The Union Tool Corp.

ROLLER COATER

MANUAL

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Union Series #5 / #15 / #45 Roller Coaters

STANDARD OPERATING MANUAL

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INTRODUCTION

This manual was prepared for “standard” Union Roller Coaters. Union Tool provides standard machines, as well as, special machines for your particular application. This manual provides “in-general” information on our standard equipment. Some of the information may not pertain to your particular machine, but will provide you with a general overall lubrication and maintenance guide, as well as, troubleshooting.

Should your company or operator have any questions regarding this manual, please do not hesitate to contact the Union Tool Corporation, Technical Sales Department at 574-267-3211. Our hours are 8:00 A.M. through 5:00 P.M. Eastern Standard Time – Monday through Friday.

Union Roller Coaters are designed to apply a smooth, even, controllable coating of liquid materials, such as: glue, resinous adhesives, drawing lubricants, paint, wax, oil, sizing, silicone solutions, etc. to many reasonably flat surfaced substrates. Roller coating eliminates the human error, wasteful application, and the poor general coverage of spray or hand coating. “Dry Spots” and "Squeeze Out" is prevented and quality control is easily maintained.

All of our series #5 / #15 / #45 roller coater frames are manufactured with welded tubular steel and plate steel construction.

INTRODUCTION *(Continued)*

All rolls are supported in antifriction, self-aligning bearings. The diameter of our series of coating rolls and doctor rolls can be found in the chart below:

Series #	Coating Roll	Doctor Roll	Backup Roll
#5	4”	2-3/4”	4”
#15	6-1/2”	4-3/8”	6-1/2”
#45	8-3/4”	6-5/8”	8-3/4”

Note: Backup rolls are located on “Model C” Roller Coaters Only

Union Roller Coaters are most versatile in that additions or modifications can be made to accommodate almost any type of coating problem. Many coaters have been designed to contain deburring rolls, brush rolls, squeegee rolls, heated or chilled rolls in addition to coating rolls. Coating rolls can be chrome plated steel or covered with a number of different coverings including (but not limited to): Neoprene, Mechanical Neoprene, EPDM, Nitrile, Silicone, Gelatin, Thiokol, Buna N, Aluminum, etc.

Rolls can be spiral or longitudinally corrugated, depending on the type and amount of coating material used.

In most cases a smooth ground roll will apply the desired amount of coating material to the substrate being run.

SAFETY

SAFETY INTRODUCTION:

Here you will find safety guidelines for use with Union Tool equipment. These guidelines apply to anyone working with Union Tool equipment, including operations and service personnel. These guidelines are repeated throughout the manual, along with specific warnings and cautions not included here. These safety guidelines cover:

- **Safety during Installation;**
- **Safety during Operation;**
- **Safety during Servicing;**

Failure to follow these recommendations may result in personal injury from electrocution and/or equipment and property damage.

SAFETY DURING INSTALLATION:

Electrical:

1. A protective electrical ground connection to a reliable earth ground is essential for safe operation. Without one, all accessible conductive components (including knobs and controls that appear insulated) can render an electric shock.

2. A disconnect switch with lockout capability must be provided between the power source and the equipment.

SAFETY *(Continued)*

SAFETY DURING INSTALLATION (Continued):

3. The power supply wire gauge and insulation must be sufficient to meet the power requirements for the machine.

4. Only fuses of the correct type voltage rating and current rating should be used. Refer to the Union Tool wiring diagram equipment parts list for fuse recommendations. Using incorrect or non-recommended fuses can present a fire hazard.

Pneumatic: Union Tool has installed a lockout, three-way, manual valve in the air supply line to the filter/regulator. This valve makes it possible to relieve air pressure and lock out the pneumatic system before undertaking maintenance or repairs.

SAFETY DURING OPERATION:

DO NOT operate Union Tool equipment under the following conditions:

1. Near volatile or otherwise explosive gases or materials.

2. Without the covers, panel and safety guards properly installed.

SAFETY *(Continued)*

SAFETY DURING OPERATION (Continued):

3. At atmospheric temperatures below 20°F (-6°C) or above 120°F (50°C).
4. In drafty areas with the coating rolls unshielded from the draft.
5. **NEVER** use Union Tool equipment as a ladder or stepping stool.

