contact the manufacturer or authorized distributor for replacements.

Do not operate this machine unless all required warning labels are properly installed and clearly visible.

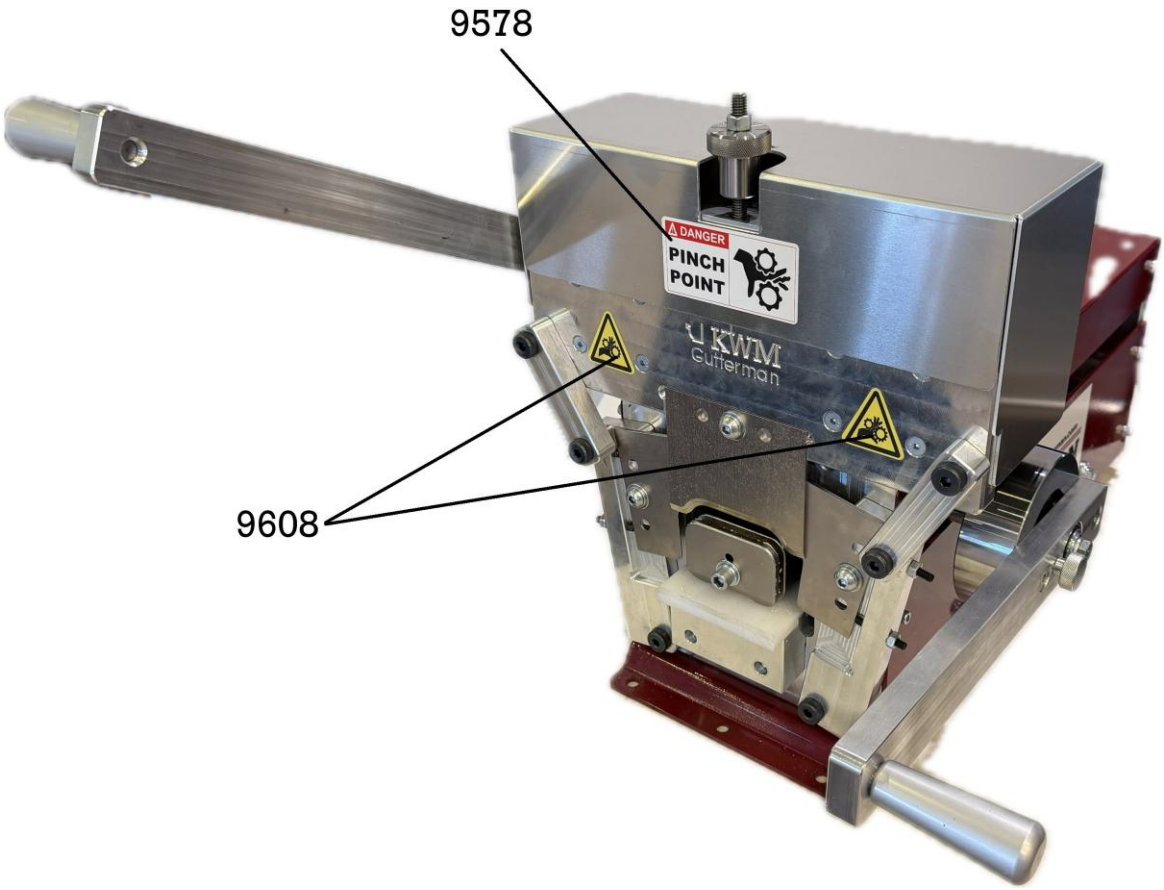


Figure 2-1: Warning Labels on the Ironman Elbow

WARNING: Use extreme caution at all times, especially when hands and fingers are near the knives and mandrel assembly. Contact with these components may result in serious injury.

3. Profiles

3.1 Profiles
The machine is capable of forming the following downspout elbow profiles:

2 in × 3 in (51 mm × 76 mm) — A Elbow, crimped up to 90°
2 in × 3 in (51 mm × 76 mm) — B Elbow, crimped up to 90°
3 in × 4 in (76 mm × 102 mm) — A Elbow, crimped up to 90°
3 in × 4 in (76 mm × 102 mm) — B Elbow, crimped up to 90°

3.2 Material Types and Thicknesses
The machine is designed to operate with the following materials:

Aluminum / Copper:

0.019 in and 0.027 in aluminum downspout blanks
16 oz copper downspout blanks

3.3 Material Strength
Acceptable material strength limits are as follows:

Aluminum / Copper:

Maximum tensile strength: 33 ksi (230 MPa)
Maximum yield strength: 28 ksi (195 MPa)

4. Machine Specifications

4.1 Standard Base Unit Specifications

Length: 20.75 in (525 mm) [mount-to-mount]
Width: 22.75 in (575 mm) [handle-to-handle]
Height: 26.75 in (680 mm) [base to vertical handle]
Weight: 74.5 lbs (34 kg) [chassis only]
Weight: 95 lbs (43 kg) [with four (4) tooling sets installed]

4.2 Standard Equipment Features

4.2.1 Profiles

Each profile requires the use of a dedicated tooling set, which includes:

- Top Knife
- Side Knife – Left
- Side Knife – Right
- Mandrel assembly

4.2.2. Forming Details

Manually Operated Crimping Mechanism
- Adjustable crimp depth
- Adjustable side knife position
- Rack-and-pinion crimping gears
- Spring return to neutral position

Manually Operated Advancing Mechanism
- Rack-and-pinion advance gear
- Locking/release pin for advance handle
- Crimp stop at final advance position

4.2.3 Production Speed

Production rate: approximately two (2) elbows per minute
Tooling change time: approximately 10 minutes (see Section 9)

4.3 Additional Equipment Features

4.3.3 Accessories

Push tool
Multiple tooling sets (optional)
Side-mount storage bars for additional tooling (optional)

4.4 Intended Use

The Ironman Elbow Manual Elbow Forming Machine is designed solely to form the specified elbow profiles using the designated material types, thicknesses, and strength limits outlined in this manual.

Use of this machine for any purpose other than its intended application is strictly prohibited. Unauthorized use may result in serious personal injury and/or damage to the machine.

The machine shall not be used to form partial, modified, or non-specified profiles, nor to process materials outside of the stated gauges or strength limits.

