



Operation & Maintenance Manual

NOTICE TO USER

The user is expressly warned to consider and adopt all safety precautions that might be indicated by the activities described herein and to avoid all potential hazards. By following the instructions contained herein, the user willingly assumes all risks in connection with such instructions.

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1.0 First Steps

1.1 Inspection

Upon receipt of the CPC1500, perform a thorough inspection of the shipment. Compare what you received to the packing list to be sure you have all the components, including any supplies you may have ordered. Check for any damage to the equipment. If damage is found, notify the delivering freight company and United Surface Solutions LLC immediately.

1.2 Selecting Equipment Location

Placement of the new equipment should be decided before the delivery date. The equipment locations should be based on the “flow of parts” in your factory. The CPC1500 requires electrical power and optional water source to operate, although for most applications, fresh water, a wastewater treatment system, a drain, and a large work surface should be provided near the machine. United carries a full line of workstations and wastewater treatment systems and is happy to recommend appropriate equipment to fit your needs.

It is recommended to leave at least three (3) feet on each side of the machine for maintenance purposes. Sufficient work and storage space is also required.

1.3 Equipment Setup

Isolation Pads

While setting up the CPC1500, make certain that High-Capacity Rubber Isolation Pads (rated at a min. of 1500 psi) are installed under each leg of the unit. These pads are used to level the equipment and will extend the service life of the machine. The leveling procedures will be explained later in this section.

Electrical

A licensed electrician is required to connect electrical power to the CPC1500. The power requirements are printed on the data plate, located on the machine’s rear panel.

Caution: Be sure to connect only the specified voltage to the machine! These systems are built with standard voltage of 230VAC. They can be ordered in 208, 380, 400, 460, and 480 volt configurations. Applying excessive voltage will result in severe damage to your system and will void the warranty. If you question the voltage specified on the data plate, inspect the motor and AC drive to confirm their rated voltage or call United Surface Solutions with the serial number.

A visible-blade safety disconnect is required (supplied by the customer) to connect the appropriate power to the CPC. Connect incoming power from the safety disconnect to the junction block located in the electrical control box. Do not connect power to any other location. A conduit is supplied on the lower left side of the rear panel for routing power from the safety disconnect. Use an appropriate junction box to connect to this conduit. Do not connect conduits, cables, or any other device to the removable panels on the CPC, as this will interfere with maintenance. Be advised that the CPC will sway (front to back) under normal operating conditions and may damage rigid conduit or plumbing attached to the machine.



United personnel are not authorized to make connections to your building's electrical system. Likewise, non-United personnel are not authorized to make any modifications or adjustments to the equipment without written authorization. Doing so may compromise operator safety as well as your warranty.

Leveling

Once the electrical connections have been made, it will be necessary to level the unit. Do not skip this step of the setup process. This unit uses a fluid mass of media to finish your parts and if the machine is not level, this fluid mass will favor one side of the barrel, effectively reducing the available

working volume of the barrel. This may result in an increase in part-on-part damage. The following instructions will aid you in leveling the CPC:

1. Install High-Capacity Rubber Isolation Pads (rated at 1500 psi) under each leg of the unit. Recommended pad size is 6" X 6" X 1/2".
2. Turn on the power for the CPC at the Disconnect Switch located inside the rear panel of the machine. The door safety switch should release once the System Initialization is complete.
3. Select Manual Operation from the CPC Touch Screen Interface. Using the Jog controls position the cradles to gain access to the center axle of the turret.
4. Place a Magnetic Beam Level on the center axle of the turret.
5. If adjustment is needed, shim under the Isolation Pad with varying thicknesses of sheet metal. If large adjustments are necessary use thicker padding, standard sizing is 3/4" and 1".

DO NOT BOLT DOWN THE SYSTEM. The CPC1500 uses a rotating turret that puts stress on the machine. Being on isolation pads, the machine is meant to "flex" and absorb this stress. If the machine is bolted down and not able to flex, additional stress is placed on the bearings, causing premature bearing failure. The warranty applies only when the CPC1500 is on the isolation pads. If the CPC is bolted to the floor, the warranty on bearings, barrels, and belts is voided.

WARNING: Whenever maintenance or service is being performed on the machine, a lock must be installed at the power supply to ensure that power is not applied to the unit.

2.0 Overview

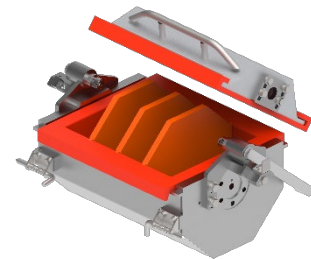
2.1 Specifications

Model: CPC1500

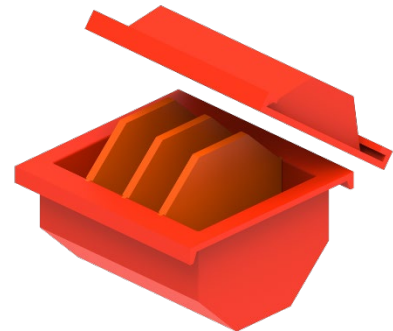
Description: Centrifugal barrel finishing system with removable barrels.

Maximum Capacity	1.5 cubic foot (42.5 L)
0.375 cu.ft. (10.5 L)	11" (280mm) long
Barrel Dimensions	9" (230mm) octagonal flat to flat
Divided Compartment	9" (230 mm) long
Up to 4 per Barrel	2.25" (58mm) Wide
CPC Interface	Touchscreen controls with recipe storage capabilities.
Main Drive	3HP, three phase AC motor, inverter controlled.
Turret Speed Range:	0-250 RPM fully adjustable
Barrel Rotation Ratio:	1:1
Barrel Construction:	304 stainless steel with removable urethane lining.
Machine Enclosure:	304 Stainless steel.
Power Requirements:	208/230 (± 10%) VAC, 50/60Hz, 3Ø, 20A (460 V Available).
Water Inlet	¾" NPT
Compressed Air:	None
Dry Floor Compatible:	YES
Weight	1200 Lbs. (550 Kgs.) approximate
Warranty:	Up to three year warranty
Options:	Extra Liners and Dividers, workstation.

**speed above 250 RPM requires a larger motor and is offered as an option.*



Complete Barrel



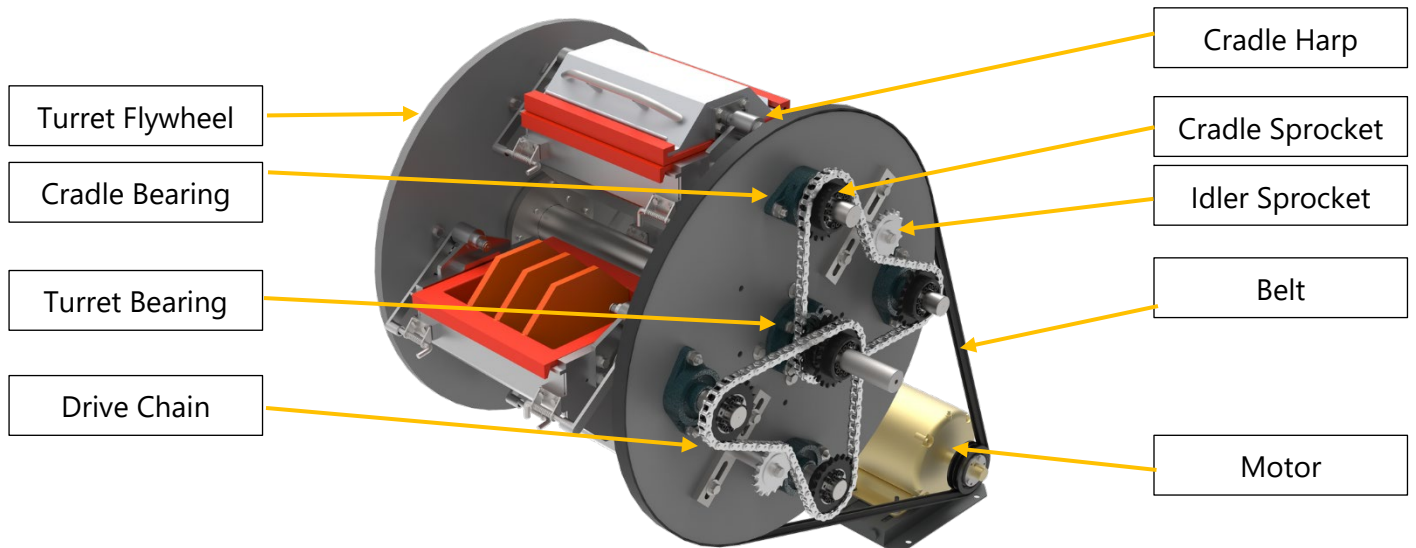
Divided Compartment Liner
And Dividers

2.2 Component Overview

Main Machine



Drive System



3.0 Operation

3.1 Applying Power

Before applying power, ensure that the electrical control box is closed and secure, and that there are no obvious exposed electrical conductors.

To apply power to the CPC1500, switch on the safety disconnect switch (supplied/ installed by the customer) to the ON position. The touchscreen will display the boot screen and the LED power indicator located on the black frame of the touch screen face will be illuminate.



3.2 Main Menu

After boot is complete, the Main Menu shows with buttons for Auto Operation, Manual Operation, System Tools, and System Help.

WARNING: The Touch Screen is built to NEMA 4 standards and is resistant to water but can be easily damaged by sharp hard objects. DO NOT use any such objects to operate the touchscreen.



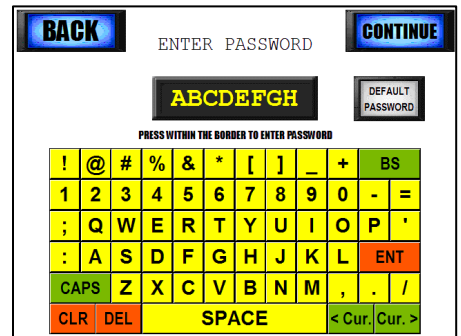
3.3 Auto Operation

3.3.1 Entering a New Process

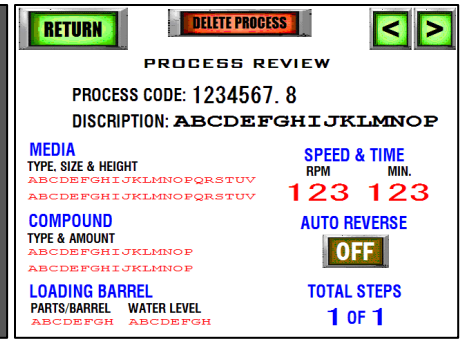
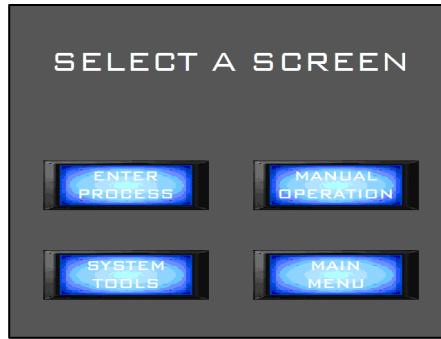
After selecting **AUTO OPERATION** from the Main Menu, the Process List screen will appear. To create a new process, choose an empty cell (if all cells are full, press **11-20** to view the second screen, **>** to view the third) then press **REVIEW**. The Enter Password screen will appear.



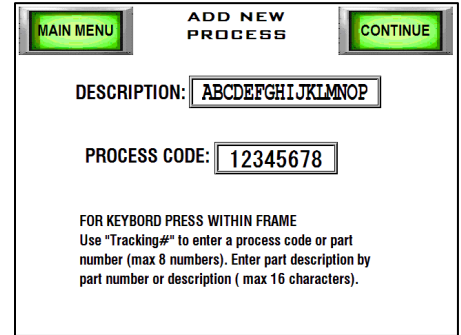
To enter a password, press the empty password field XXXXXXXXXX then begin typing the password that was either set by United Surface Solutions or changed by you (details on changing passwords will be in a later section of the manual). After typing the password, press **ENT** then. If successful, the screen will display **PASSWORD CORRECT** above the password field. If this is displayed, proceed by pressing **CONTINUE**. To correct any mistakes, press **BS** (backspace) and continue typing.



After the Enter Password screen, the Select a Screen appears. Press **ENTER** **PROCESS**, which brings up the Process Review screen. To begin entering your new process, press **PROCESS CODE**.



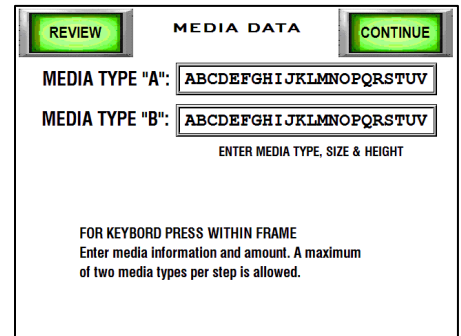
This will recall the Add New Process screen. Press the box next to Description to enter a new description. Press **ENT**. Repeat for the Process Code field. The Process Report given to you by United Surface Solutions contains all process information, including the process code. United recommends following all the Process Report data. If a process needs to be modified to produce different results, contact United Surface Solutions for no-charge process development. After entering the process description and code, press **CONTINUE** to proceed to the Media Data screen.