SAFETY DURING SERVICING:

1. **DO NOT** perform internal service or adjustment on any equipment unless another person capable of rendering first aid and resuscitation is present.
2. Only qualified personnel should service Union Tool equipment.
3. To avoid personal injury, never touch exposed connections and components while power is ON. Dangerous voltages exist at several points in the equipment.
4. Disconnect, lock out and tag external electrical power before removing protective panels or replacing electrical components.
5. Remove all jewelry (rings, watches, etc.) before servicing equipment.
6. If possible, stand on a rubber mat when servicing Union Tool equipment. **DO NOT** work on equipment if standing water is present. Avoid working in a high-humidity atmosphere. Cover exposed terminals and work areas with rubber sheeting to avoid accidental contact while the power is **ON**.

INSTALLATION

Your Union Tool Roller Coater is easy to install.

1. Remove the coater from the skid. Depending on the size, the coater could be very heavy so please make a note of the shipping weight and use the proper equipment. Lift from the bottom of the frame. Be sure that the lift forks are against the frame when lifting the coater from the wooden skid.

2. Place the coater in the chosen position.

3. Level the coater.

4. Make the power drop to the disconnect box. The voltage should be clearly marked on the front of the disconnect box and on the electrical print inside the box.

5. Make an air drop to the coater if the coater is equipped with a filter and regulator. **Please do not reduce the size of the lines of the air drop smaller than the supplied filter and regulator.**

Make a visual check between the coating rolls and doctor rolls; look for any loose objects that may have fallen between the rolls. Check the rotation of the coating and doctor rolls in the reverse mode. All guards and covers must be in position for the coater to operate.

Location

The machine should be located with due consideration for the movement of materials in and out of the machine and the ease of movement required by the operator.

Mounting holes are provided in the "feet" of the machine for the purpose of leveling. The machine must be on a solid, level surface and a spirit level should be used longitudinally on the channel at the top of the machine and on the lateral top section of the frame. The machine must be secured to the floor by bolts or equal to ensure stable running.

WIRING

Make sure proper wiring is carried out to prevent damage to the circuit. Refer to packing list or wiring diagram inside the electrical control box. This will ensure correct voltage to all motors.

MACHINE SHOULD BE GROUNDED FOR SAFETY OF OPERATOR.

OPERATING INSTRUCTIONS

Roll Adjustments

The vertical adjustment assembly raises and lowers the upper roll assembly to accommodate various thickness of substrates being ran. Generally, this upper roll assembly is the only one that requires vertical adjustments; however, in special cases the lower roll assembly has been made adjustable. These rolls should never be allowed to be forced together so as to cause damage to the surface of the rolls. A handwheel located at one end of the coater connects two gear box arrangements and is the means of operating this assembly. Turning this handwheel in the direction as indicated by the tag will adjust the gap between the upper coating roll and lower coating roll (or lower back-up roll). This assembly is mounted on top of the machine at the end housing and includes a coupling to allow the top roll to be adjusted parallel to the bottom roll within a thousandth of an inch. To parallel the roll, pull the spring-loaded portion of the coupling back and either turn the single handwheel or turn the shaft to move either side up and down independently.

NEVER ALLOW COATING ROLLS TO TOUCH. Sharp materials or burrs should never be run through the machine with rubber rolls. This would cut & gouge the rolls.