5. Terminology

5.1 Machine Nomenclature

Front End — The end of the machine where the crimping mechanism is located

Back End — The end of the machine opposite the crimping mechanism

Left Side — When facing the crimping mechanism, the side on the operator's left

Right Side — When facing the crimping mechanism, the side on the operator's right

5.2 Profile-Specific Terms

The profile is defined as viewed from the front end of the machine, as the material exits:

Left Curve — The profile remains horizontally level and curves to the left as it exits the machine

Right Curve — The profile remains horizontally level and curves to the right as it exits the machine

Crimp Depth — The depth to which the top, left, and right knives press into the material

5.3 Machine-Specific Terms

Push Tool — An accessory used to assist with insertion of the material (blank)

Mandrel Assembly — Rectangular components inserted into the downspout blanks over which the material is formed and crimped

Knife — Flat, contoured bars that press the material between the mandrels during the forming and crimping process

Advance Handle — Handle extending from the right side of the machine used to advance the elbow through the forming process

Crimp Handle — Handle extending from the left side of the machine used to actuate the crimping process

Crimp Depth Adjustment Knob — Adjustment knob used to set crimp depth (see Figure 11-5)

Return Height Adjustment Nut — Nut located on the underside of the front plate, below the crimp depth adjustment knob, used to limit upward travel of the crimping assembly and prevent misalignment of the crimping dies

6. Required Tools

Combination or Open End Wrenches

- 7/16-in
- 9/16-in

T-Handle Hex Wrench

- 1/8-in up to 5/16-in – 1/16-in increments

L-Handle Hex Wrench

- 1/8-in up to 5/16-in – 1/16-in increments
- Ball-Nose type wrenches recommended
- 3/16, 1/4, 5/16

Cutting Tools

- Hack Saw
- Band Saw

7. Sub-Assembly Overview

7.1 Crimping Assembly

The crimping assembly is located at the front of the machine. It extends from the spring return components protruding through the top cover down along the front of the machine. The assembly includes the three (3) knives, knife adjustment screws, and crimp dies. Most moving components within this assembly are enclosed by a safety cover.

The crimping assembly performs the initial forming operation by creating a fold in the material (blank). Actuation of the crimp handle forces the knives to press into the blank, forming the material around the mandrel assembly.

Crimp depth is adjustable using the adjustment knob located at the center of the crimping assembly (see Section 10).