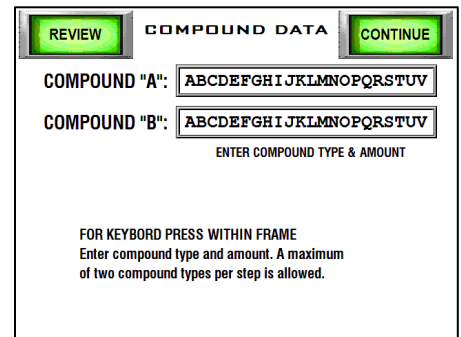
Press the Media Type A field to enter the media part number. Add a space then type the height of the media (measured as inches below the top of the barrel) and press **ENTER**.

Example: MC-CACC-18x1132 2"

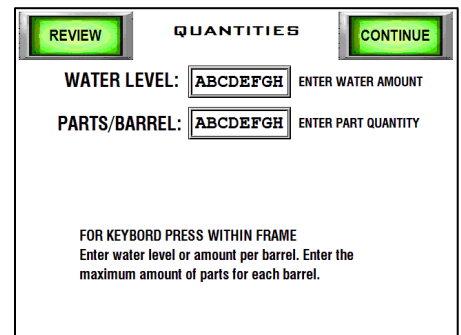
If two types of media are used, enter Media Type B. Press **CONTINUE**.



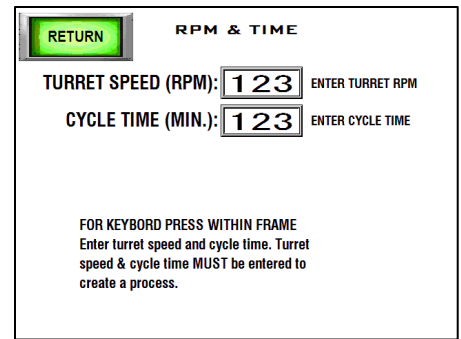
The Compound Data screen is much like the Media Data screen. Repeat all the steps but instead of height, input the compound part number and the amount of compound required (1/2 Cup, 0.25 Cup, etc.). The measurement is for operator reference, so any number format is acceptable. Press **CONTINUE** to proceed to the next screen.



The Quantities screen is used to input information about parts and water in each barrel. Enter Water Level by pressing the empty field. Enter it as "Level" (just covering the media), or +/- a measurement (1") above or below the media. This measurement is per barrel. Next, enter the Parts/Barrel by pressing the empty field next to the label. Simply enter the number designated on your Process Report. Press **CONTINUE** to proceed to the next screen.



The RPM & Time screen is one of the most important screens in process storage and is required to save a process. This screen directly controls machine settings when running a process. Tap on each empty field to enter the recommended time and RPM. Press **ENT** after entering each value. These values are only for the first (or only) step. Press **RETURN** when done to review the process.



The process screen has options to press > to add a 2nd step, turn auto reverse on (reverses the rotation of the turret at the halfway point in a process), or press **RETURN** to complete the process storage. If there are any errors, you may correct them by pressing on them. You will be notified if the RPM & Time are missing. You will be returned to the Process List screen.

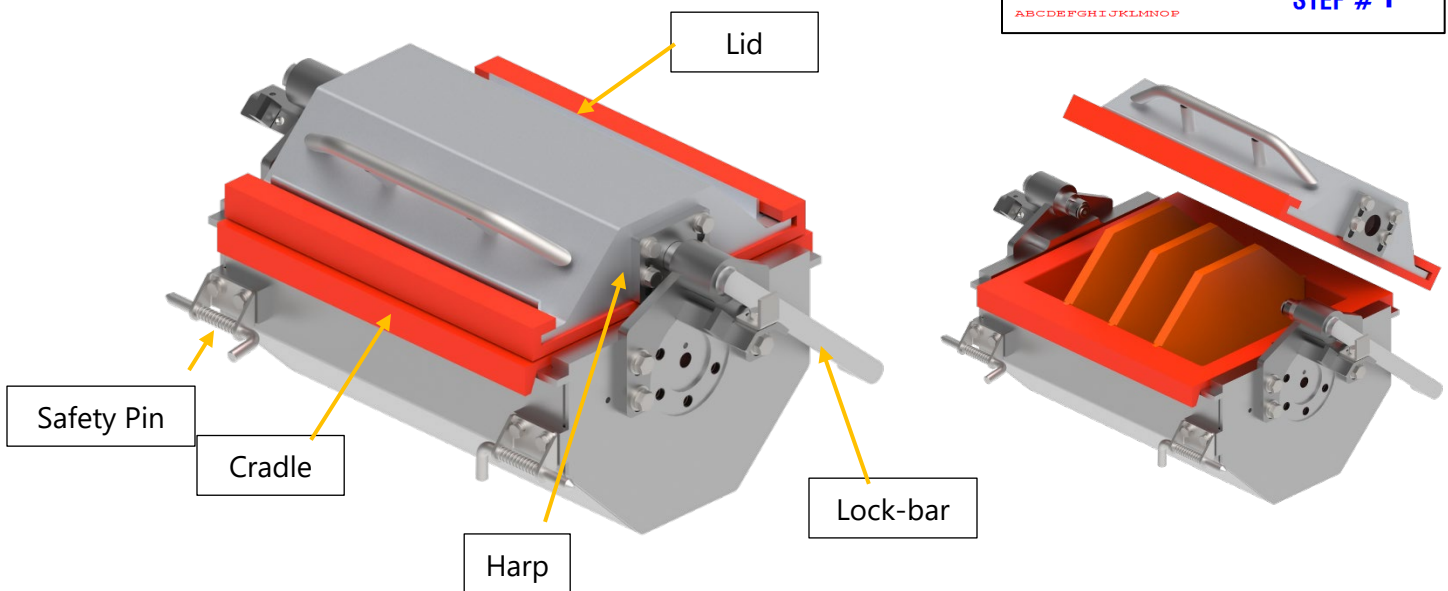


3.3.2 Running a Process

Loading Barrels

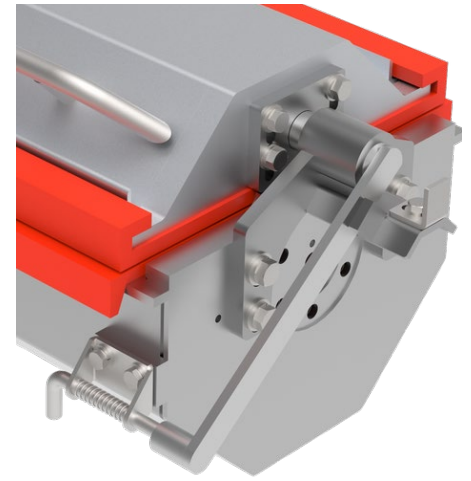
To run a process, choose a process from the Process List screen and press **RUN**. The Loading Instructions screen will appear. Use these instructions to load each barrel with the correct amount of compound, water, media, and parts.

To load a barrel, first remove the lid from the barrel.



To open a lid, Pull the Safety pin away from the Lock-bar then rotate the lockbar away from you, when loose, pull away from the lid to the side. The lock bar should drop towards the center shaft of the turret (see figure illustration above). Repeat with opposite side. Then remove the lid rinse and store it in the

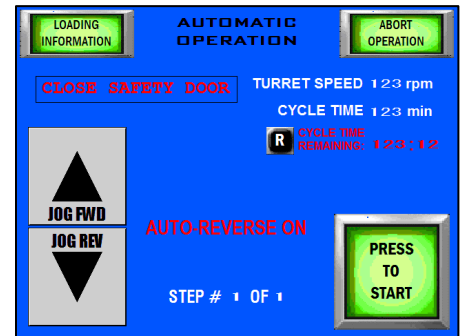
holding bin. Remove the Urethane liner from the cradle by carefully lifting it from the cradle and away from the machine. Don't worry if any foam, water or media spills into the machine, simply use the water hose provided to rinse it of. The shroud will capture all the water and push it out of the machine into a bin. If you have purchase additional liner, now you are able to replace the removed liner with a new one by reversing the process. **Making sure that the lock Bar is securely in position and the safety pin is locked in place.** Repeat the process with all four barrels.



Loading Cradles

Beginning Process


To begin a process, press **CONTINUE** from the Loading Instructions screen. To jog the turret, hold the **Jog** button and press **JOG FWD** or **JOG REV** on the Automatic Operation screen. Before beginning operation, ensure all information on the screen is correct. If starting a process from the beginning, ensure the **CYCLE TIME REMAINING** matches the **CYCLE TIME**. If it does not, press **R** to reset it. To start the cycle, press **PRESS TO START**. **Door must be closed to start the process.**



Stopping a Process

To stop a process before it has been completed, press **STOP** (takes the place of **PRESS TO START**). The turret will slow to a stop. Once stopped, the door will unlock and may be opened. The cycle time remaining will be saved on the Automatic Operation screen. The process can be continued by pressing **PRESS TO START**. If the process will not continue, remove your parts and reset the cycle time.

Stopping a Process in Emergency Situation

If the machine needs to be stopped immediately in an emergency situation, press the emergency stop button.  This will quickly stop the machine. The Emergency Stop Activated screen will display and the door will unlock when the machine has stopped. Inspect the machine and make adjustments/repairs as necessary. Reset the E-Stop by turning it counterclockwise and pulling it out. A countdown will appear and unlock the machine when completed. The cycle time remaining will be the same as when the machine was stopped.



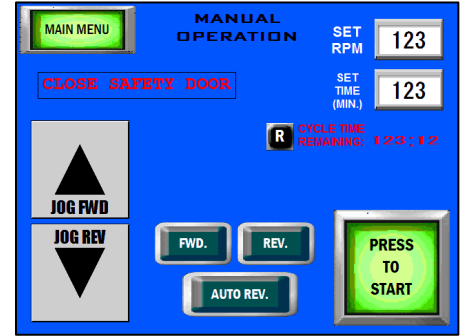
Unloading Barrels and Cradles

Unload cradles as described in **Loading Cradles** and remove barrels one cradle at a time. Always ensure barrels are locked into place when jogging the turret.

3.4 Manual Operation

3.4.1 Setting Manual Process Parameters

After selecting **MANUAL OPERATION** from the Main Menu, the Manual Operation screen will appear. To jog the turret, hold the **Jog** button on the machine's left side and press **JOG FWD** or **JOG REV** on the Manual Operation screen. Set the RPM by pressing the RPM field and entering a value, then press **ENT**. Set the Cycle Time by pressing the Cycle Time field and entering a value, then press **ENT**. Press **R** to reset Cycle Time Remaining if needed. Choose **FWD** or **REV** to specify the direction the turret will spin or press **AUTO REV.** to split the process between forward and reverse. To start the cycle, close the door and press **PRESS TO START**.



3.4.2 Running a Manual Process

Loading Cradles

To open a lid, rotate the lockbar then pull away from the lid. The lock bar should drop towards the center shaft of the turret. Repeat with opposite side. Then remove the lid rinse and store it in the holding bin. Remove the Urethane liner from the cradle by carefully lifting it from the cradle and away from the machine. Don't worry if any foam, water or media spill into the machine, simply use the water hose provided to rinse it off. The shroud will capture all the water and push it out of the machine into a bin. If you have purchased additional liner, now you are able to replace the removed liner with a new one by reversing the process. **Making sure that the lock Bar is securely in position and the safety pin is locked in place.** Repeat the process with all four barrels.

To jog the turret, press CONTINUE. Hold the **Jog** button and press **JOG FWD** or **JOG REV** on the Automatic Operation screen.


Beginning Process

To set process parameters, refer to **3.4.1 Setting Process Parameters**. To start the cycle, press **PRESS TO START**.

Stopping a Process

To stop a process before it has been completed, press **STOP** (takes the place of **PRESS TO START**). The turret will slow to a stop. Once stopped, the door will unlock and may be opened. The cycle time remaining will be saved on the Manual Operation screen. The process can be continued by pressing **PRESS TO START**. If you are done, remove your parts and reset the cycle time.

Stopping a Process in Emergency Situation

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Unloading Barrels and Cradles

Unload cradles as described in **Loading Barrels** and remove barrels one cradle at a time. Always ensure barrels are locked into place when jogging the turret.

3.5 Operating Tips

Here are a few tips for working with your CPC1500 that will make production easier and more consistent:

- Always use a compound in wet processes unless otherwise specified. Otherwise, media will soon take on a “glazed” appearance and will no longer cut properly.
- Rinse parts after each step of the process. Do not let compound dry on parts.
- Do not let parts sit for an extended period after finishing. Some materials, especially aluminum and zinc alloys, will corrode if left in the machine for as little as 10 minutes after the end of a process. Operate the CPC for a few extra minutes if the parts have sat in the barrel. This may help eliminate spotting that could have developed.
- Never put compound directly on work pieces. Always load media, parts, and water before adding compound or you may find a residue of compound on your parts.
- Thoroughly clean out empty barrels between process steps.
- Never use the same scoop for more than one compound. Doing so will contaminate both products and may result in inferior finishing.
- Keep finishing media as clean and uncontaminated as possible.
- Avoid inadvertently mixing media together.
- If the work pieces are subject to rust, a rustproof treatment must be used after processing.