OPERATING INSTRUCTIONS

Roll Adjustments *(Continued)*

The doctor roll adjustment assembly is the movement of the doctor roll in relationship to the coating roll. This adjustment governs the thickness of the coating being applied. The unifeed single handwheel located at either the infeed or offbearing end of the machine (depending on the model of coater) are used to move the doctor roll bearing slide plates, to which the doctor roll is mounted, in and out from the coating roll. These slide plates are machined to slide freely within the containment of the full length gib plates. A finely threaded screw is utilized to slide this bearing plate. This screw is located through a graduated collar to give you a precise degree of accuracy and control when turning the hand knob. The unifeed is supplied with a mechanical digital indicator to give a precise reading of the doctor roll position in relationship to the coating roll. This whole assembly is mounted on the upper bearing plates on Models “A”, “B” and “C”. The Model “D” is a bottom coater and this assembly is mounted to the housing ends, as is the lower assembly on the Models “A” and “B”. The Model “A” doctor roll hand knob adjustments or single handwheel unifeed are located at the top infeed side and the bottom offbearing side. In the “B”, “C” and “D” Models, these adjustments are located all on the infeed side. <u>The clockwise movement of the handwheel means moving the doctor roll toward the coating roll; a counterclockwise movement will move it away from the coating roll.</u>

OPERATING INSTRUCTIONS

Roll Adjustments *(continued)*

A trough is formed by the doctor roll and coating roll. This trough is where the coating material will sit within the “coating head assembly” with the ends sealed by UHMW seal plates. These seal plates should be hand tightened by either the hex nut or thumb screw located with the seal plate assembly. Only tighten these seal plates when the machine is due to operate; before the machine is turned on and the coating material is filled into the trough. When the machine is not in use, loosen the seal plates ensuring that they are not touching the rolls. The seal plates are a wear item and overtime will begin to leak. When this occurs you will need to replace with new seal plates.

Before attempting to fill the trough, feeler gauges should be used between the rolls at each end to ensure an even coat. In theory, to set a staring gap between these rolls, the solids in the coating material and the desired dry film thickness should be known. With these two factors, a setting for the gap between the rolls can be determined by multiplying the dry finish thickness by the percentage of solids, divided into 100. For example, the desired dry film thickness is 0.002" and the solids in the coating material is 50% or 100/50 = 2. Then 0.002" x 2 = 0.004 which is the gap required. Or, if the dry film thickness required is 0.002" and the solids in the coating material is 20% then 100/20 = 5

OPERATING INSTRUCTIONS

Roll Adjustments *(continued)* / Roll Change Out

So, 0.002" x 5 = 0.010" which is the gap required between the doctor and coating roll. This may not give you the dry finished thickness required due to the possibility that not all the coating material passing through the gap is deposited on the stock being run. A small adjustment of the doctor roll may be necessary to produce the required dry finish thickness.

ROLL CHANGE OUT:

To remove the coating and doctor roll (s) follow these procedures:

1. Remove seal plates.
2. Remove “end” covers on both housings
3. Remove chain and sprockets from rolls to be replaced.
4. Loosen roll bearings (4 bolts per bearing) and collars which hold bearings in place.
5. Slide bearings toward center of roll along journal; keep the roll supported by overhead hoist and straps. Care should be taken not to damage the roll face or the steel journals while removing the roll.
6. Shift the roll toward one end housing and tilt the opposite end out.
7. Shift entire roll out of the machine
8. Installation of a new roll is the same sequence in reverse

OPERATING INSTRUCTIONS

Roll Change Out

When installing new rolls, care should be taken to ensure that the vertical coating roll springs are firmly positioned on the screw shoulder and screw thrust bearing. This adjustment is done by the hex nut on the lower end of the elevating screw. Minimum tension prevents damage to the rolls should a varied substrate thickness be passed through.

ROLL MOUNTINGS

All rolls are mounted in self-aligning ball bearings. Self-aligning seals effectively keep grease in and prevent entry of dirt regardless of alignment. All bearings are mounted on smooth surfaces to ensure proper mounting and alignment.

ROLL MOUNTINGS

Feeding

On the basic coaters, feeding is done on an infeed table of solid sheet metal fabrication, mounted level with the roll pass line. A series of adjustable pickoff fingers are mounted on the offbearing side of the machine to ensure positive pickoff of the substrates being run. An outfeed table can also be substituted for our pickoff fingers.