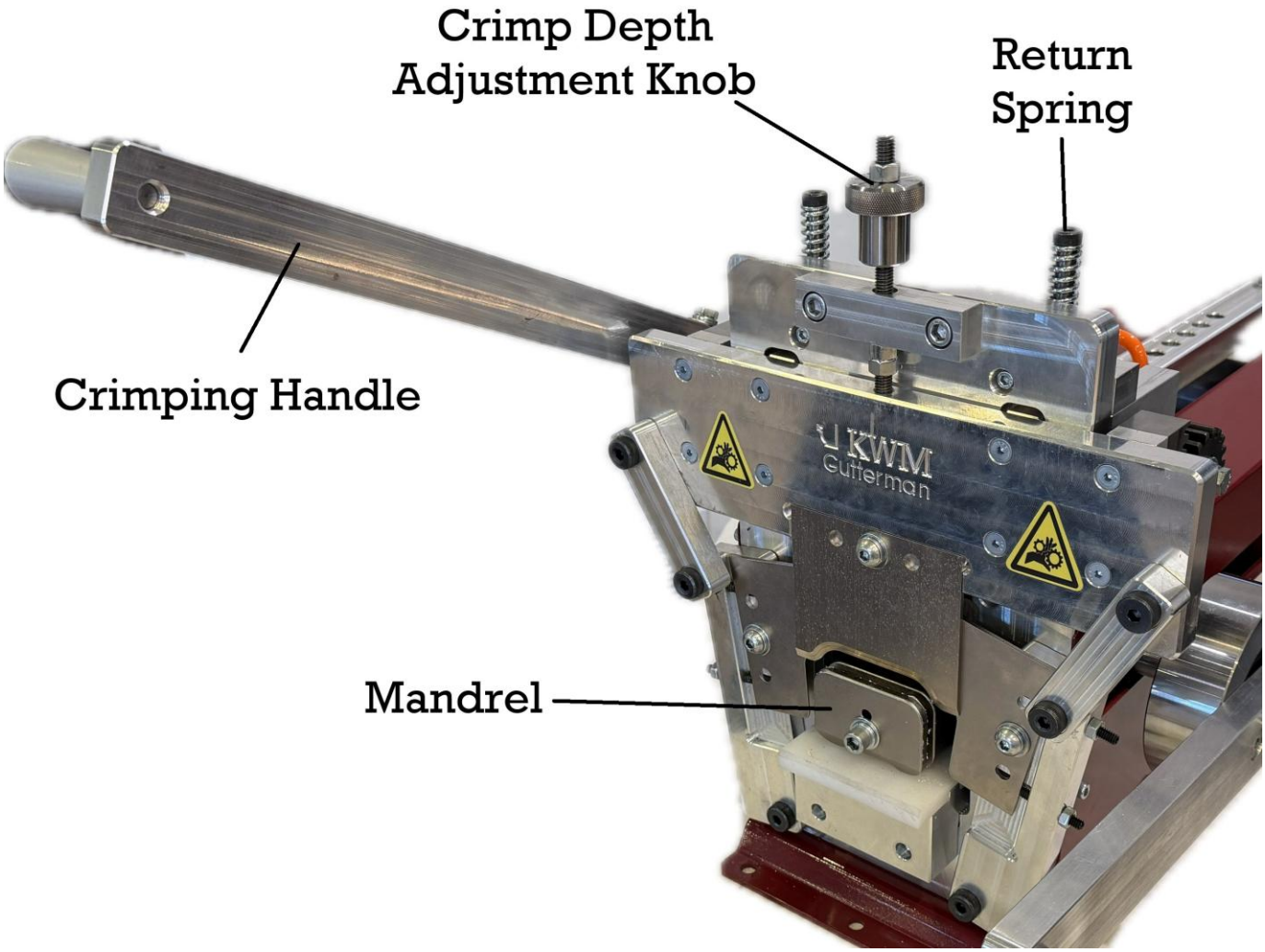


Figure 7-1: Crimping Assembly

7.2 Advance Assembly

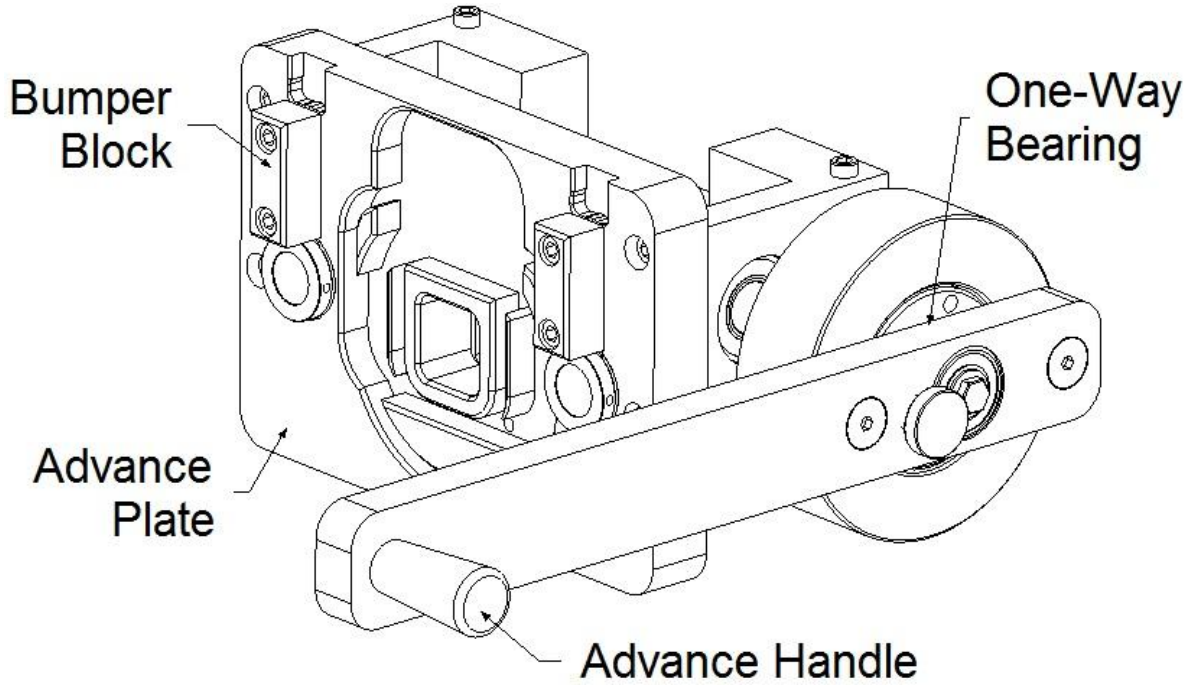
The advance assembly is a movable component located within the enclosure formed by the safety covers. It travels along two (2) slide shafts and is driven by a rack-and-pinion gear system.

With the locking/release pin properly engaged, pulling the advance handle moves the advance assembly forward. This action completes the final stage of forming by advancing the blank and positioning it for the next crimping cycle.

The advance handle is mounted to a cam clutch bearing, which allows the assembly to move forward only when the handle is pulled, preventing reverse motion during operation.

Two (2) blocks, referred to as bumper blocks, are incorporated into the assembly. These blocks prevent unintended movement of the crimping assembly and eliminate additional or unintended crimps when the advance assembly is in the fully forward position.

The assembly also includes an advance plate. This plate features four (4) machined contours to accommodate different downspout configurations. During operation, the advance plate contacts the blank and advances it through and out of the machine as the handle is actuated.



Advance assembly

7.3 Tooling Storage

When multiple tooling sets are purchased, a storage box is included.

This box helps keep tooling organized and readily accessible, allowing for efficient and safe changeover between profiles.

8. Setup and Operating Procedure

8.1 Receipt and Unpacking

Upon receipt, verify the contents of the shipment against the packing list. Inspect all components for damage or missing items. If any discrepancies are identified, contact your sales representative or distributor immediately.

8.2 Initial Inspection

WARNING: Inspect the machine prior to operation.

During transport, components may loosen and/or foreign objects may enter the machine.

The operator shall verify the following prior to operation:

1- No foreign objects are present that could damage machine components
2- All fasteners are secure and properly installed
3- Gears, slide shafts, and other moving parts are properly lubricated, correctly adjusted, and ready for operation

WARNING: Replace all safety covers prior to operation

After adjustment or repair, be sure all tools are removed from the machine prior to operation.

8.3. Installing the Crimping Handle

To reduce shipping size, the Ironman Elbow is shipped with the crimping handle removed. The operator must reinstall the handle prior to operation using two (2) 9/16 in combination or open-end wrenches. Remove the 1/2 in bolt and nut from the shaft. Slide the handle onto the shaft and align the holes in the handle with the holes in the shaft at the desired orientation. Insert the bolt through the aligned holes, install the nut, and tighten securely until the handle is firmly clamped to the shaft.

8.4. Mounting Instructions

8.4.1 General

READ ALL MOUNTING INSTRUCTIONS PRIOR TO MOUNTING THE MACHINE.

The Ironman Elbow shall be permanently mounted at its intended point of use (e.g., in the bed of a pickup or panel truck, on a trailer, or on a dedicated workbench).
The machine weighs approximately 95 lbs (43 kg). The mounting surface must be capable of safely supporting this weight and any additional operational loads.
The machine shall be installed and operated on a level surface. The front end and operating handles must be positioned to allow full, unobstructed movement and shall be kept clear of any physical obstructions, including equipment, partitions, or walls.

WARNING: Do not force the machine frame to conform to the mounting surface.

If gaps exist between the machine frame and the mounting surface, leveling pads or suitable shims shall be used to achieve proper support. Forcing the frame to twist or warp to match an uneven surface may result in misalignment, loss of dimensional accuracy, and potential machine damage.

The machine chassis is designed to be rigid. Proper leveling and support must be maintained during installation to preserve the original alignment and performance of the machine.

8.5.2 Stationary Mounting

For safety and stability, the machine shall be securely bolted to the mounting surface. The frame shall not be forced or drawn down to conform to an uneven base. If the mounting surface is irregular, shims or leveling devices must be used to ensure solid, even contact at all mounting points.

A level and stable installation is essential for safe operation and the production of accurate, high-quality profiles.

For guidance on specific mounting applications, contact the manufacturer. Mounting information is available upon request at no charge.

If the machine is mounted to a table or stand, the table or stand must be securely anchored to the floor or ground.

9. General Operating Procedures

9.1 Initial Setup

9.1.1 General

The manufacturer recommends providing sample blank material at the time of order. This allows the machine to be configured to meet the specific material and profile requirements of the user.

