ULTRA OPTICS


# 54R

## ENGINEERING MANUAL

# Table of Contents

## Introduction



## System Overview



## System Operation

# Introduction

This manual is intended for use by Ultra Optics customers. It is important to read and understand the information in this manual before installing or operating the system. This manual is provided by Ultra Optics to its customers as a courtesy and, except as expressly provided in this manual, ULTRA OPTICS MAKES NO WARRANTIES, EXPRESS OR IMPLIED, REGARDING THE CONTENTS IN THIS MANUAL. ULTRA OPTICS ASSUMES NO RESPONSIBILITY FOR ANY OUTCOMES AS A RESULT OF USING THIS MANUAL. Any information contained in other manuals for equipment supplied by third-party manufacturers (including, but not limited to the PLC, robot, motors, etc.) shall take precedence over information contained within this manual with respect to that third party equipment.

The employees of Ultra Optics wish to thank you for your business. The 54R is Ultra Optics' latest innovation in a rich history of designing and manufacturing the most accurate and robust lens coating machines available. If, after reading this manual, you are not confident in carrying out any task, please call Ultra Optics' technical service team at 763.488.6030.

## Symbols

Symbols and statements used throughout this manual include:

Text following this symbol needs extra attention.

NOTE: Text like this is extra information that may be helpful to the situation.

CAUTION: Text like this is information to help avoid damage to the machine and/or property.

**WARNING!**: **Text like this is information to help avoid serious personal injury and/or death.**

## Service

The 54R automated back-side coating unit was designed and manufactured for many years of safe and dependable operation. In the event service is required, please contact Ultra Optics at:

Ultra Optics
9200 Wyoming Avenue North, Suite 360
Brooklyn Park, MN 55445
TechnicalSupport@ultraoptics.com
763.488.6030

## Design Modification

DO NOT use this product in any manner not consistent with the instructions outlined in this manual!
NEVER alter the design, or perform service that is not consistent with the instructions outlined in this manual, without the prior written approval of Ultra Optics.

ALWAYS refer to the manual supplied by the component manufacturer for the most accurate and current information regarding that item and its particular use. Any information in the component manufacturer's manual shall take precedence over information contained in this manual.

## Additional Copies

Additional copies of this manual are available online at www.ultraoptics.com, or by contacting Ultra Optics by phone at 763.488.6030. No part of this document may be reproduced or copied in any form, or by any means, without the prior written permission of Ultra Optics. 

# SAFETY FIRST!

## Safety

The 54R is a complex piece of equipment that contains various safety hazards. Some of these hazards include, but are not limited to:

- Ultra Violet light – UV-light is used to cure the coating on the lens. Exposure to this light can damage the eyes. The UV-light also produces extreme heat and high temperatures. These temperatures could cause skin burns. All flammable materials, including cleaning agents, must be kept away from these temperatures due to the risk of fire.
- High pressure hot water wash – hot water (~140°F) is sprayed at high pressure to provide a thorough cleaning of the lens. This water could cause burns or injury if directed on bare skin.
- Air jet drying – compressed air is blown at the lens surface to dry it after being washed. This compressed air could contain particles and cause damage to the eyes.
- Moving components – the machine contains several moving components that could cause damage and/or serious injury.
- Chemicals1 – the chemicals used in this machine can cause skin/eye irritation and damage clothing.

Because of these issues, it is important that only trained and qualified technicians operate and work on these machines. When doing so, in addition to following the guidelines in this manual, appropriate personal protective equipment (PPE) should be worn. The PPE may include, but is not limited to safety glasses, face shield, protective gloves, lab coat or smock.