BEFORE STARTING:

Two areas must be checked before operating this machine. Be sure the rolls are apart; be sure the pickoff fingers/outfeed table and infeed table are not touching the rolls. Serious damage to the rolls or the machine will occur if these points are not checked and corrected before operation. Careful reading of these instructions will ensure you of satisfactory operation. Tighten all bolted pieces to the machine (jarring and jolting during shipment may cause loosening of parts or assemblies).

Move all rolls away from each other. Steel roll contact with each other may cause a galling action and will ruin the finish of these rolls.

Roll rotation should be checked. If it is wrong recheck circuit for proper wiring.

PICKOFF FINGERS

The series of pickoff fingers should never be moved while the machine is running; any adjustment should have been done while the machine was idle.

Serious damage could occur if these fingers come into contact with the rolls.

GUARDS

Proper guards are installed and care should be taken to see that all guards are securely in place before the power is turned on.

DOCTOR ROLL SAFETY FEATURES

The adjusting screw on the doctor roll assembly is spring loaded. In event of a large object being caught in the trough of the rolls, the pressure can be relieved by vigorously pushing the adjusting screw out of the slotted bracket on the bearing slide block, towards the center of the machine.

LUBRICATION

Lubrication of the machine has been checked at the factory during the testing period. However, a double check of all the lubrication fittings should be made to familiarize the maintenance staff of all the lubrication points. Be sure to check the oil level in the reducer gear box before power is applied.

CLEANING

Clean all equipment whenever it will be idle for a period in excess of the usable life of the coating material, or at last once daily.

The most efficient way to clean the coating head is to use as much of the coating material within the rolls while coating product. Any material left in the rolls when production is over will be wasted. If both coating heads (top and bottom) were being used, you do not need to move the top vertical adjustment. If only the top coating head was used, raise the top coating assembly to about 3"; stop the coater and insert the cleanup pan. The cleanup pan and catch pan may be lined with plastic or paper; this will make it easier to clean up when the wasted coating material and clean up material have been dumped. If you are cleaning both the top and bottom coating heads, do not make any vertical adjustments. Stop the coater by moving the reversing switch to neutral and raise lexan hood for access on the backside of the coater. Once the lexan hood is open, the machine will not be able

Cleaning (continued)

to be started. Add cleanup material to one or both coating assemblies in between the doctor and coating rolls. Close the lexan hood and move the doctor roll against the coating roll, just as you would to apply a minimum coating. Start the roller coater in the forward position. Allow the cleanup material to revolve with the coating material for several minutes. After several minutes, reverse the direction of the coating rolls by moving the reversing drum switch to reverse. This will allow all material between the rolls to be squeezed out from the bottom of the rolls into the cleanup pans or catch tray.

Repeat adding the cleanup material approximately 2-3 more times at which time all rolls should be cleaned of any coating material and only have a small amount of residue of cleanup material on them. IMPORTANT: Adjust doctor roll away from the coating roll to ensure they are not touching. This may be done while rolls are still revolving. Leaving rolls together will cause a flat spot on rubber coating rolls.

STOP/POWER DOWN THE MACHINE TO PREVENT AN ACCIDENT. Wipe the rolls clean and loosen the seal plates.

NEVER WIPE THE ROLLS WHILE THEY ARE ROTATING.

TROUBLE SHOOTING
(DOCTOR ROLL DRIVE CLUTCH)

If the torque is too high or too low readjust toque limiter by tightening or loosening the adjusting nut as required. First straighten the tab on the lock washer before adjusting nut after adjusting the nut bend the tab on the lock washer locking the tab into place (SEE CHART BELOW).

TROUBLE SHOOTING DOCTOR ROLL DRIVE CLUTCH

Problem	Possible Cause	Corrective Action
1. The doctor roll stops rotating.	1. Seal plates are too tight. 2. Clutch needs adjusting to apply more torque.	1. Loosen spring tension on seal plates. 2. Straighten the tab on the lock washer and turn the nut by hand clockwise to apply more torque.
1. The doctor roll drive chain jumping.	1. Clutch needs adjusting to apply less torque. 2. Spring tension needs to be increased on chain tightner, or the spring is broken or weak and needs to be replaced.	1. Straighten the tab on the lock washer and turn the nut counter clockwise to apply less torque.