The machine is fully set up, tested, and adjusted at the factory prior to shipment. Under normal conditions, the machine should produce high-quality elbow sections with minimal or no additional adjustment, depending on material type and thickness.

Smooth and controlled actuation of the handles is required. Consistent operation will improve part repeatability and reduce premature wear of internal components.

9.1.2 Initial Setup Inspection

A thorough inspection shall be performed prior to setup and operation. Perform the following checks:

-Inspect the machine for loose fasteners or components and secure as required
-Verify that the correct knife set is installed for the desired elbow profile

If the factory setup does not match the intended starting profile, refer to Section 10 for instructions on configuring the machine for the desired profile.

9.2 Blank Sizing

Blank length requirements may vary depending on the specific machine and downspout size. Variations in crimp-to-angle ratios between machines may affect the amount of material required for each crimp. Operator experience with the machine and material will improve accuracy in determining appropriate blank lengths.

During operation, the combined crimping and advancing process consumes approximately 1 in of material per cycle. The distance from the final crimp to the end of the blank (where it contacts the advance plate) is approximately 3.25 in.

The only variable portion of the blank is the length of material extending beyond the elbow. This length may be adjusted to meet application requirements.

To determine the required blank length:

Add the desired length beyond the elbow to 3.25 in
Add 1 in for each crimp to be performed

The resulting total is the required blank length.

The table below provides recommended blank sizes for various elbow configurations. These values are intended as general guidelines. Adjustments to crimp depth and side knife position may allow for steeper bend angles with fewer crimps, resulting in shorter required blank lengths.

2"X3" DOWNSPOUT BLANKS

ELBOW SIZE	BEND DEGREES	BLANK LENGTH (In)	BLANK LENGTH (mm)
A ELBOWS	45	8.5"	216mm
	60	10"	254mm
	75	11.5"	292mm
	90	12.5"	318mm
B ELBOWS	30	8.5"	216mm
	45	10"	254mm
	60	11.5"	292mm
	75	12.5"	318mm
	90	14"	356mm

3"X4" DOWNSPOUT BLANKS

ELBOW SIZE	BEND DEGREES	BLANK LENGTH (In)	BLANK LENGTH (mm)
A ELBOWS	45	9"	229mm
	60	10.5"	267mm
	75	14"	305mm
	90	15"	330mm
B ELBOWS	30	9"	229mm
	45	10.5"	267mm
	60	12"	305mm
	75	14"	330mm
	90	15.5"	368mm

9.2.1 Profile vs. Number of Crimps

As a general guideline, two (2) crimps produce approximately 25° of bend in 2 in × 3 in downspout. For 3 in × 4 in downspout, two (2) crimps produce approximately 15° of bend.
Adjustment of crimp depth and side knife position may alter these values. Variations of one (1) to two (2) crimps may still produce acceptable elbow profiles, depending on material and setup conditions.

WARNING: These values may vary between machines and are provided for reference only.

9.2.2 Setting the Number of Crimps

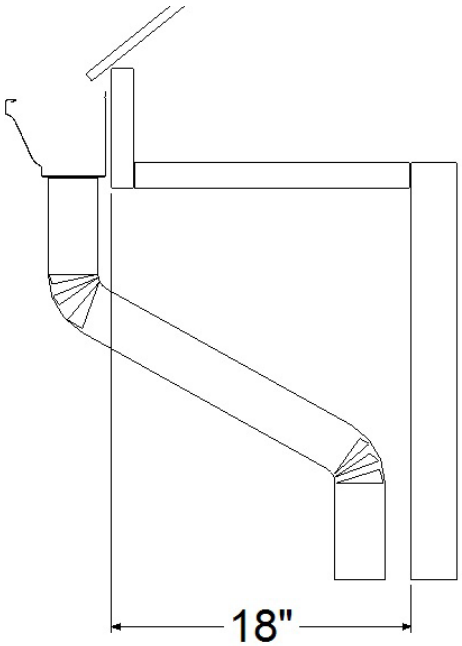
The machine is configured at the factory for a specific downspout size. The resulting elbow angle is determined by the number of crimps performed.
The markings along the top of the enclosure indicate the number of crimps. Insert the T-handle pin into the corresponding hole for the desired number of crimps.
When the blank is inserted, the T-handle pin limits rearward travel of the advance assembly, preventing the machine from producing excess crimps.

Set the T-handle pin position to control the number of crimps.

9.2.3 Return Sizing

When making offsets, the required blank length is determined by the desired elbow angle and the length of the overhang the offset is intended to span.

The following example illustrates blank sizing for a 2 in × 3 in A-style downspout elbow with a 75° bend and an 18 in overhang.



Blank Sizing for Offset Fabrication

The two elbow sections are each 75° (approximately six (6) crimps per elbow).

Measure the distance from the wall to the fascia, then add 1 in of material for each crimp required to form the offset. In this example, the resulting blank length is approximately 30 in.

***These are provided as guidelines. They will vary due to machine and the material used ***

9.3 Cutting Elbow Blanks

Elbow blanks shall be cut square at both ends. Properly squared cuts help ensure straight, uniform crimps and reduce the potential for twisting during forming.
Use a fine-tooth, high-quality blade designed for nonferrous metals. A 10 in blade with approximately 150 to 200 teeth is recommended.

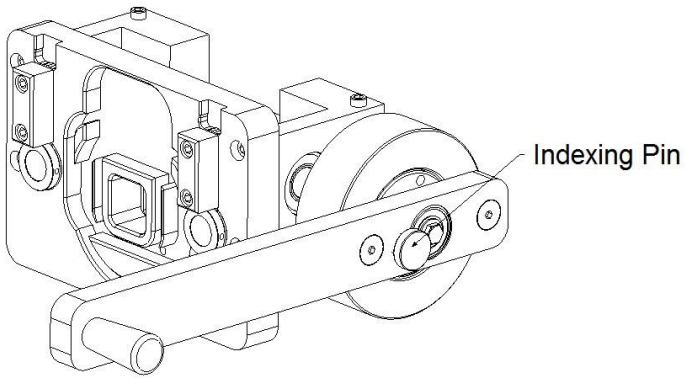
9.4 Inserting a Blank

Extend the indexing pin and rotate it 90° so that it does not reengage when released. This allows the advance assembly to move toward the back end of the machine.
Insert the push tool into one end of the blank. Position the opposite end of the blank over the mandrel. If necessary, slide the advance assembly toward the back of the machine to allow the mandrel to be raised slightly.
Gently rock the blank back and forth as needed to allow the mandrel to lift and the blank to seat properly around it. Continue inserting the blank until it reaches the advance plate.
While maintaining control of the blank, continue slight rocking or vertical movement until the rear of the blank is fully seated in the appropriate slot of the advance plate.
Advance the assembly until it contacts the T-handle pin. The blank is now fully inserted and ready for crimping.