[1] All Safety Data Sheets (SDS) for Ultra Optics coatings are available by visiting our website at www.ultraoptics.com

**WARNING!** **This machine uses high voltage electrical power. The access panel to the electrical control panels should only be opened and worked in by a qualified technician. Failure to take proper precautions could result in serious injury or death.**

**WARNING!** **This machine uses hot water at high pressure. The water heater could burn the skin if the surface is touched. Extreme caution should be used when performing any work or maintenance on or around the wash components.**

**WARNING!** **An extremely intense ultraviolet light source is used to cure the coating on the lenses. Service work should not be performed on the 54R while this lamp is energized. Direct exposure to the lamp could result in severe or permanent vision loss. The ultraviolet light source also produces extremely high temperatures. Touching objects in this area (above or below the deck) could result in a burn. All flammable materials (such as alcohol) MUST be kept away from these temperatures due to risk of fire.**

**WARNING!** **The coating chemicals applied in this machine could cause significant health risks if ingested or if it gets into the eyes. The SDS for the coatings being used can be found at www.ultraoptics.com.**

## Required Utilities

The following facility utilities are required to operate the 54R. The provisions for these facilities are the responsibility of the customer and are not included in the scope of supply for this machine.
Electrical Power: 220 VAC, single phase, 4-wire (NEMA L14-30), 30 amp circuit.

Compressed Air: 80 psig, 18 cfm. The connection on the machine is a 1/4” quick connect

Deionized Water: Consumption of 7.6 L/hr at periodic rates of 0.3 L/min of deionized

water flow rate with ≥ 1 megaohm resistivity. The connection on the
machine is 3/8” barbed fitting.

Water Drain: An accessible floor drain is required within 30 feet of the machine.
Internet Connection

# System Overview

## General Overview

The 54R is the latest back-side hard coat machine from Ultra Optics and represents a state-of-the-art solution for the optical industry. The system’s basic functions are based on the highly-touted robustness of our long-running MR3. The MR3 has been reliably coating lenses for over 20 years.
In addition to the MR3’s well-proven coating process technology, the 54R brings system automation. This innovative system utilizes a robotic arm to automatically load/unload lenses from the trays into the coating machine. Lenses are brought into the machine via standard job trays on a conveyor system. Incoming trays can have a work ticket with a bar code that the 54R system will read. The 54R will communicate with the LMS system to allow custom coating operations for each job by utilizing customized recipes. Automated loading processes reduce work handling, increase through-put, reduce breakage, and will significantly reduce overall operating costs.
The yield of the process is improved by incorporating several process improvements, such as:

- Hot water wash – using hot water to wash the lens improves the system’s ability to remove any contaminants such as dirt, dust or residual polish material. A completely clean lens is a fundamental requirement to obtaining a successful coating application.
- Water quality monitoring – our many years of experience have taught us that if the quality of the de-ionized water starts to diminish, so does the effectiveness of cleaning

- the lens. Rather than wait for evidence of poor water to show up in the form of lens breakage, the 54R system continuously monitors the quality of the wash water and alerts the user when problems start to arise. This allows servicing the equipment before the issue gets worse and the production yield goes down. Measured UV light intensity – the coating applied to the lens will only properly cure if it has received sufficient energy from the UV light source. It is well understood that the intensity of the UV light source diminishes over time. The 54R actively monitors this intensity level and will alert the user when the intensity is getting too low to produce reliable curing of the coating. Enhanced compressed air filtration – a well-cleaned lens can quickly be spoiled if it is dried with contaminated air. To reduce lens breakage during the drying step of the process, the 54R makes use of multi-stage air filtration to deliver ultra-clean air during the drying of the lens.
  Precise spindle speed control – the spindle motors on the 54R are all controlled with precise digital processes. Each motor contains feedback to the controller which allows the controller to make appropriate adjustments when needed to achieve the desired spin speeds. This improved control will produce consistent results every time.