TROUBLE SHOOTING
(SEAL PLATE PROBLEMS AND LEAKING)

Note: Running the coater with the seal plates tight, without adhesive or cleanup or coating material to lubricate the seal plates, can damage the rubber on the end of the rolls (SEE CHART BELOW).

TROUBLE SHOOTING SEAL PLATE PROBLEMS AND LEAKING

Problem	Possible Cause	Corrective Action
Seal plate adjustment		1. The correct tension is to hand tighten the nut or thumb screw and if needed one or two extra turns to apply more spring tension to the seal plate.
1. Seal plates leaking coating material.	1. The seal plate spring tension may be too loose. 2. You will need to check that the coating roll ends are flush with the doctor rolls, as far as left to right. 3. Check if the seal plates are grooved deeply or damaged and have been leaking, you will need to replace the seal plates at this time. 4. Check for damage on the rubber on the end of the roll. 5. Check that the doctor roll is level with the coating roll.	1. Tighten the nut or thumbscrew to apply more spring tension. 2. Loosen the setscrews in the coating or doctor roll bearings and move the roll that has shifted to the left or right; retighten the set screws. 3. Replace the seal plates. 4. Replace the coating roll. 5. There are adjustments on the doctor roll bearing gibs.

MAINTENANCE CHECK LIST		
1.	The two covers will need to be removed on the offbear end to gain access to the drive components.	□
2.	Remove the seal plates from the machine.	□
3.	The drive chain will need be removed from equipment as well as the doctor roll drive chain.	□
4.	All idler sprocket assemblies and coating roll and doctor roll bearings need be inspected as well as lubricated. Replaced as required.	□
5.	The drive chain needs be inspected and replaced as required.	□
6.	Tension springs on the chain drive will need to be inspected and replaced as required.	□
7.	If the balance of this part of the inspection has been completed, then reassemble.	□
8.	The single handwheel adjustment – this control will be lubricated as well as checked out for moving freely and will re-zero the mechanical digital indicator so it reads out correctly with the proper gap setting.	□
9.	The unifeed adjustment will need to be checked out for operation and wear as well. If any parts show ware replace as required. Check it for parallelism and make any adjustments as necessary and set the mechanical digital indicator to read out the gap setting for the opening of the roll.	□
10.	All motors will need to be blown off and cleaned up as much as possible, as well as the gearbox needs to be checked for the level of gear lube inside it.	□
11.	The gearbox should be drained and replenished with fresh gear lube (yearly).	□
12.	All electrical connections on the main control panel will need to be checked out and tightened on the terminal stripes as well as the components inside the electrical box (yearly).	□
13.	Check the level control to confirm it is functioning properly (if applicable)	□
14.	Check all pneumatics and air supply lines (if applicable)	□
15.	Check the system for leaks of any kind	□

The Union Tool Corp.

SERIES #5 / #15 / #45

ROLLER COATER

“STANDARD FEATURES”

VARIABLE SPEED DRIVES

Union Tool coaters include AC variable speed drive controllers that control the speed of the rollers. The controllers are labeled to indicate the roll in which each controller is maneuvering. Variable speed ratios will depend on the specific series of roller coater.

SLIDING WINDOW GUARDS

All Union Tool coaters incorporate sliding window guards. These window guards are located on the front and back side of the coater and are equipped with **magnetic sensors** so that the guards must be in place in order for the coater to operate. These guards are an important safety feature and provide the operators to run the machine in a safe manner.