NOTE: It is recommended that the indexing pin remain in the extended position during this process to ensure the blank is fully inserted prior to crimping.

NOTE: It is recommended that the push tool remain in the front end of the blank until the first crimp is completed. The initial crimp may cause the opening of the blank to twist, resulting in an undesirable elbow.

After the first crimp is performed, the push tool may be removed and set aside.



Close of up advance handle showing location of indexing pin.

9.5 Producing a Crimped Elbow
Once the previous setup steps have been completed, the machine is ready to produce an elbow.
Actuate the crimp handle through its full range of motion, then allow it to return to the starting position.
Extend the indexing pin away from the handle and rotate it 90° so it can engage one of the holes behind the handle.
Slowly raise the advance handle until the indexing pin engages a hole. Continue lifting the handle to the top of its travel.
If the indexing pin does not engage, slowly lower the handle until engagement occurs, then raise it again to the top position.
Slowly lower the advance handle through its full range of motion. This action advances the blank toward the front of the machine and completes one (1) crimp.
If necessary, apply slight upward pressure on the push tool during the initial advance to assist in forming the first fold.
Continue alternating between the crimp handle and advance handle until the crimp handle no longer produces a crimp.
At this point, remove the completed elbow from the front of the machine and prepare the next blank.

NOTE: The handles should be operated in a smooth, controlled manner. Do not force or rapidly cycle the handles between positions.
Abrupt or forceful operation may result in inconsistent crimp depth, leading to non-uniform elbow profiles.
Controlled actuation improves repeatability and helps reduce premature wear of internal components.

WARNING: During operation, the operator shall keep both hands on the machine at all times. Failure to do so significantly increases the risk of hand and finger injury.
Loose clothing, jewelry, and long hair shall be kept clear of all moving components at all times to prevent entanglement hazards.

10. Profile Changeover Procedures

10.1 Profile Changeover — General Notes
The following descriptions and figures illustrate the machine in the 2 in × 3 in A configuration. The changeover procedure and required tools are the same for all configurations.
Profile changeover can be performed using a set of L-shaped hex wrenches (see Section 4). Moving the advance assembly to the back end of the machine may simplify the changeover process.
WARNING: When the advance assembly is not in the fully forward position, the crimp stops will not function as intended. Under these conditions, the knives are capable of moving, which increases the risk of serious injury. Use extreme caution and keep hands clear of all moving components during changeover.

WARNING: Ensure the crimp handle is not actuated during the changeover process. Movement of the crimp handle may result in serious injury.

10.1.1 Knives Removal and Mandrel Assembly Removal
Using a 5/16 in hex wrench, remove the three (3) knives prior to removing the mandrel assembly to reduce the risk of injury.
Remove the three (3) 3/8 in socket head cap screws securing the knives to the machine, then carefully remove the knives.
After the knives have been removed, remove the 3/8 in socket head cap screw securing the mandrel assembly. Slide the mandrel assembly off the advance shaft.

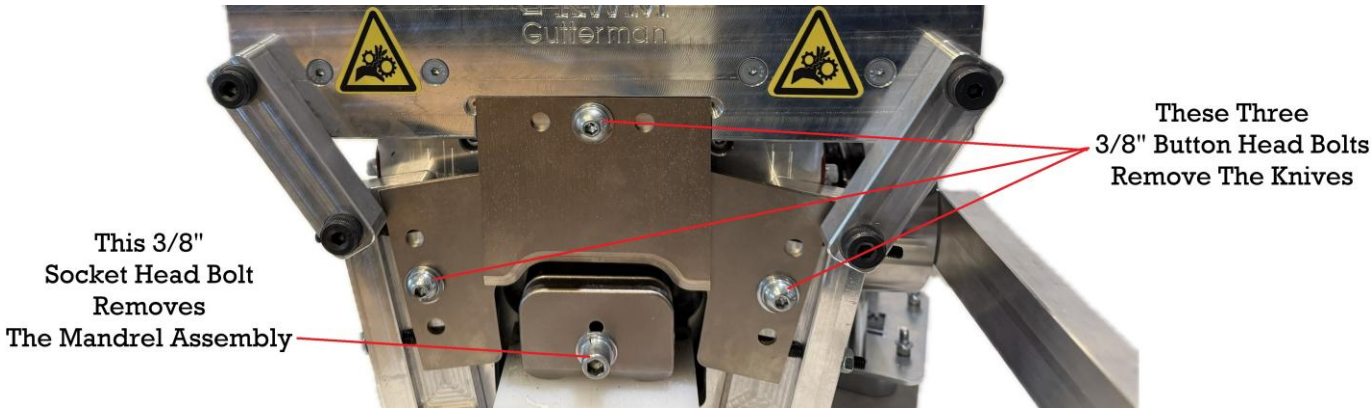


Figure 10-1: Front view of knives and mandrel assembly to be exchanged.

10.1.2 Mandrel Assembly Installation and Knife Installation
Install the mandrel assembly and knives using the same 3/8 in socket head cap screws from the previous configuration.
To reduce the risk of serious injury, install components in the following order: mandrel assembly, side knives, then top knife.
Install the mandrel assembly first. Ensure the heads of the two (2) 1/4-20 socket head screws face the operator, then slide the assembly onto the roller key extending from the gear rack. It may be necessary to move the advance assembly toward the back of the machine to allow slight upward movement of the gear rack during installation.
Once properly positioned, secure the mandrel assembly using a 3/8 in × 1.75 in socket head cap screw.
Install the side knives next. Position each knife with the beveled side facing the machine, then secure using the appropriate socket head cap screw. Tighten the fasteners until snug, but do not overtighten. The knives must be able to slide slightly side-to-side to allow proper contouring to the blank during adjustment.
Refer to Figure 10-2 for correct orientation of the left knife. The right knife is installed in the same orientation.

Figure: 10-2: This side of the **left** knife should face operator when mounted

The beveled side of the **left** knife should face away from the operator when mounted.