4.0 Process Development

4.1 Process Types

Fluent Mass: The fluent mass is employed within the barrel to provide an impinging force upon the parts during rotation of the barrel. The types of fluent mass are often referred to as "Media". The parameters that define the preferred fluent mass are determined by the type of process to be performed.

4.1.1 Cut

The cut process is used for removal of material from the surface of the parts, usually to remove milled or coarse sanding marks. Ideally, a cut process produces a surface texture of between 32 and 10 micro-inches. In a cut process, the individual particulate of media ranges from 0.0625" to 1.25". The size of the particulate as well as the media make-up or "bond" will greatly influence the aggression of the process and the outcome of the surface texture of the part. In conjunction with the bond of the media, the density of the media affects the aggression of the process. This is because the centrifugal barrel finishing system is capable of generating 10 to 30 times the force of the individual media particulate. The higher the density of the media particulate, the greater the impacting force applied to the part.

In setting the parameters which define the size of the fluent mass for the rough cut process keep in mind the following rules: If the fluent mass particulate is too large, too much energy is imparted to the fluent mass so that the parts are damaged when the media impinges the surface. This causes a rough surface texture and a high peak to valley surface reading. Alternatively, if the particulate size is too small, insufficient energy is imparted to the fluent mass. An inability to impart sufficient energy to the fluent mass prevents the media from effectively removing a significant amount of material, thereby rendering the process ineffective. The density of the fluent mass for the rough cut process may range from 10 to 300 lbs/ft³, wherein the optimal range is from 85 to 150 lbs/ft³, and the preferred density of the fluent mass for the rough cut process is approximately 95 lbs/ft³.

4.1.2 Refinement

The refinement process is used to improve the surface texture of a part after a cut process. This may be necessary to prep the part for plating, painting, or burnishing. This operation is similar to the cut process with the exception of media bonds that are usually mild or non-abrasive, slower turret speeds, and abrasive compounds between 240 and 1000 mesh. The surface texture of the part may have a low micro-inch finish, between 4 and 10 Ra, with a dull or matted surface appearance.

4.1.3 Burnishing or Dry Buffing

To achieve deep luster and a bright polished color, a burnishing or dry buffing step must be used. The fluent mass for this process ranges from low density media, such as ground and treated Walnut Shell or Corn Cob used in Dry Buffing, to very high density media such as Steel or Stainless Steel shot or pin utilized in a burnishing operation. The preferred fluent mass is between 100 lbs/ft³ to 150 lbs/ft³, such

as a porcelain bond media or a sintered ceramic. Depending on the required quality of the surface texture, this operation can be performed at any stage of the finishing process. Unlike conventional hand grinding or buffing, the transfer of material to flatten or smooth the part is minimal, if at all present in burnishing. Therefore, the surface texture of the part must be refined to the desired quality, using rough cut and refinement steps, prior to the burnishing or dry buffing step.

Burnishing

Burnishing is generally very short in cycle time, usually between 5 to 15 minutes. The action that is taking place is the actual closure of microscopic fractures or scratches within the surface texture. For this reason the characteristics of a high density, non-porous media is needed to develop a high luster and bright color when processing in a wet burnishing application. Due to the high density of the media used, the surface of the part will become hardened through a process called compressive stress. The demand for parts which have undergone compressive stress is increasing in areas such as tool manufacturing because of the increase in the life of end mills, taps, and bits. This process is used by bearing manufacturers to increase the life of ball and roller bearings, bearing races, and journals. It is also commonly used within the aerospace industry on jet engine turbine blades to increase efficiency and longevity by offering a more refined surface texture.

Dry Buffing

In a dry buffing step, the closure of the microscopic peaks and valleys of any scratch or fracture must be completed within the refinement step. This is due to the very low density of the media allowing a minimal amount of energy transfer between the part and media particulate. A dry buffing operation usually has a minimum cycle time of 30 minutes and does not offer the added benefit of compressive stress. The deep color and luster that is developed yield excellent results for applications such as delicate plating operations and fine jewelry.

For each step, cut, refinement, or burnishing / dry buffing, the fluent mass may occupy 30% to 100% of the barrel volume, wherein the optimal range is 60% to 90%. Preferably, 80% of the barrel volume is occupied by the fluent mass. The relative volume of the fluent mass determines the functional parameters. If too little fluent mass is employed, the individual media particulate of the fluent mass is imparted with too much energy; as it impinges the part, the surface is damaged. If the ratio of the fluent mass to the part mass is too low, the parts will be more likely to impinge one another. Alternatively, if too much fluent mass is employed within the barrel, insufficient energy is imparted to the media particulate so that material is not removed from the surface of the part and the desired edge radius or surface texture will not be achieved. With these factors in mind, the goal is to create a process with a high amount of aggression as well as a high fluent-mass to part ratio in order to control media and/or part-on-part impingement.

4.2 Compounds

It is important to understand the role that compound plays within any type of mechanical mass finishing process. It is primarily used to clean media, not parts. Without the use of a soap-based compound, the porous surface of the media will become clogged and glazed. This glaze will harden the surface and

restrict the media from removing material from the part, rendering the media useless. The improper use of compounds can develop a film on the parts yielding unacceptable results. The three basic types of compounds are abrasive, detergent, and burnishing compounds.

4.2.1 Abrasive Compounds

To increase the aggression of the cut process, generally in shorter cycle times, an abrasive compound such as Silicon Carbide, Aluminum Oxide, and Quartz or Pumice Stone, may be added to accelerate material removal. The particulate size of the abrasive ranges from 30 to 1000 mesh. The size of the abrasive particulate is based on the desired surface texture of the part. Abrasive compounds can be purchased in the raw state or as premixed compounds usually having soap or detergent-based additives.

4.2.2 Detergent Compounds

Used generally in aggressive cut down cycles, this high pH compound has very strong cleaning characteristics to cleanse and preserve the media surface. These compounds have excellent durability and maintain their properties under extreme conditions. The high pH of the compound assists in preventing oxidization, although tends to darken the surface color of the part.

4.2.3 Burnishing Compounds

A major role in determining the color of the part is played by the burnishing compound. This type of compound is mostly used in burnishing cycles along with high-density media such as sintered ceramic, porcelain, or stainless steel. In some cases it may be used in a mild cut or refinement step in order to maintain a smooth bright surface for plating or painting. The properties of these compounds are not as strong as a detergent and may tend to break down in an aggressive process or one with long cycle times.

4.3 Process Report

One of the most important tools that your company has purchased from United Surface Solutions is the Process Report. This provides a detailed "recipe", or process, to finish your parts to specifications. Many hours have been devoted to the development of general and specific processes, the results have been summarized in the Process Report. By understanding the information on the process report, you will have not only a starting point, but also a standard method of recording your own improvements for others to understand.

4.3.1 Media

Media Information					
Process	Cut	Type	MC-CACC-316x1132		
Shape	ACC	Size	3/16" x 11/32"	Height	2"
Other					

Process: Cut, refine, polish, etc. as described in *Section 4.1 Process Types*.

Media Type: The descriptive part number of media. *Material - Bond & Shape – Size x Size*

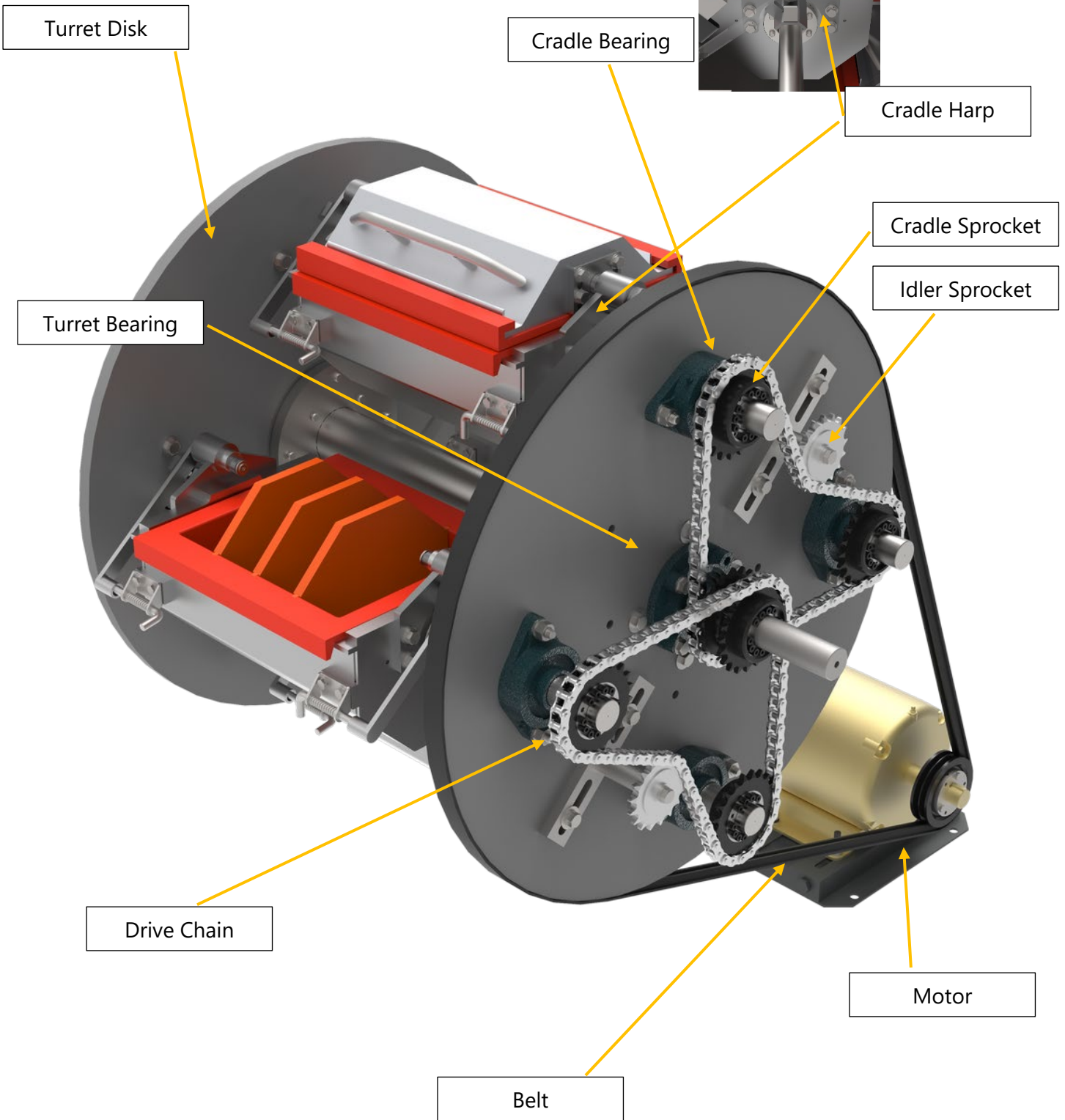
Shape: The shape of the media.

Size: dimensions of the media in Imperial units unless otherwise stated.

Height: The height of the media, measured in inches below the barrel lip.

5.0 Maintenance & Repair

5.1 Overview of Drive System



5.2 Preventive Maintenance Schedule

Every Shift

- Inspect cradle over-centering latches.
- Inspect Lid lock bars and barrel tabs.

Weekly Maintenance

- Check for chain tension
- Lubricate Lid Cam lock collars and bushings
- Wipe down overspray
- Check for unusual wear and tear in liners
- Check for lid seal (O-Ring) replace as needed

First 50 Machine Hours

- Inspect belt and tighten as needed
- Inspect barrel chains, lubricate and adjust as needed

Every 150 Machine Hours

- Inspect turret double-v belt and tighten as needed
- Inspect barrel chains, lubricate and adjust as needed
- Inspect and tighten set screws on barrel shaft sprockets
- Grease turret bearings
- Grease barrel bearings
- Inspect barrel & lid linings

Every 1000 Machine Hours

- Inspect electrical connections and tighten as needed.

United Surface Solutions Preventive Maintenance Program

United Surface Solutions offers a preventive maintenance program to keep your machine working properly to keep your downtime at a minimum. Call (877) 837-4623 or email info@unitedusa.com for more information.

5.3 Turret Drive Assembly

The turret of the CPC is driven using a double a-section v-belt that extends from the pulley on the main motor to the flywheel on the turret. Under most circumstances, this belt will not require any dressing or other conditioning. Periodically inspect the belt for signs of unusual wear and cracks. Cracks on the top surface of the belt may appear once the belt stretches. This is normal and will not affect the operation of the belt. If cracking appears on the underside or the "V" area of the belt, replacement of the belt is recommended.