## Lens Conveyor

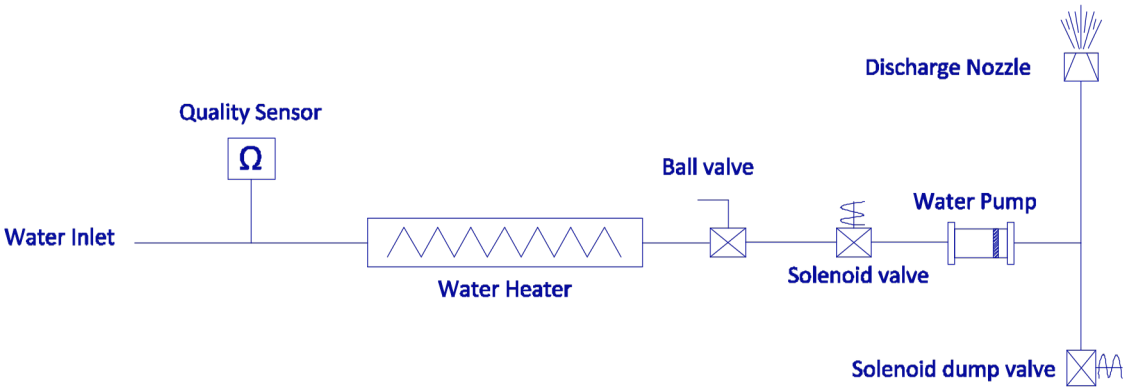
The front of the 54R machine contains an automated conveyor. This section is designed to take incoming trays and feed them into the processing area of the machine. A motor-driven belt is used to advance the trays across the front of the machine. There are several stop locations for the trays to wait, and they are controlled by stop pins mounted beneath the trays. These stop pins are controlled pneumatically by the system PLC. The machine can be configured to run the conveyor for either right-to-left or left-to-right operation as viewed from the front of the machine. The conveyor is uniquely designed to reduce friction, noise and wear on the job trays. When the tray is stopped, the conveyor beneath that individual tray will not be in motion. This unique feature will create less dust and debris, which further helps reduce lens breakages due to pits on lenses.

## Lens Load/Unload

Lenses are loaded and unloaded into the machine by making use of a robotic arm. The motion of the arm is controlled by the system PLC. As the system's PLC controls the over-all process, it controls the servo motors of the robot arm through the large servo drives in the control panel. The machine's arm assembly will transport the lens from one processing station to the next (i.e. from the wash station to the dray station, then to the coating station, etc) without any action required from the robot. The 54R is able to be configured to process lenses either on or off the block. The lenses are picked and held by use of vacuum pressure at each of the suction cups.
If the 54R is configured to run on-the-block, the suction cup is applying vacuum to the block, not the lens directly, reducing the amount of stress on the lens during processing. Further, the mass of the block provides heat dissipation during the curing stage, reducing the temperature of the lens during curing. The benefit of these design considerations is significant reductions in lens warping during processing.
If the 54R is configured to run off-the-block, the machine will take the un-blocked lens out of the tray and then place it in a centering device. After the machine centers the lens, the machine will pick the lens again and place it into the processing portion of the machine. This centering action helps provide consistent, quality results. The 54R has been designed so that it does not touch the back side of the lens when processing off-the-block lenses.

## Wash process

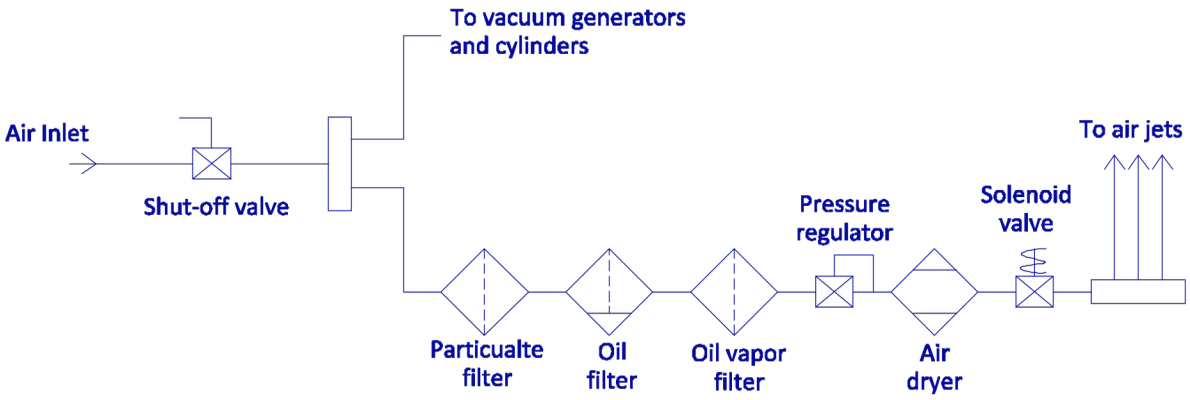
The lens is washed with high pressure, heated deionized water. As shown in the schematic below, the deionized water passes through a water heater where it is heated to approximately 140°F. The hot water then flows through a manual ball valve and a solenoid valve into the pneumatically driven pump. The pump increases the pressure of the water to 2000 psig. The hot, high pressure water is then sprayed through a nozzle onto the back-side of the lens. The lens is spinning during the wash process to help assure a complete surface cleaning. The spent water is collected in the bottom of the wash bowl and drained through a tube to the pump-out box. At the end of the wash cycle, the water pump stops, and any residual water downstream of the pump is emptied through the dump valve.