With the side knives installed, install the top knife with the beveled side facing the operator, as shown in Figure 10-3.

Secure the top knife using the appropriate socket head cap screw and tighten fully. Proper tightening is required to ensure correct crimping performance.

Figure 10-3: This side of the top knife should face the operator when mounted.

10.1.3. Storing the Removed Knives and Mandrel on Sides of the Machine.

Availiable with the Ironman Elbow is a box to store all four sets of knives and mandrels, this will keep your knives and mandrels secure when not in use.

Adjustment may be required after installation of the new knives and mandrel assembly. Refer to Section 11 for adjustment procedures.

Only minor adjustments should be necessary under normal conditions. In most cases, adjustment of crimp depth is sufficient when changing between A and B configurations.

If significant adjustment is required, verify that the changeover procedure was completed correctly before proceeding.

11. ADJUSTMENTS AND TROUBLE SHOOTING

WARNING: Ensure all setup and operating procedures outlined in Section 7 have been completed and verified prior to making any adjustments to the machine.
WARNING: Read and fully understand all procedures in Section 10 and Section 11 before performing any machine adjustments.

11.1 General Operation

Inconsistent machine operation may result in defects in the finished elbow. Ensure that both handles are actuated smoothly, consistently, and through their full range of motion during operation.
The first two subsections of this section address common sources of inconsistency and may correct issues with the finished profile. If problems persist, proceed to the knife adjustment procedures to achieve the desired profile.

11.2 Crimping/Advancing

For proper operation, the handles should be actuated in a controlled downward motion rather than pulled toward the operator. Smooth, consistent handle movement is required to produce uniform parts.
Rapid or forceful operation of the handles may result in inconsistent crimps and increased wear on machine components.
Proper leverage should be maintained to allow controlled handle movement. If adequate leverage cannot be achieved by adjusting the operating surface height, the orientation of the crimping handle may be adjusted to improve operator ergonomics.

11.2.1 Adjusting Position of Crimping Handle

Adjustment of the crimping handle orientation requires a 7/16 in combination wrench and a 5/16 in L-shaped hex wrench.
Remove the top safety cover to expose the crimp shaft and gear assembly.
Identify and note the current engagement position between the rack gear and pinion gear. For reference, Figure 11-1 shows the gears meshing at four (4) teeth down from the top of the rack. This same engagement position must be maintained when reinstalling the handle.
As an alternative method, the crimping assembly may be held in position by turning the crimp depth adjustment knob clockwise until it contacts the front stop. This will prevent movement of the crimping assembly during handle removal and adjustment.

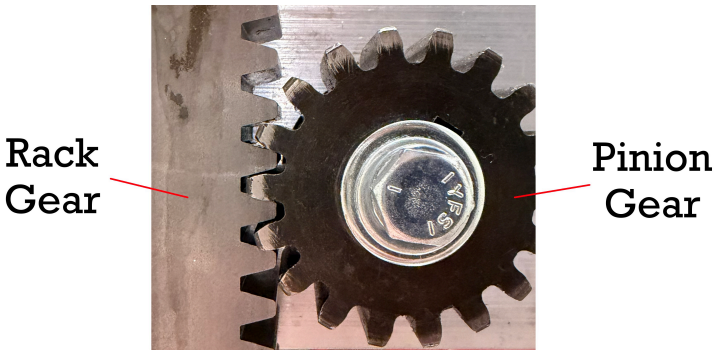


Figure 11-1: Gear Engagement Position (Four Teeth Down on Rack Gear)

Loosen the four (4) outermost 1/4-20 × 1.25 in socket head cap screws on the front plate (see Figure 11-2). Fully remove the two (2) screws on the left side. This will allow the rack gear and spacer to separate from the rear of the front plate.
Next, fully remove the two (2) screws on the right side. This will allow the crimping handle to move freely without actuating the crimping assembly.