Check for excess wear on motor belt pulley, if the pulley looks overly polished, the belt is loose.

WARNING: Always disconnect power and lock the main disconnect switch before doing any maintenance or repair work.

Adjusting Main Drive Belt

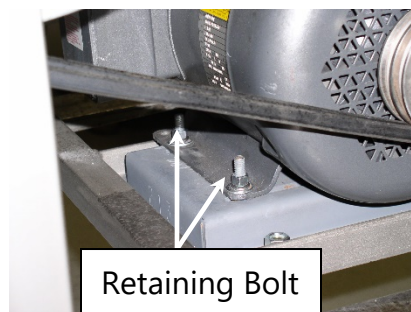
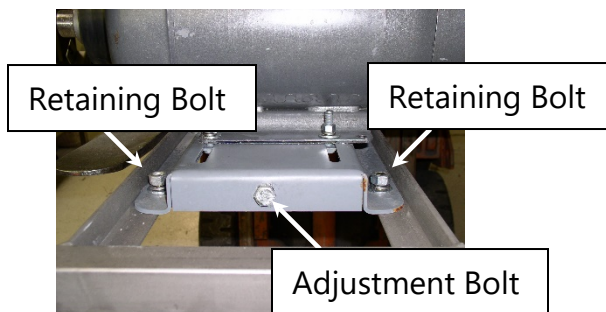
The Gates Rubber Company recommends that the best tension for a V-Belt drive is the lowest tension at which the belts will not slip under the highest load condition.



In this manner the method that is used by United's technicians is the twist method. The tension of the turret belt should allow the technician to twist the belt to the halfway point. If the belt can be twisted past the halfway point then the belt must be tightened. If the belt does not twist to the halfway point excess stress is being applied to the belt and bearings and may cause these components to fail prematurely.

For belt adjustment follow the procedures below:

1. Turn OFF the power at the safety disconnect and lock the handle in this position.
2. Loosen the four (4) retaining bolts holding the main drive motor to the motor base.
3. Use the adjustment bolt on the rear of the motor base to move the motor backwards to tighten the belt, or forward to loosen the belt.

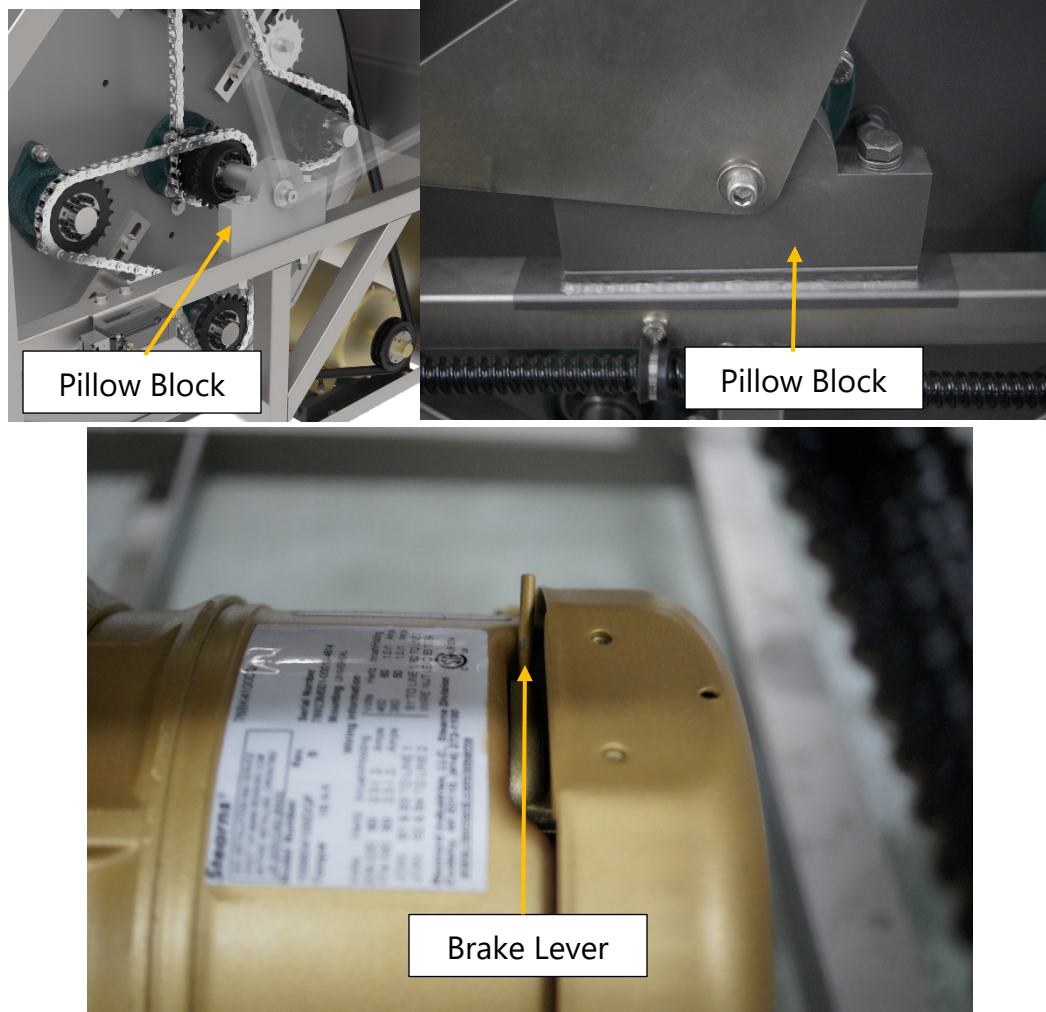


4. Recheck the tension on the belt and adjust if necessary.
5. Retighten the four (4) retaining bolts holding the main drive motor to the motor base and torque to 30 ft-lbs.

Note: It is important the motor remains parallel to the turret. Before retightening check motor with straight edge or square for alignment with turret.

Replacing Main Drive Belt

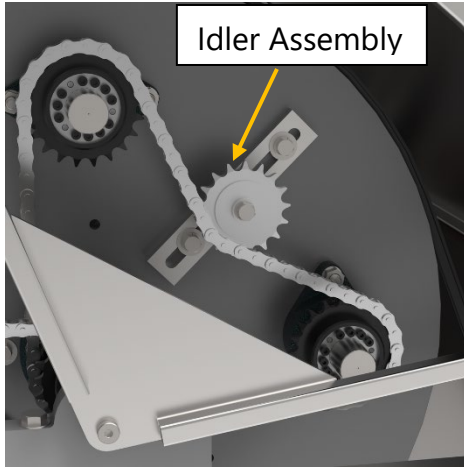
1. Empty ALL barrels, insert into the cradles and latch cradle lids.
2. Turn OFF the power at the Safety Disconnect and lock the handle in this position.
3. Release the motor brake by pulling the brake release lever on the motor brake.
4. Loosen the motor adjustment nuts and move motor forwards to loosen the main drive belt. Remove the belt from the motor pulley.
5. Remove the six (6) bolts from the pillar blocks, four (4) on drive side, two (2) on free side.
6. Raise the turret and pillow blocks off the frame and slide the old drive belt out under the pillow block and slide the new drive belt in.
7. Tighten the six (6) the pillar block bolts, four (4) on drive side, two (2) on free side and torque to 80 ft-lbs.
8. Adjust the main drive belt as described in **Adjusting the Main Drive Belt**.
9. Engage the motor brake by pushing in the brake release lever.



5.4 Barrel Drive Assembly

The barrels are driven at a 1:1 ratio opposite the rotation of the turret by a 50 series sprocket and chain system. The chain type is classified as Diamond Chain and is resistant to stretching after the brake-in period of 30-40 hours of operation. During this brake-in period, some adjustment may be necessary.

Inspection



A butterfly configuration is used to drive the cradle assemblies that accommodate the barrels. Each butterfly configuration drives two (2) cradle assemblies and is adjusted by an idler arm assembly. The operator can check for chain slack and determine if an adjustment is necessary simply by rocking the cradle assembly in a forward and reverse rotation while the CPC is powered OFF and the door is open. If movement is present then adjustment is necessary. Visually examine the chains and sprockets for signs of wear or misalignment. If indications of wear are present use the following procedure for further inspection:

Drive Component Removal

To remove and replace barrel drive components follow these procedures:

1. Empty ALL barrels.
2. Turn OFF the power at the safety disconnect and lock the handle in this position.
3. Release the motor brake by pulling on the brake release.
4. Position the turret so that the drive components to be repaired or replaced are conveniently located then set the motor brake.
5. Remove the two (2) bolts holding the idler arm assembly in place and remove the idler arm from the turret.
6. Check the idler sprocket bearing for ease of movement and side play and inspect the sprocket for wear. Replace bearing/sprocket assembly if necessary. Torque sprocket retainer nut to 50 ft-lbs.
7. Remove the chain by means of the master link. Clean with mild solvent if necessary and lubricate with penetrating oil such as "Slick 50® One Lube®".
8. Inspect the Barrel Drive Sprockets and Power Locks for movement. Visually inspect for rust between the sprocket and cradle shaft and physically grasp the sprocket and check for movement on the shaft. If movement is evident remove sprocket and examine Power Locks for wear. Replace Power Locks, shaft or sprocket if wear is excessive.
9. Install Idler Arm Assembly and any sprockets removed and slightly tighten, do not torque.
10. Align Barrel and Turret Sprocket to Idler Sprocket using a measuring device. First measure the distance from the turret disc (disc that the Idler Assy. is mounted on) the center of the Idler Sprocket, record the distance. Next adjust the Barrel and Turret Sprockets so that the centerline of the sprocket equals that of the recorded distance. Refer to photo 5-7 *Align Sprockets* for a

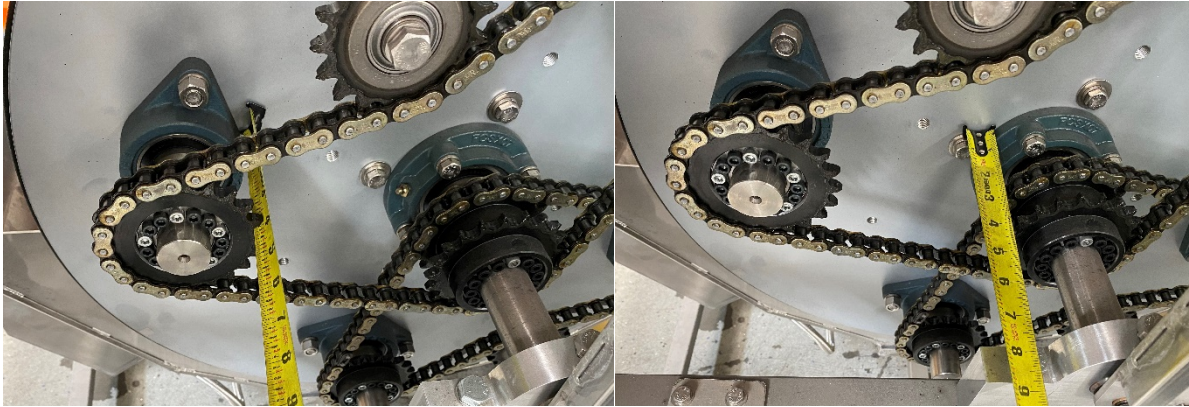
demonstration view. Torque Turret and Barrel Sprocket setscrew to 20 ft-lbs.

11. Install the chain and lock the master link using the retainer.

Adjusting Barrel Chain

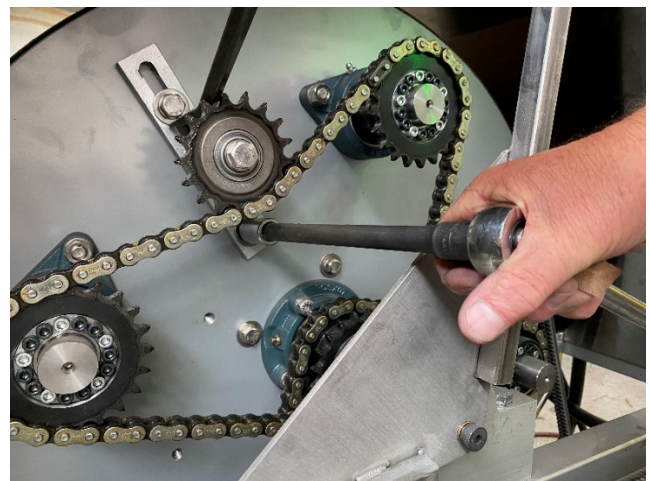
To adjust the barrel chain please refer to the following procedure (if continuing from the previous section skip steps 1-5):

1. Empty ALL barrels, position into the cradles and latch cradle lids.



5-7 ALIGN SPROCKETS

2. Turn OFF the power at the safety disconnect and lock the handle in this position.
3. Release the motor brake by pulling outward on the brake release knob shown in photo *5-4 Motor Brake*.
4. Position the turret so that the Idler Arm Assembly for the butterfly assembly that needs adjustment is conveniently located and set the motor brake.
5. Slightly loosen the two (2) bolts holding the idler arm assembly in place and remove the Idler arm from the turret.
6. Using a pry bar gently press down (applying 10 to 15 pounds of pressure) on the Idler assembly taking up all slack in the chain. Refer to photo *5-8 Adjusting Idler Assembly* for tightening method.
7. Retighten the two (2) bolts holding the idler arm assembly and torque to 80 ft-lbs.