The system PLC actively monitors input from the water quality sensor and all system sequencing to control the water pump and solenoid valves. The temperature of the water is controlled by the machine's PLC by reading a temperature sensor and controlling the heating unit.

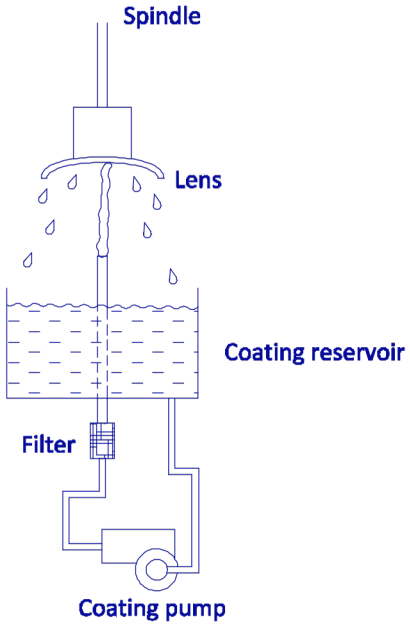
## Dry Process

After the wash process is complete, the machine will transport the lens to the drying station. The lens is dried by use of clean, compressed air. In the drying station the air nozzle is articulated in a manner that ensures a complete drying of the entire lens surface. Similar to the wash process, the lens is spun while in the drying station to help remove all of the water.
As shown in the diagram below, the air that is used for drying the lens passes through several filtration and drying stages to obtain the clean and dry air that is used for the drying process. The timing of the drying process is controlled by the system PLC.




## Coating Application

With the lens down in the coating application station, the coating pump draws coating material from the reservoir and pumps it through a filter, up to the surface of the lens. The lens is being spun during the time of application to ensure a sufficient amount of coating is applied to the entire surface. After the coating has been applied, the pump will stop and the spin speed of the lens changes to a new value which will generate the proper film thickness of coating. The timing and spin speeds are controlled by the system PLC. This process is shown schematically in the following diagram.



The 54R utilizes two independent coating application systems. This allows utilizing two different coatings in one machine. In many applications, this can eliminate the need for two different coating machines. This versatility can be used to process tintable coating on jobs that will be tinted, and non-tintable coating on jobs that will not be tinted or will be later coated with anti-reflection (no glare) coating. This could also give the opportunity to utilize a specialized coating such as anti-fog, etc. The system will apply the applicable coating by utilizing the recipe system and LMS integration.

## Cure process

The 54R is designed to cure Ultra Optics' line of UV-based coatings. After the lens has completed the coating application cycle, the arm assembly will index and then drop down into the curing station. An ultra-violet lamp resides in the curing station. The radiation energy from this lamp is used to effectively cure the coating to the lens with the proper characteristics of adhesion, hardness, etc. The PLC monitors and controls the intensity of the lamp and the timing of the curing process based on the known performance and requirements of Ultra Optics' coatings.