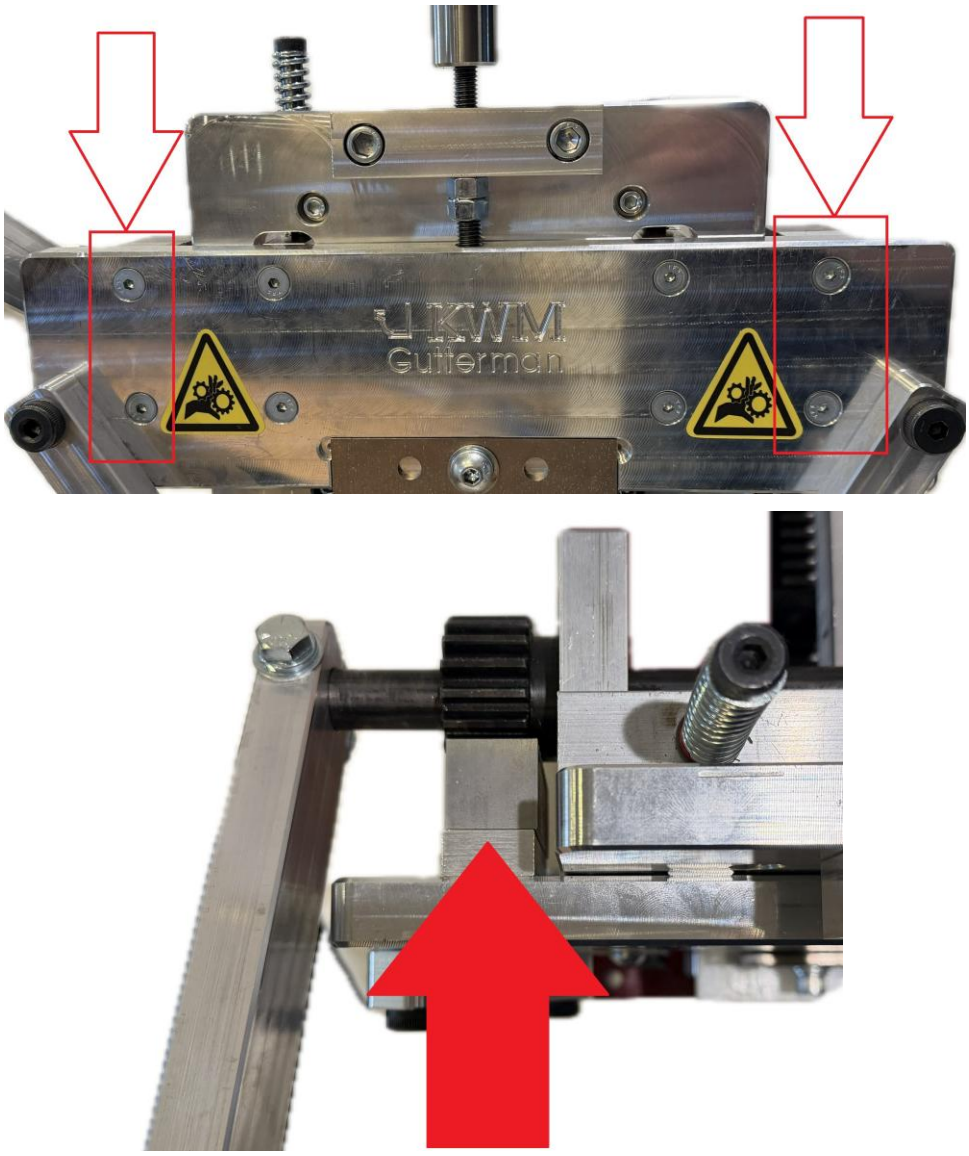


Figure 11-2: Removal of Outer Screws and Rack Components

Removal of the four (4) outermost screws allows for removal of the rack gear and rack spacer. Removing these components from both sides of the front plate enables adjustment of the crimping handle position. Rotate the crimping handle to the desired orientation. Reinstall the rack gear and spacer on the left side, ensuring the gear teeth are properly realigned to their original position (four (4) teeth down, as shown in Figure 11-1). Verify that the notched end of the rack gear is oriented upward.

Reinstall the rack gear and spacer on the right side. Install and securely tighten all four (4) socket head cap screws.

Turn the crimp depth adjustment knob counterclockwise until it contacts the adjustment nut above it.

Reinstall the top cover and resume operation in accordance with Section 7.

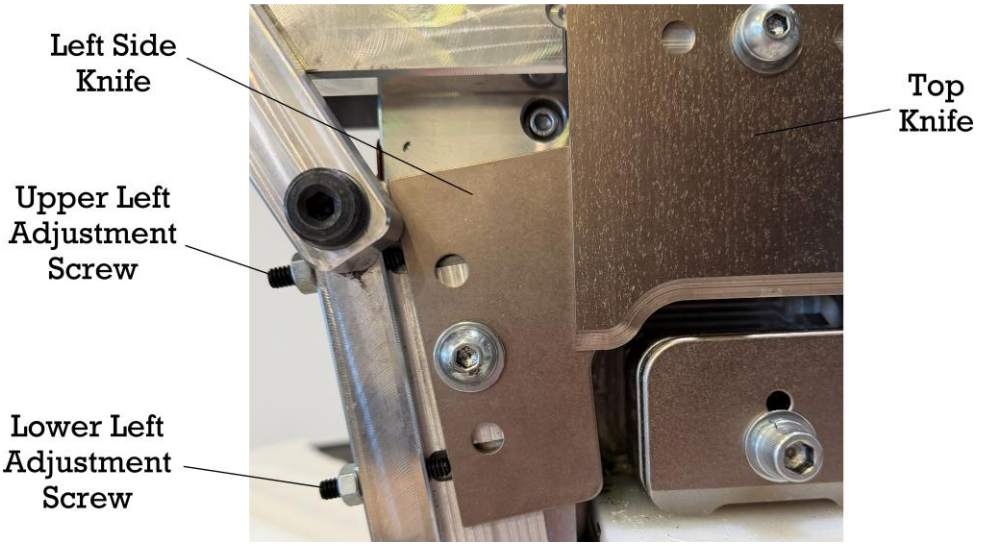
11.3 Profile Curvature Adjustments

WARNING: Ensure material specifications outlined in Section 3 are followed. Use of material exceeding specified strength or hardness may result in tearing or unpredictable forming results.

To achieve the desired elbow profile, minor adjustments to the side knives and overall crimp depth may be required.

Adjustment screws shall be turned in small increments only. Large adjustments may result in significant and undesirable changes to the crimp profile.

Perform adjustments gradually and use multiple test blanks to verify results and achieve the desired profile.



The above image shows the location of the two adjustment screws for the left side knife.

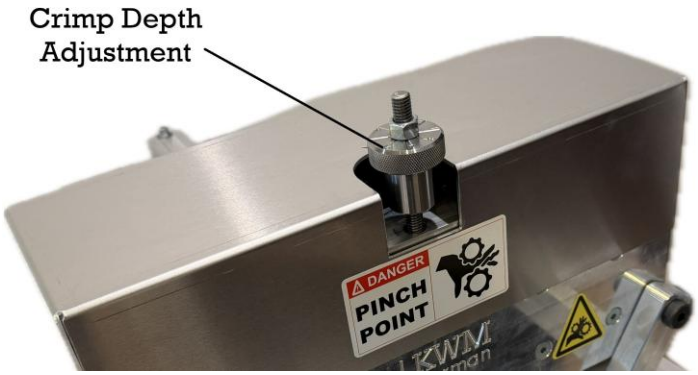


Figure 11-5: Crimp Depth Adjustment Knob Location

Crimp depth is adjusted using the knob shown above.
Use the color coded top crimp adjustment setting block as a starting point for the desired profile.(See below)
Place the setting block in between the Crimp Depth Adjustment Knob and the top aluminum plate.
To increase crimp depth (top and sides), rotate the adjustment knob slightly counterclockwise. To decrease crimp depth, rotate the knob clockwise.
Make adjustments in small increments and verify results using test blanks.

Complete adjustment of the machine may require adjustment of all four (4) side adjustment screws in addition to the crimp depth adjustment knob.
Use the color coded left and right knife setting blocks as a starting point for the desired profile.(See below)
The setting block should rest on the lower adjustment bolt.
Multiple test blanks may be required to achieve the desired profile. Operators should expect a brief learning period when performing adjustments.
If there is any uncertainty regarding adjustment procedures or the function of adjustment components, contact the manufacturer or authorized distributor for assistance.

Profile	Color
3X4 A	Yellow
3X4 B	Green
2X3 A	Red
2X3 B	Blue

KWM Gutterman recommends that the customer provide sample downspout material prior to delivery. These samples will be used to configure the machine and produce representative finished elbows for inclusion with the shipment.

11.3.1 Tearing

The crimping process is a controlled forming (folding) operation. The most common issue encountered during this process is material tearing.