Bearings

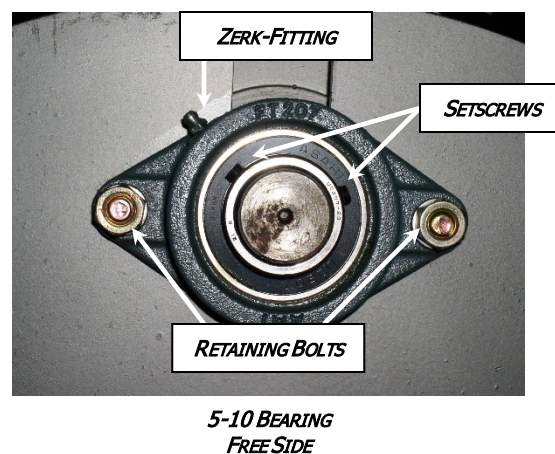
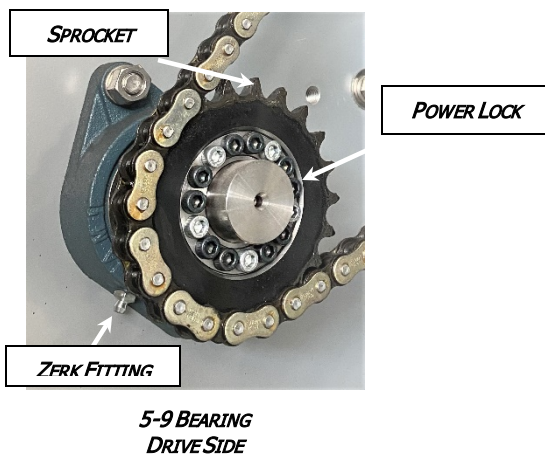
Lubricating

The barrel and turret bearings must be periodically lubricated with water-resistant grease, such as Deoplex Multi-Purpose #2EP, to maintain their service life. Each of the eight (8) barrel bearings (four per side) is equipped with a zerk-fitting for this purpose. Refer to photo 5-9 and 5-10 for zerk-fitting locations.

When lubricating, add only a small amount of grease at any one time, usually only one or two pumps on a grease gun. Adding too much will result in damage to the seal, which will allow water and process chemicals to enter the bearing. If this occurs, the bearing will have to be replaced within a short period of time.

Barrel Bearing - Replacement

1. Empty ALL Liners, position into the cradles and latch lid.
2. Turn OFF the power at the safety disconnect and lock the handle in this position.
3. Release the motor brake by pulling outward on the brake release knob shown in photo 5-4 Motor Brake.
4. Position the turret so that the barrel bearing to be replaced is conveniently located and set the motor brake.
5. Remove the two (2) retaining bolts holding the idler arm assembly in place and remove the Idler arm from the turret.
6. Loosen the screws on the power lock, and slide the sprocket off the barrel shaft, using a bearing puller if necessary.
7. Loosen the two (2) setscrews holding the bearing onto the shaft.
8. Remove the two (2) retaining bolts holding the bearing to the turret and slide the bearing



off the shaft.

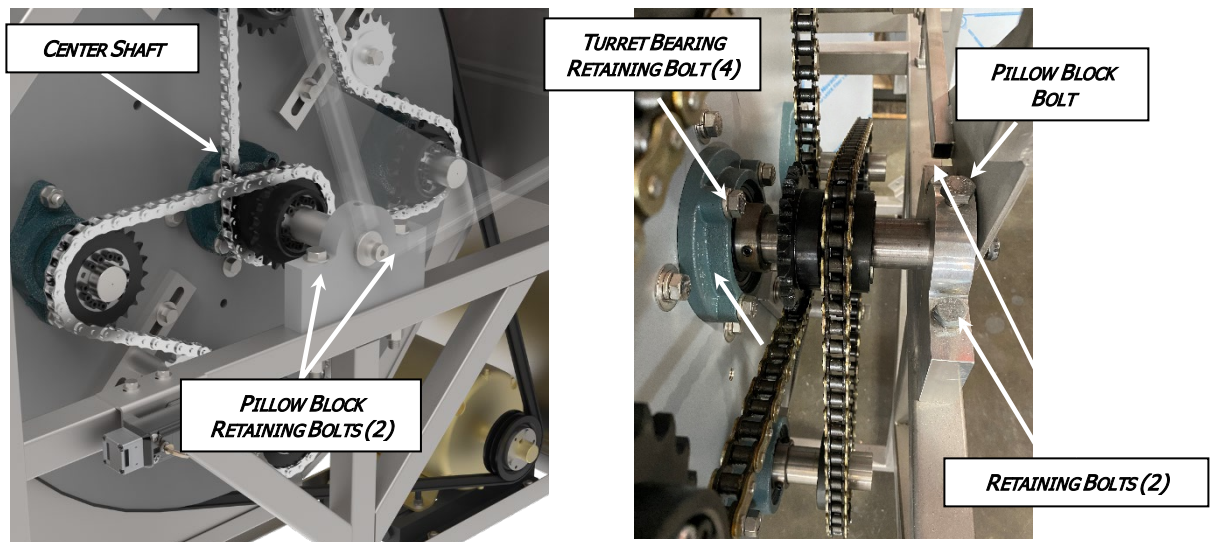
9. *Install Barrel Bearing.* Measure the distance from the center shaft to the cradle shaft center

point. The distance should equal that of the existing bearings or exactly 8 inches. Torque bearing retaining bolts to 80 ft-lbs.

10. Proceed to line #9 in Drive Component Removal in the previous section for installation instructions.
11. Lubricate the new bearing according to the instructions given in the section Lubricating.

Turret Bearing - Replacement

1. Empty ALL barrels, insert into the cradles and latch cradle lids.
2. Turn OFF the power at the safety disconnect and lock the handle in this position.
3. Release the motor brake by pulling outward on the brake release knob shown in photo 5-4 Motor Brake.
4. Loosen the motor adjustment nuts and move motor forwards to loosen the main drive belt. Remove the belt from the motor pulley.
5. If replacing bearing on the Drive Side, remove all Idler Assemblies and both chains.
6. Loosen setscrews on both pillow blocks, Do Not remove the pillar block retaining bolts.
7. Remove the four (4) Turret Bearing Retaining Bolts for the bearing that is being replaced.
8. Loosen the Turret Bearing Setscrews for the bearing on the OPPOSITE side of the turret.



9. Gentle tap the center shaft, OPPOSITE the side of the bearing being replaced, moving it inward about 3/8 of an inch. This will push the bearing that is being replaced out of its centering groove.
10. Remove all 4 (4) Pillar Block Retaining Bolts; 2 (2) on drive side and two (2) on free side.

11. Raise the Turret and remove the Pillar Block from the Center Shaft.
12. Loosen the setscrew on the bearing to be removed and slide it off the shaft. If replacing the bearing on the Drive Side, loosen the Sprocket Setscrews and remove both sprockets followed by the bearing.
13. Install the new Turret Bearing into the centering grove and tighten the retaining bolts by hand. Install the Center Shaft Sprockets if replacing the bearing on the Drive Side.
14. Install the Pillar Block and lower the Turret. Torque the Pillar Block Retaining Bolts to 80 ft-lbs.
15. Position the Center Shaft evenly between the Pillar Blocks and torque the setscrews to 20 ft-lbs.
16. Torque the Turret Bearing Retaining Bolts to 60 ft-lbs and torque the setscrews for BOTH Turret Bearings to 15 ft-lbs.
17. Proceed to line #9 in Drive Component Removal in the previous section for installation instructions.
18. Lubricate the new bearing according to the instructions given in the section Lubricating.

Barrels

The barrels for CPC1500 consist of a Cradle, Liner, Lid liner, Aluminum Lid and Lock bars. The 304 stainless steel Cradle is used to house the 80-durometer molded Urethane lining. The lid is made of Aluminum, the Lock bar is an over centering cam constructed from Stainless steel, and Bronze Bushing.

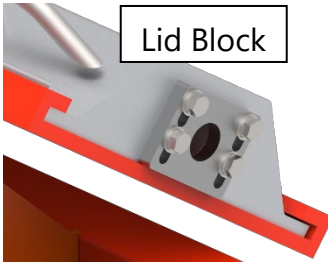
Inspecting Barrel Lining

The linings in the barrels are made of molded Urethane. Periodically, check for thin spots, worn areas and warpage. Overheating or processing will cause warpage to the liners, which may cause warpage. Over time these liners would have to be replaced.

Lockbar

The Lockbar is used to apply pressure on the lid and create seal between the lid and barrel. If the barrel lid is not secure, the barrel will leak water during operation.

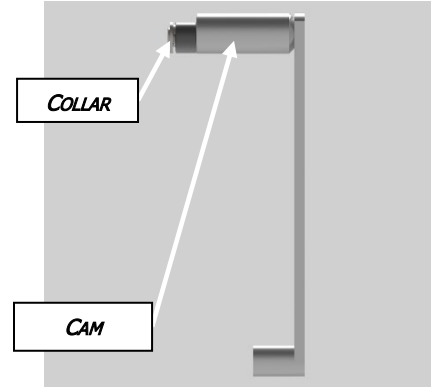
The Lockbar uses an over-centering cam action to seal the lid during operation. Periodically, inspect the Lockbar and Lid Block for excessive wear. The cam lobes and shaft ends should be symmetrical and have no flat areas or groves. If the Lid Block is worn then it must be replaced. See photo's 5-10 Profiles and 5-11 Lockbar.



Lid Block

5-10 PROFILE

The Lid Block works in conjunction with the Lockbar to secure the lid. The shaft ends of the Lockbar insert into the Lid Block creating a seal between the barrel and lid. If components begin to wear and become oval, it may become harder to seal the barrel.



COLLAR

CAM

5-11 LOCKBAR

Lid Block

The Lid Block (5-10) is designed to lock the lid against the barrel. Should the lid need adjusting due to sealing issues, do not use adjust the Harp, **adjust the Lid Block**. Loosen the 4 Bolt's on both sides of the lid, adjust accordingly, then tighten the bolts again. Make sure both sides are even.

If repair is needed it is recommended that it be preformed by a qualified United technician. For further information please contact **United Surface Solutions Product Support Team, Service Department, (877) 8374623**.

Torque Specifications

PART DESCRIPTION	TORQUE
Turret Bearings Retaining Bolts (four per bearing)	60 ft-lbs
Barrel Bearings Retaining Bolts (two per bearing)	80 ft-lbs
Idler Assembly Retaining Bolts (two per idler)	80 ft-lbs
Idler Sprocket Power Locks	11 ft-lbs
Pillar Block Retaining Bolts (four - drive side, two - free side)	80 ft-lbs
Motor Adjustment Base to Frame Retaining Bolts (four total)	80 ft-lbs
Motor to Motor Adjustment Base Retaining Nuts (four total)	30 ft-lbs
Setscrews – Bearings (two per bearing)	15 ft-lbs
Isolator Pad Retaining Nut (one per pad)	15 ft-lbs

6.0 Troubleshooting

Interface Not Functioning

Possible Problem	Item to Check	Remarks
Control voltage fuse blown	Check for blown fuses.	If the door interlock has shorted out, it is usually because someone attempted to open the shutter door while in Run Mode. Check the interlock before re-energizing this circuit. Replace as necessary.
No power to the machine	Carefully check the three terminal blocks on the top of the main disconnect for line power.	Consult with your plant electrician to determine the source of the power outage.
PLC Power Supply Blown	Check the lights on the PLC located inside the control box.	The Power Supply on the PLC also powers the Interface, If there is power to the Drive Inverter and not to the PLC first check fuses then replace the Power Supply if needed.
No input voltage	Check that the main disconnect located on the electrical cabinet door is turned to the "On" position	Make sure that the machine is not being serviced before re-energizing the machine.
Main fuses blown	There are three fuses located in the main disconnect. With the power off, check for continuity across each of these fuses.	If a fuse is blown, <u>DO NOT REPLACE IT</u> until the problem that caused the fuse to blow has been corrected.
Loose wire or defective component	Turn the main disconnect to the "Off" position and carefully check and retighten electrical connections beginning at the main disconnect.	If you are certified to work with high voltage AC, re-energize the Disconnect and follow the voltage paths until you find the problem.