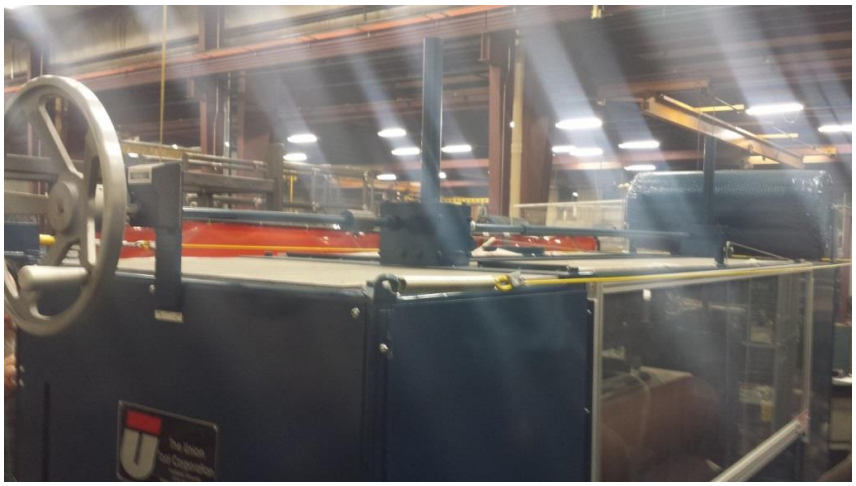
E-STOP PUSH-PULL CORD

All coaters are equipped with a push-pull emergency cable that extends around the perimeter of the coater. This cable can be pushed or pulled to be activated. Once activated, this will stop all powered rolls and will not allow the rolls to function until the blue safety switch has been re-set to the center position. If the coater is equipped with air cylinders, the e-stop will activate air valves so that the air cylinders raise the upper coating head. The **red pushbutton** on the safety switch can also be pushed as an e-stop in the event of an emergency.

When the emergency cable has been tripped, the blue safety switch will be in the off position (lowered).

To re-set the safety switch, click switch to the center position. In order for the switch to stay in the middle, the tension must be correct. The tension can be adjusted by turning the turn buckle until it is tighter or looser depending on the need

SINGLE HANDWHEEL ADJUSTMENT



The single hand wheel adjustment allows the gap between the coating roll and lower back-up roll (or lower coating roll for a double-sided coater) to be adjusted for the thickness of the substrate to be coated. Depending on the unit, this hand wheel is turned either clockwise or counter clockwise to open or close the gap. A mechanical digital indicator will provide a continuous readout of the gap and normally reads in five (5) digits (00.000”). The first two numbers are inches. If the rolls have been recently changed, or for some reason the gap is not parallel, paralleling the rolls can easily done.

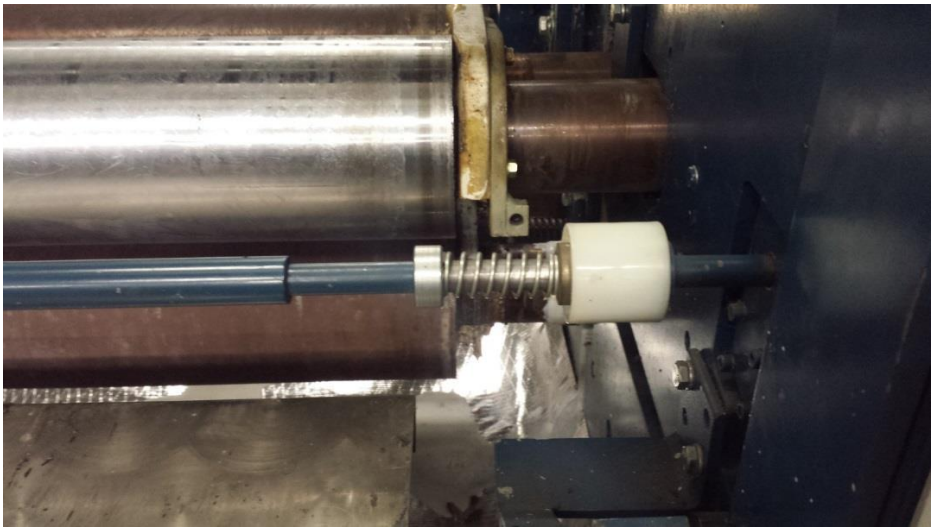
PARALLELING THE VERTICAL ADJUSTMENT (thickness gap)