**WARNING!** **An extremely intense ultraviolet light source is used to cure the coating on the lenses. Service work should not be performed on the 54R while this lamp is energized. Direct exposure to the lamp could result in severe or permanent vision loss.**

**WARNING!** **The ultraviolet light source produces extreme temperatures. Any work on the machine should be done after the ultraviolet lamp has been turned off and sufficient time has passed for it to cool. Leaving the lamp turned on causes risk of burning and injuring the employee.**

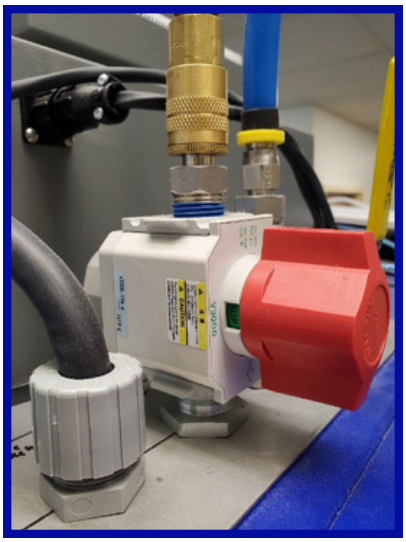
**WARNING!** **Do NOT use alcohol of any kind to wipe/clean the machine with the ultraviolet lamp turned on. The extreme temperatures of the lamp could cause the alcohol to ignite and start a fire.**

# System Operation

## Start-up Procedure

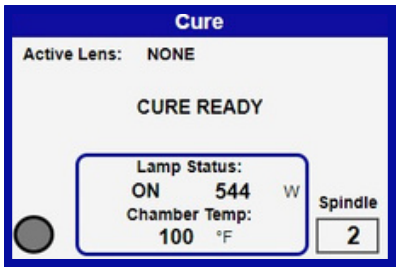
The following procedure should be followed after the 54R has been shut-down, but not completely powered down. An example of this situation would be when the machine has been shut-down at the end of the day. This procedure does not apply to the first time the machine is powered-up. Specifically, the following procedure should be followed the next time the system is to be run after it was previously shut-down by turning off the air supply and pressing the Power button near the touchscreen.

1. Perform all of the daily activities listed in the Scheduled Maintenance section of this manual.
2. Turn on the air supply to the machine. As shown in the photo below, the red handle should be aligned with the direction of air flow.

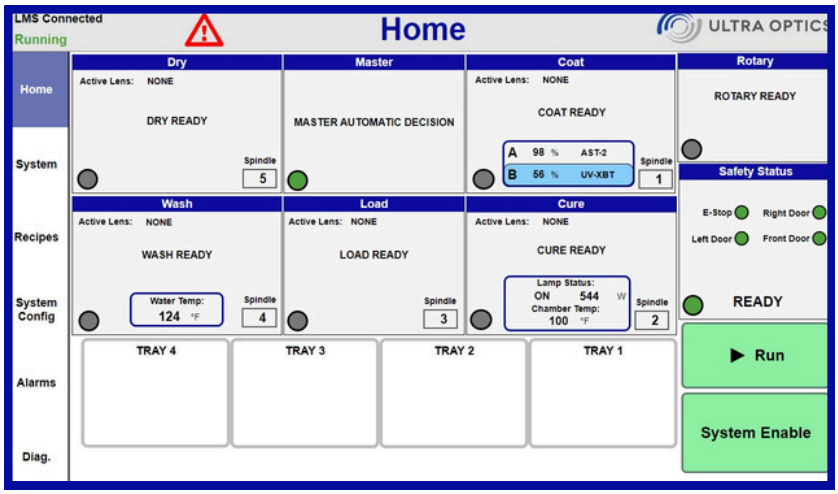


3. Push the power button to “ON” at the Operator Interface Terminal (OIT).
4. Allow the controller to turn on and configure itself. This may take 1-2 minutes.
5. When able, touch the “System Enable” button. This will cause the machine to do a homing sequence. When the sequence is complete, the “System Enable” button will turn green.
6. Confirm the coating height is properly set.
7. Ensure that the UV lamp has successfully ignited and is on. The HMI should show

7. Ensure that the UV lamp has successfully ignited and is on. The HMI should show Lamp Status: ON and “CURE READY” as shown below:




8. Touch the “Run” button. When “Run” mode has successfully activated, the button will turn green as shown below:




9. Begin feeding trays to the system.

## Communication With Lab Management System

The 54R is designed to integrate into the lens manufacturing system by communicating with the Lab Management System (LMS). Each job tray will have a work ticket containing a barcode. As the tray enters the 54R, the barcode on the ticket will be scanned. Once the bar code is scanned, the 54R controller will communicate with the LMS software to determine how the job should be processed. After passing the job identification number to the LMS, a code which resides in the CPID field will be returned to the 54R. This code will then determine if the 54R should simply wash and dry the lens, or if it should also apply and cure the back-side hard coat.