Will Not Begin Cycle

Possible Problem	Item to Check	Remarks
No power to the machine	Verify that the Power Indicator is lit and the CPC screen is operational.	Follow the procedures under "Interface Not Functioning"
Shutter Door is not closed entirely	The Shutter Door must be closed in order in order to place the machine in Run Mode.	Always either completely open or completely close the Shutter Door.
Drive error	Check Drive Keypad for error code.	Refer to the instruction manual for the drive that was supplied with the machine or contact United for support.
Loose wire or defective component	Turn the main disconnect to the "Off" position and carefully check and retighten electrical connections beginning at the main disconnect.	If you are certified to work with high voltage AC, re-energize the Disconnect and follow the voltage paths until you find the problem.

Premature System Halt

Possible Problem	Item to Check	Remarks
No power to the machine	Verify that the Power Indicator is lit	Follow the procedures under "Interface Not Functioning"
Drive error or overload	Check Drive Keypad for error code.	Refer to the instruction manual for the drive that was supplied with the machine or contact United Finishing Systems for support.
Human error	<p>Attempting to open the Shutter Door while the machine is running may result in the cycle being canceled.</p> <p>The Stop Button may have been accidentally pressed.</p>	If the cycle timer has reset, human error is likely the problem. If the machine is stopped and the timer is still running, human error must be discounted.
E-Stop activated	Check the CPC Touch Screen to determine if the E-Stop has been activated.	If the E-Stop has been activated the timer will display the remaining time. Proceed to Manual Mode Screen to determine time remaining and finish the current process.
Loose wire or defective component	Turn the main disconnect to the "Off" position and carefully check and retighten electrical connections beginning at the main disconnect.	If you are certified to work with high voltage AC, re-energize the Disconnect and follow the voltage paths until you find the problem.

Desired RPM Not Reached

Possible Problem	Item to Check	Remarks
Machine overloaded	If the acceleration of the machine slows before the desired RPM is reached, the machine is attempting to avoid an overload condition.	Loading the barrels with <u>more</u> material <u>will not overload</u> the machine. With the CPC, the greatest load condition occurs at approximately 60% fill height. Try running your process with <u>more</u> parts and media to eliminate this condition.
Exceeds Maximum RPM	If in Manual or Auto Mode Screens the "EXCEEDS MAXIMUM RPM" is displayed, check the Maximum RPM setting in the System Tools screen.	Maximum RPM and Cycle Time limits are set to protect the system from operator error. These settings can be password protected.

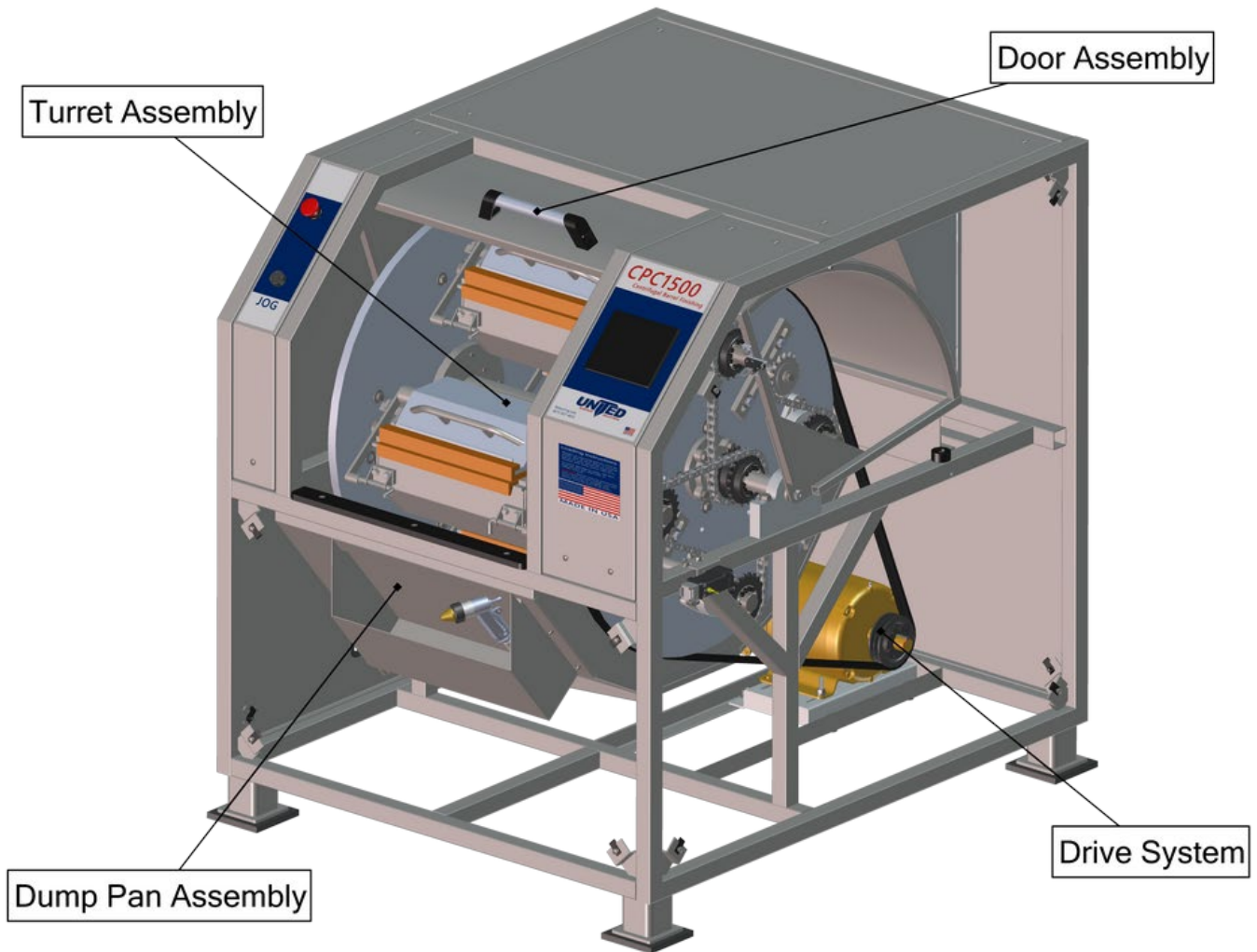
Barrels Leak

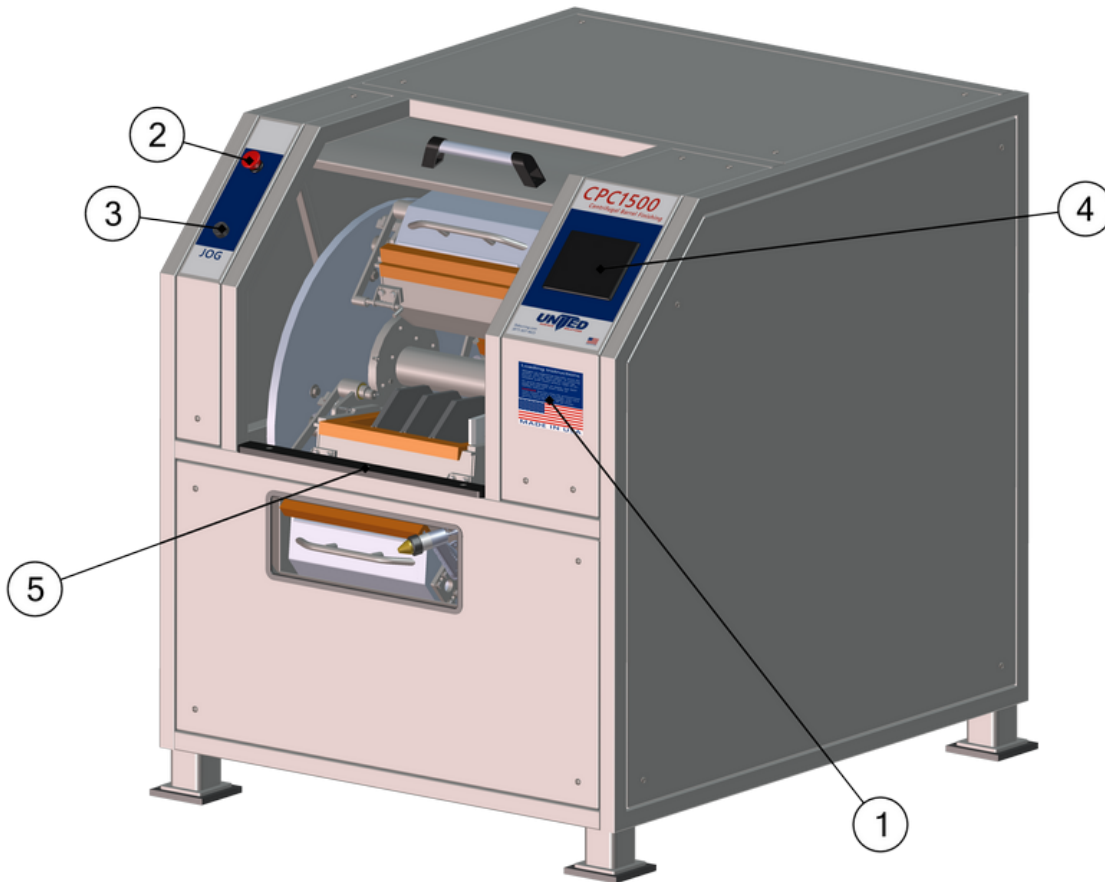
Possible Problem	Item to Check	Remarks
Contamination on the sealing surface of the barrel and lid	Remove the lid and check for media, compound or other obstructions on the sealing surfaces	Review the section "Closing & Loading Barrels" for procedures to eliminate this problem.
Process too hot	Verify that the process is not building up significant heat and pressure that is causing the seal to fail.	Refer to the section "Opening the Barrels" for information and tips about building up pressure in the barrels.
Worn barrel tabs	Inspect the barrel tabs on each end of each Lock bar and adjust as necessary.	Refer to the section "Lockbar" for detailed instructions.
Worn linings	Inspect the barrel linings	Refer to the section "Inspecting Barrel Lining" instructions.
Worn Seals	Inspect Rubber seals for crack or damage	Replace rubber seals Periodically

Turret Slips During Loading

Possible Problem	Item to Check	Remarks
Loose or broken main drive belt.	Attempt to rotate the turret by hand, if it rotates, then the belt needs servicing.	Refer to the "Main Drive Belt" section for tensioning and replacement instructions.
"Glazed" main brake rotor	Run the machine at 120-180 rpm empty and then remove power from the machine. This will grind a thin layer off the rotor allowing the brake to re-seat.	Due to the requirements of the machine, this "glazing" may become a common occurrence. In which case add this procedure to your preventative maintenance schedule.