To parallel the rolls, the spring-loaded coupling that connects the shaft between the two vertical gear boxes must be pulled back. This will allow one side to be adjusted without moving the other side. It is often easier to adjust the hand wheel side so that you know how far you have opened or closed the gap to make the rolls parallel. To parallel the rolls we recommend using a .015 feeler gauge. When paralleling the rolls always make sure that the machine is turned off for safety purposes

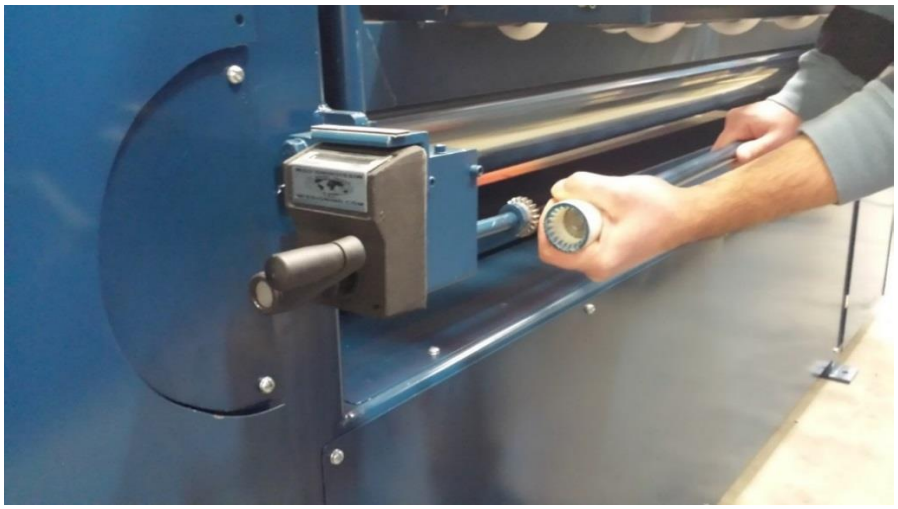
UNIFEED ADJUSTMENT

The doctor roll(s) is adjustable on a horizontal plane in relationship to the coating roll to control the amount of coating being applied. As the doctor roll is adjusted into the coating roll, less coating will be applied. As the doctor roll is moved away from the coating roll, more coating will be applied. The adjustment for the doctor roll is called a Unifeed. It is a single hand wheel that connects two (2) gear boxes that turn a screw moving the doctor roll on a horizontal plane.

PARALLELING THE UNIFEED ADJUSTMENT (doctor roll to coating roll)