Tearing typically results from excessive crimp depth or improper side knife adjustment, particularly when the side knives contact the blank unevenly or are set too far inward at the top.

Ensure the side knives make light, even contact at the lower corners of the blank. From this position, the side knife angle may be adjusted incrementally to increase crimp effectiveness while minimizing the risk of tearing.

The top knife must be properly coordinated with the side knives to achieve uniform forming without overstressing the material dies to create the correct fold. A visual assessment must be made to determine how to adjust the depth of crimp. An inspection of the inside of the completed elbow must not reveal any cracks in the elbow.

11.3.2 Right or Left Curve

A right or left curve in the finished elbow occurs when one side knife crimps more material than the other. This condition may result from one side being over-adjusted or the opposite side being under-adjusted.

If one side is crimping too much material, adjust that side by turning both the upper and lower adjustment screws counterclockwise. This maintains the knife angle while reducing the amount of material being formed.

If one side is not crimping enough material, turn both the upper and lower adjustment screws clockwise, maintaining the same knife angle while increasing material engagement.

A common indication of insufficient crimping on one side is the formation of a bulge rather than a defined fold. In this case, slightly increase the side knife engagement until a consistent, uniform fold is achieved.

11.3.3 Profile Twisting Adjustments

Twisting of the profile may occur if only one adjustment screw (either upper or lower) on one side is set deeper than the other, resulting in uneven forming forces.

This condition will cause the exit end of the blank to deflect laterally and vertically.

To correct twisting, adjust the appropriate upper or lower screw on the affected side in small increments until the profile exits straight and uniform. Maintain balanced adjustment between upper and lower screws to ensure even forming pressure.

11.4 Crash Procedures

A machine crash may consist of one or more of the following conditions:

-Material does not advance through the machine
-Material becomes bent, jammed, or crumpled against a fixed machine component

A machine crash presents a potentially hazardous condition for the operator. Crashes may create sharp or jagged metal edges that pose a risk of cuts and lacerations.

Appropriate personal protective equipment (PPE), including safety glasses and leather or cut-resistant gloves, shall be worn at all times when clearing a crash.

Identify and correct the cause of the crash prior to resuming operation. Perform a thorough inspection of the entire machine, as obstructions or root causes may not be immediately visible.

Safety covers shall be removed as necessary to allow for a complete inspection.

11.4.1 Clearing the Crash

Use appropriate cutting tools (e.g., right-hand and left-hand snips as required) to remove any folded, bent, or crumpled material from the machine.

Removal of jammed material may require removal of the knives and mandrel assembly.

In cases of a severe crash, partial disassembly of the machine may be necessary to fully clear the obstruction; however, this is typically not required.

WARNING: Exercise extreme caution when operating or servicing the machine with safety covers removed. Exposure to moving components significantly increases the risk of serious injury.

NOTE: A common cause of a machine crash is performing an additional crimp without sufficient advance to move the elbow over the mandrel.

In some cases, the obstruction may be cleared by placing a wooden block between the back end of the blank and the advance plate, then carefully actuating the advance handle.

If this method is unsuccessful, removal of the knives and mandrel assembly may be required. In most cases, the affected elbow will be unusable.

11.4.2 Crash Recovery

A machine crash indicates a significant problem with machine adjustment, operating procedure, or mechanical condition.

Once all material has been removed from the machine, refer to Sections 8 and 9 for Initial Setup and General Operating Procedures. Re-read Sections 9 and 11 in full before returning the machine to service.

Perform a thorough inspection of the entire machine, then complete all applicable setup, inspection, and adjustment procedures identified in Sections 9 and 11. Restart the process from the beginning, as though the machine has not yet been operated.

Following a crash, all machine adjustments shall be considered suspect and must be verified prior to resuming operation.

WARNING: Reinstall all safety covers before returning the machine to continuous operation.

12. General Machine Maintenance

12.1 Cleanliness / General
The machine and surrounding work area shall be kept clean and free of dust, dirt, and debris at all times. Routine cleaning of the entire machine will help extend the service life of mechanical components. Maintaining a clean machine and work environment also helps prevent the introduction of foreign objects into the machine, which may result in damage to internal components.

12.1.1 Factory Assistance
If operational or maintenance issues cannot be resolved using this manual, contact the manufacturer or authorized distributor for assistance.
Customer support is available to ensure proper operation and continued satisfaction with the equipment.

NOTE: This maintenance schedule is based on intermittent operation of approximately eight (8) hours per day, five (5) days per week.

Adjust the maintenance intervals as necessary to reflect actual machine usage and operating conditions.

12.2 Index of Periodic Maintenance
Maintain the Ironman Elbow in proper operating condition by following a regular maintenance schedule. Perform a brief inspection of the machine prior to each use to identify any obvious issues. In addition, implement a periodic maintenance schedule using the following checklists.

12.2.1 Semi-Annual Checks
Inspect gears and sprockets for wear or damage
Inspect all fasteners for proper tightness

12.2.2 Monthly Checks
Lubricate gears and sprockets
Perform a full range-of-motion test on the crimping and advance assemblies
Remove top covers and clear dust and debris using appropriate cleaning methods
Inspect knives and mandrel components for wear or damage
Lubricate both slide shafts

12.2.3 Weekly Checks
Remove knives and mandrel components for cleaning and inspection
Ensure the work area is clean and free of hazards and foreign objects that could enter the machine or create a risk of hand injury during operation

11.2.4 Changeover Checks (Performed Each Time Tooling Is Changed)
Inspect knives and mandrel components for wear or damage
Verify all fasteners are secure and properly tightened

13. Transportation / Moving the Machine

13.1 General
During transportation or relocation, the machine may be subjected to vibration and shock typical of vehicle or trailer movement. These conditions may cause fasteners or components to loosen.

13.2 Transportation Procedures

Ensure all machine components and accessories are secured prior to transport
Remove all loose tools from the machine and surrounding area
Remove and discard any straight or partially formed blanks from the machine

Once prepared, the machine may be loaded onto a trailer, into a vehicle, or into an appropriate shipping container.

The machine shall be securely fastened to the transportation vehicle using appropriate restraints to prevent movement during transport.

13.3 Post-Transport Inspection
After transporting or relocating the machine, refer to Section 11 and perform all applicable inspection and adjustment procedures.

WARNING: The initial inspection procedures outlined in Section 11 shall be performed each time the machine is transported or moved prior to returning it to operation.