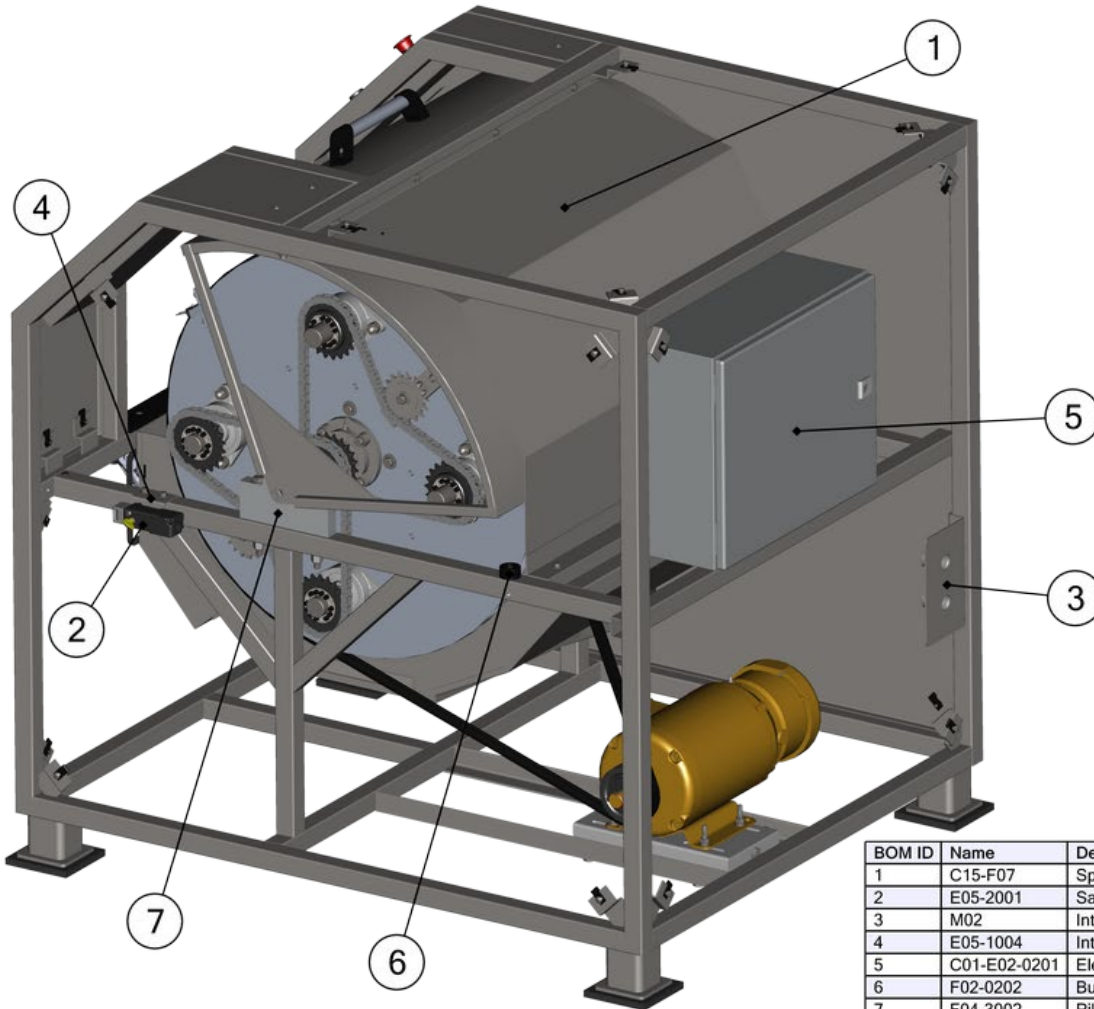
7. 0 Component List



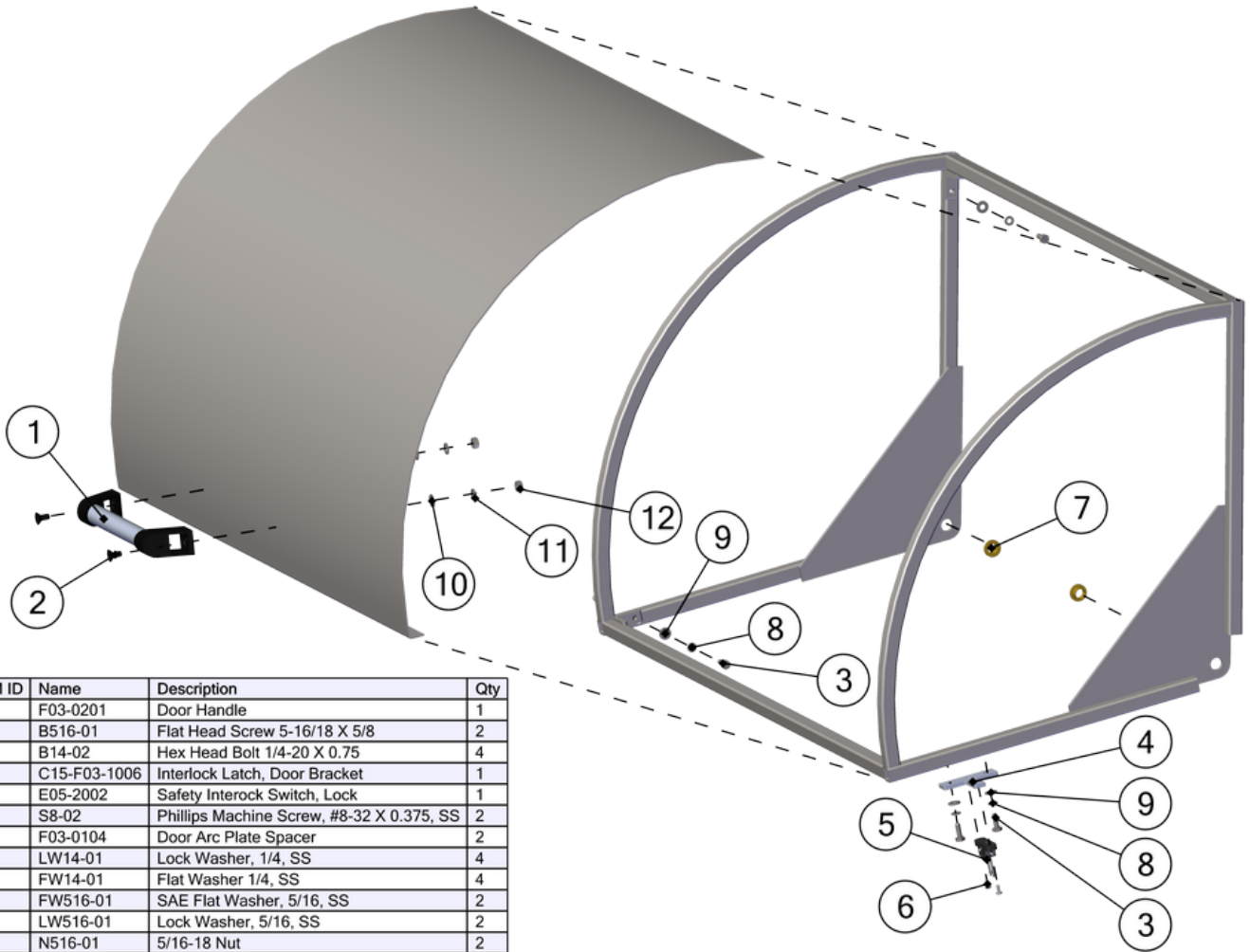


BOM ID	Name	Description	Qty
1	LBL-LOAD	Load Label	1
2	E04-2001-1	Red Emergency Stop Switch	1
3	E04-2002	Jog Button	1

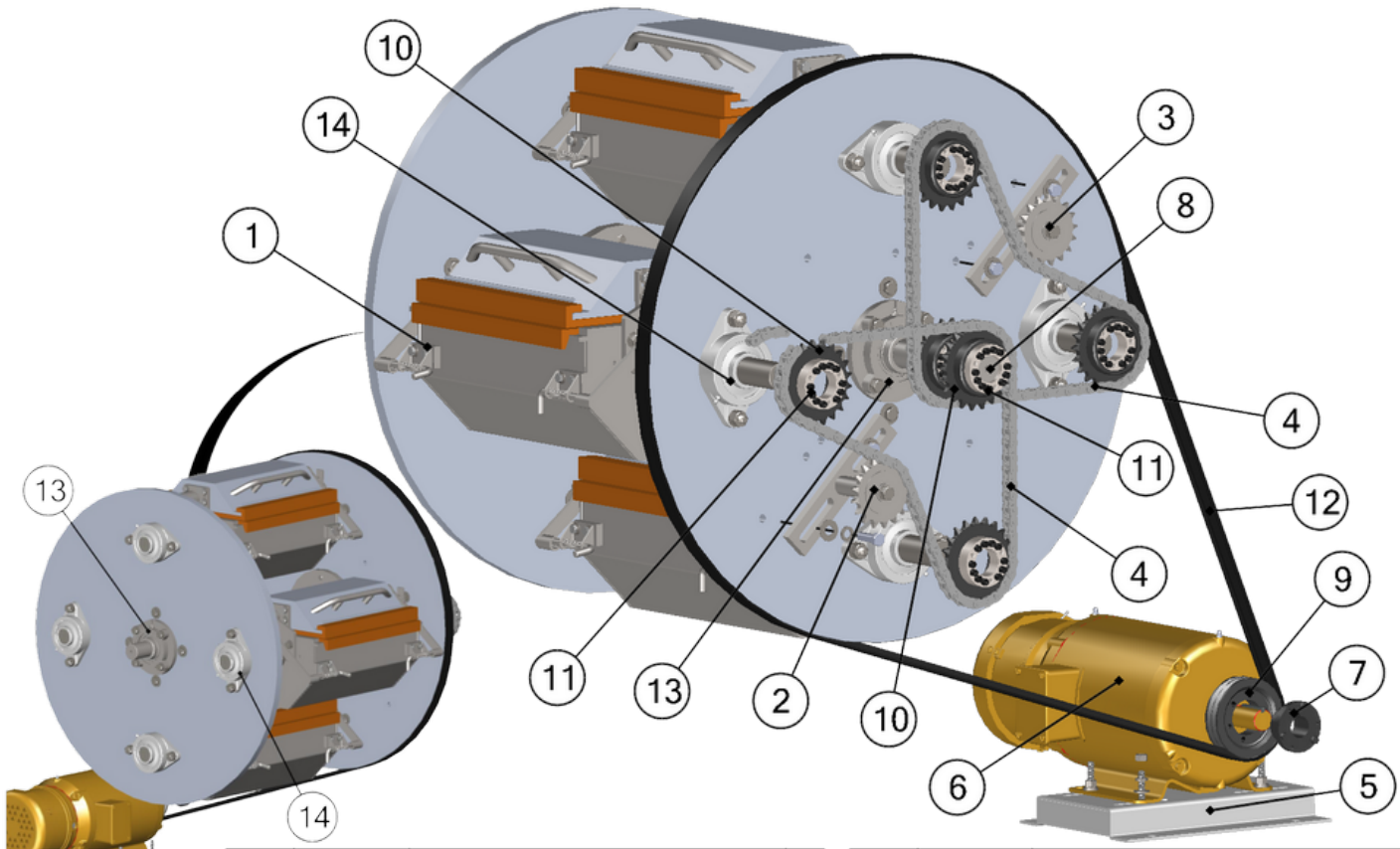
BOM ID	Name	Description	Qty
4	E03-2001	Touchscreen, IDEC, 5.7 in, C10, C15	1
5	C15-F01-0112	Door Plate	1



BOM ID	Name	Description	Qty
1	C15-F07	Splash Panel Weldment, C15	1
2	E05-2001	Safety Interlock Switch	1
3	M02	Interconnect Bracket Assy, C15	1
4	E05-1004	Interlock Mounting Bracket, C10, C15	1
5	C01-E02-0201	Electrical Box, C10, C15, C40, C60	1
6	F02-0202	Bumper Stop	2
7	F04-3002	Pillow Block, 1000, 1500, 4000	2

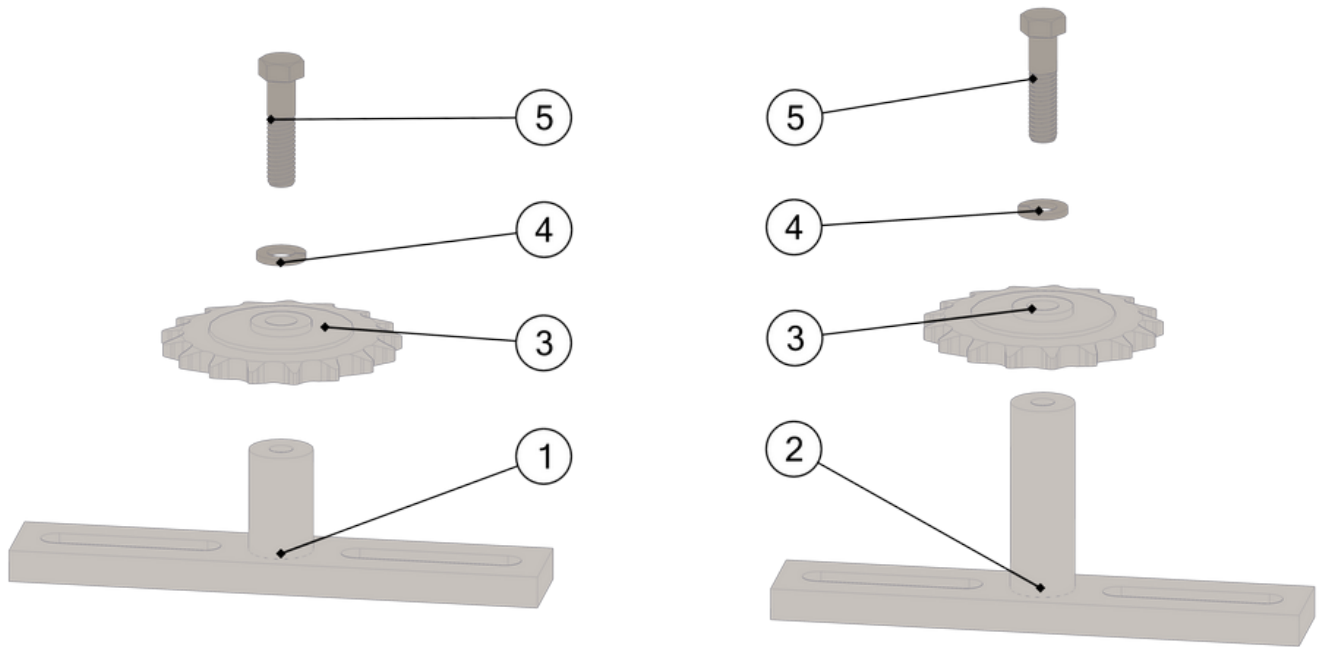


BOM ID	Name	Description	Qty
1	F03-0201	Door Handle	1
2	B516-01	Flat Head Screw 5-16/18 X 5/8	2
3	B14-02	Hex Head Bolt 1/4-20 X 0.75	4
4	C15-F03-1006	Interlock Latch, Door Bracket	1
5	E05-2002	Safety Interlock Switch, Lock	1
6	S8-02	Phillips Machine Screw, #8-32 X 0.375, SS	2
7	F03-0104	Door Arc Plate Spacer	2
8	LW14-01	Lock Washer, 1/4, SS	4
9	FW14-01	Flat Washer 1/4, SS	4
10	FW516-01	SAE Flat Washer, 5/16, SS	2
11	LW516-01	Lock Washer, 5/16, SS	2
12	N516-01	5/16-18 Nut	2