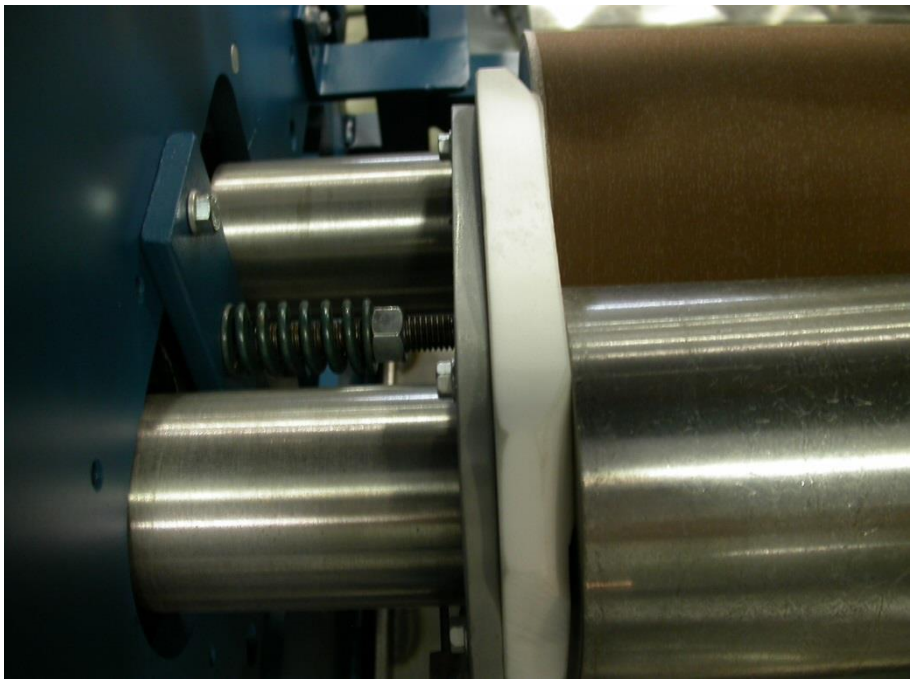


The unifeed incorporates a spring-loaded coupling just as the single hand wheel for the substrate gap does. By pulling back the coupling (pictured below), the doctor roll can be adjusted to parallel the doctor roll to the coating roll.



Depending on the set up of the machine, if you turn the coupling clockwise/or counterclockwise, it will move the doctor roll side that is furthest away from the unifeed handle either closer or farther away from the coating roll. Likewise, if you only turn the unifeed handle you can move the side closest to the handle either closer or farther away from the coating roll.
To parallel the rolls we recommend using a .015 feeler gauge. When paralleling the rolls always make sure that the machine is turned off for safety purposes.

SEAL PLATES



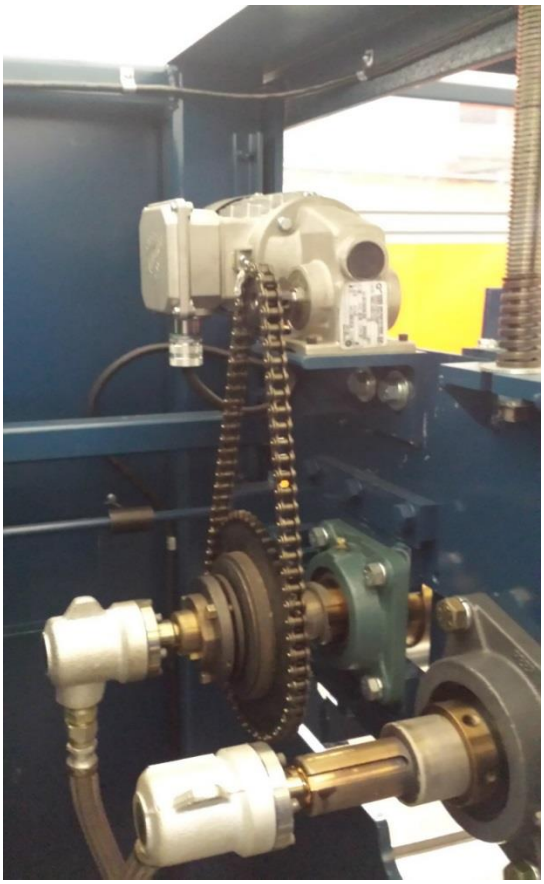
The UHMW seal plates ensure that the coating material is held between the coating roll and doctor roll. These seal plates are spring loaded and should be hand tightened against the rolls. The UHMW portion of the seal plate is a wear item and is screwed to the metal backer plate by self-tapping screws.

SEAL PLATES (Cont.)

The metal core of the coating roll and of the doctor roll should be parallel and square so that the UHMW seals the ends of the rolls. If a straight edge is not flush against the steel cores of both the coating roll and doctor roll, one roll will need to be moved horizontally, so that the steel ends are flush.

DOCTOR ROLL DRIVE CLUTCH

(Upgrade Option Only, not on all coaters)



The doctor roll drive allows the speed of the doctor roll to be changed independently from the coating roll speed. This feature eliminates the lines on the coating roll when the doctor roll turns too fast. The slower the doctor roll turns, the smoother the coating is on the coating roll. A lighter coating can also be achieved when the doctor roll is turning slower.

The drive incorporates a friction clutch so that the clutch can be set with just enough friction to turn the roll using the motor, but light enough to allow the doctor roll to free wheel during clean-up when the doctor roll is against the coating roll with a good amount of friction.

The clutch is adjusted by loosening the set screw that holds the outside tightening ring in place and then screwing the outside ring tighter.

The set screw must be tightened when the adjustment is complete.