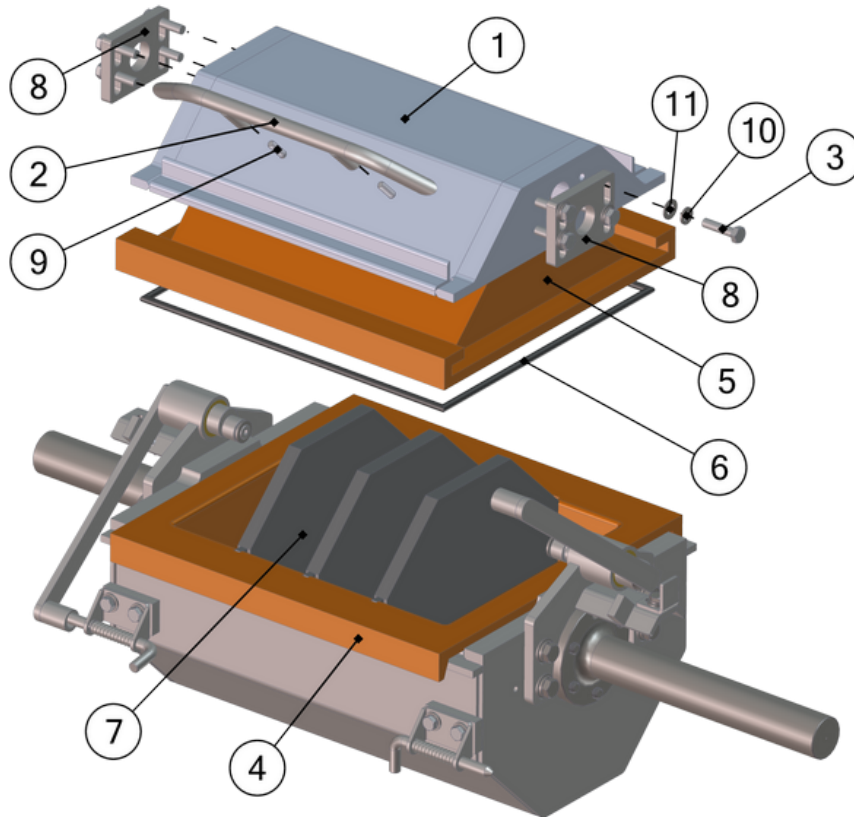


BOM ID	Name	Description	Qty
1	C15-T03	Barrel Assembly, C15	4
2	T0209	Tensioner Assembly, 3.5 in., C10, C15, C40	1
3	T0208	Tensioner Assembly, 2.125 in, C10, C15, C40	1
4	D01-2001	50 Chain, Diamond, 4', C01, C04	2
5	C01-D01-0202	Adjustable Motor Base	1
6	D01-2020	3HP, 1760RPM, 3PH, 60HZ, 182T, 3632M, TEFC, F1	1
7	C01-D01-0204	Quick Disconnect Bushing SH 1-1/8	1
8	C15-F04-0101	Main Shaft, C15	1

BOM ID	Name	Description	Qty
9	D01-0203	Motor Belt Drive Pulley	1
10	D01-0207	Cradle Sprocket	6
11	D01-0208	Power Lock, 1-7/16 ID, C10, C15, C40	6
12	D01-2006	Turret Belt, C10, C15, C40	1
13	T02-2001	Turret Center Bearing	1
14	T02-2002	Cradle Bearing, C02, C05, C10, C15, C40	4

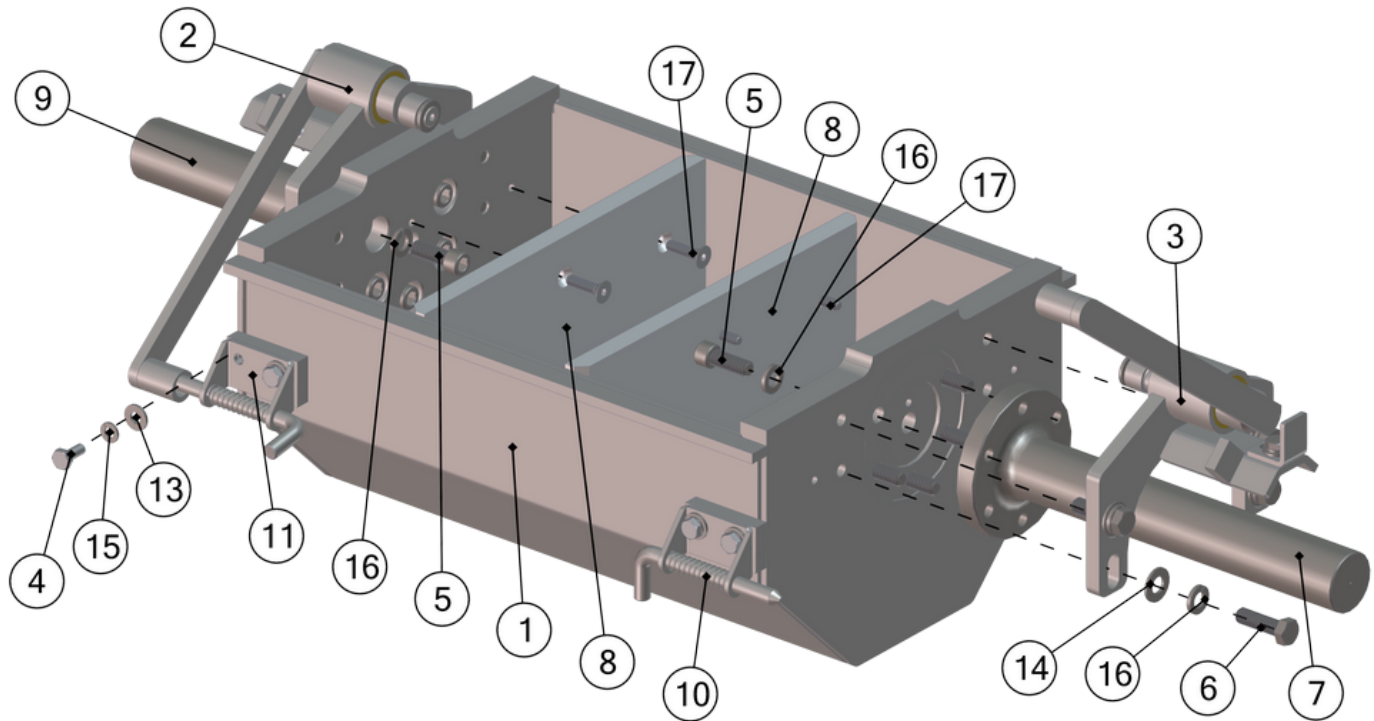


BOM ID	Name	Description	Qty
1	T0208W	Tensioner Weldment, 2.125 in.	1
2	T0209W	Tensioner Weldment, 3.5 in., C10, C15, C40	1
3	D01-2010	Idler Sprocket	2
4	LW716-01	Lock Washer 7/16	2
5	B716-01	Part. Threaded Hex Head Bolt, 7/16-14 X 1.75, SS	2



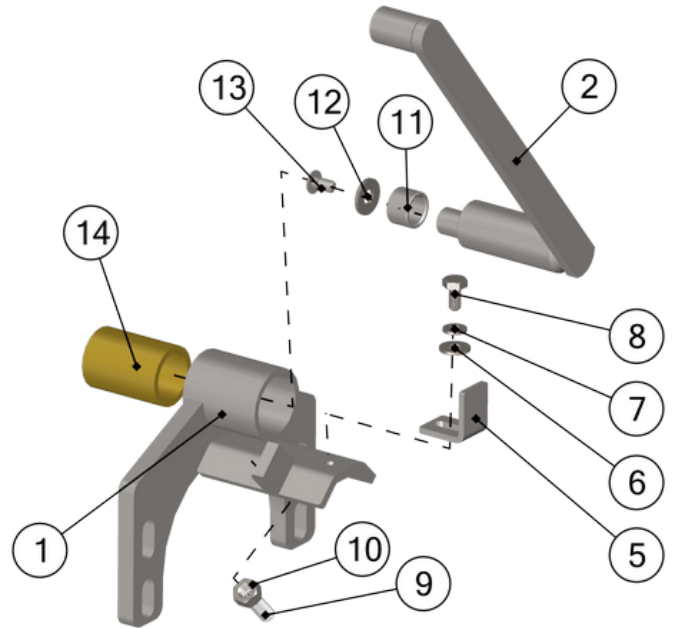
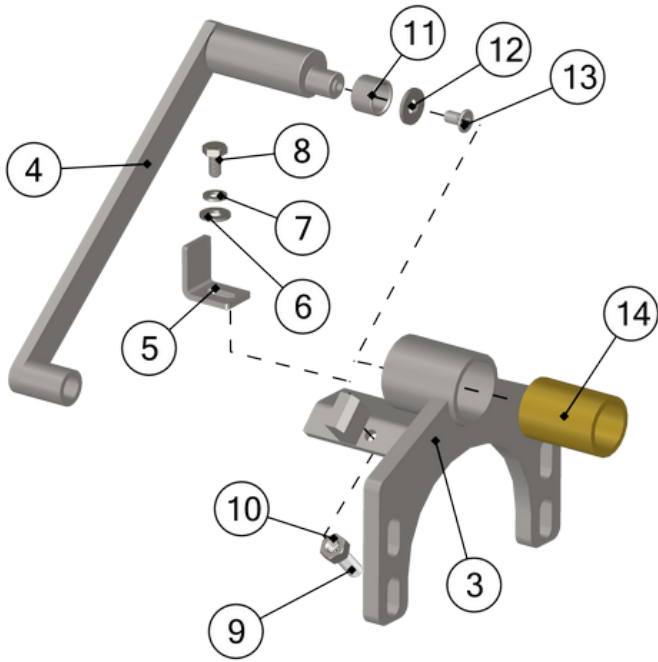
BOM ID	Name	Description	Qty
1	C15-T0302W	Barrel Lid Weldment	1
2	C15-T0310	Lid Handle Weldment	1
3	B516-04	Flat Head Screw 5/16-18 X 1.25	8
4	C15-T03-3001	Barrel Liner	1
5	C15-T03-3002	Barrel Lid Liner	1
6	C15-T0302-1005	Lid Liner Seal, C15	1

BOM ID	Name	Description	Qty
7	C15-T03-3003	Barrel Liner Divider, C15	3
8	C15-T0302-1004	Lid Harp	2
9	FH14-01	Flat Head Screw, 1/4" X 1.25"	8
10	LW516-01	Lock Washer 5/16	8
11	FW516-01	Flat Washer 5/16"	8



BOM ID	Name	Description	Qty
1	C15-T0301W	Barrel Cradle Weldment	1
2	C15-T0309	Left Lock Assembly, C15	1
3	C15-T0308	Right Lock Assembly, C15	1
4	B14-23	Hex Head Bolt 1/4-20 X 0.625"	4
5	B38-01	Bolt 3/8-16 X 1 SHCS	10
6	B38-07	Hex Head Bolt 3/8-16 X 1.25	8
7	C15-T03-1009	Barrel Shaft, 9.813" Long	1
8	C15-T03-0101	Barrel Liner End Cup	2
9	T03-0101	Barrel Shaft, 6.750", Long, C10, C15, C40	1

BOM ID	Name	Description	Qty
10	T03-0203	Right Spring Lid Lock Latch, SS	1
11	T03-0204	Left Spring Lid Lock Latch, SS	1
13	FW14-01	Flat Washer 1/4, SS	4
14	FW38-01	Flat Washer 3/8, SS	8
15	LW14-01	Lock Washer, 1/4, SS	4
16	LW38-01	Lock Washer 3/8, SS	18
17	FH14-01	Flat Head Socket Screw, 1/4-20 X 1.00, SS	6



BOM ID	Name	Description	Qty
1	C15-T0303WR	Cam Housing Weldment, Right, C15	1
2	C15-T0305W	Lid Lock Cam Weldment, Right, C15	1
3	C15-T0303WL	Cam Housing Weldment, Left, C15	1
4	C15-T0304W	Lid Lock Cam Weldment, Left, C15	1
5	C15-T03-1012	Cam Handle Limiter, C15	2
6	FW14-01	SAE Flat Washer, 1/4, SS	2
7	LW14-01	Lock Washer, 1/4, SS	2
8	B14-06	Hex Head Bolt, 1/4-20 X 0.50	2

BOM ID	Name	Description	Qty
9	SS516-01	Set Screw, 5/16-18 X 0.875, SS	2
10	N516-01	Hex Nut 5/16-18, SS	2
11	T03-0112	Lid Lock, Cam Insert, C40, C60, C120	2
12	FW14-03	USS Flat Washer, 1/4	2
13	B14-01	Socket Head Screw, 1/4-20 X 0.50	2
14	T03-0109	Lid Lock, Bushing Ø1"-ID	2