The 54R communicates with the LMS via an Ethernet cable. It is suggested to use a cat6 cable. The cable should connect to the connector on the top of the machine, as shown in the picture below:

It is necessary for the Lab Manager to ensure the CPID field is being populated for all jobs running through the 54R. If there is not a code in this field, the 54R will not be able to automatically process the job. The machine will produce an error and the user will have the opportunity to tell the machine to process that job with a default recipe, or they can remove that tray and resume with the next tray.

## Priming the Wash System

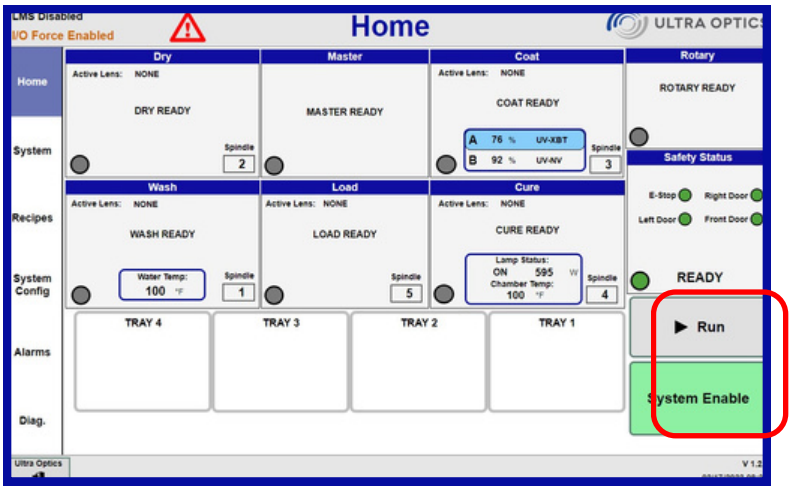
From time to time, it will be necessary to prime the wash system. This does two things, first, it helps ensure all of the air has been removed from the water line so that the wash pump is successfully pumping water to clean the lens and not cavitating due to air bubbles in the system. Second, if there are any impurities in the water system, running the wash prime function for a while can help purge the contamination out of the system.

Note that this process is only done with an off-the-block lens. If the 54R is running in on-the-block mode, the wash prime function will be done with a de-blocked lens.

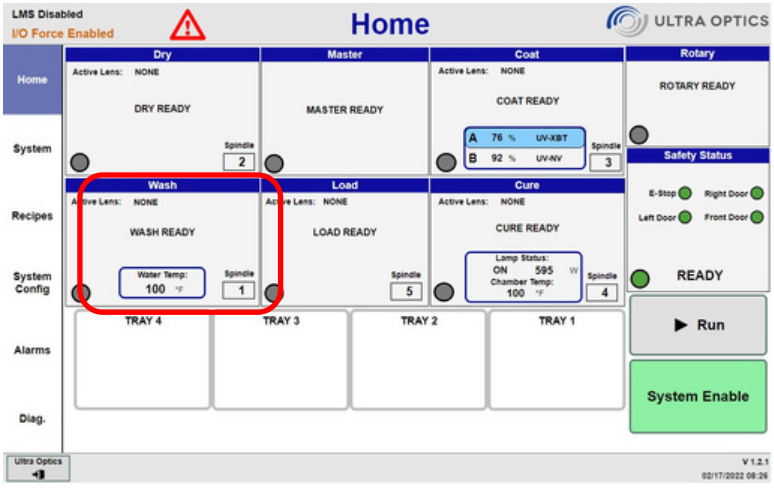
The following procedure should be used to prime the wash system:

1. Make sure there aren't any job trays on the conveyor in the machine.
2. On the Home screen, make sure the system is enabled. If the "System Enable" is not green, press it and make sure it turns green. Also make sure that the system is NOT in

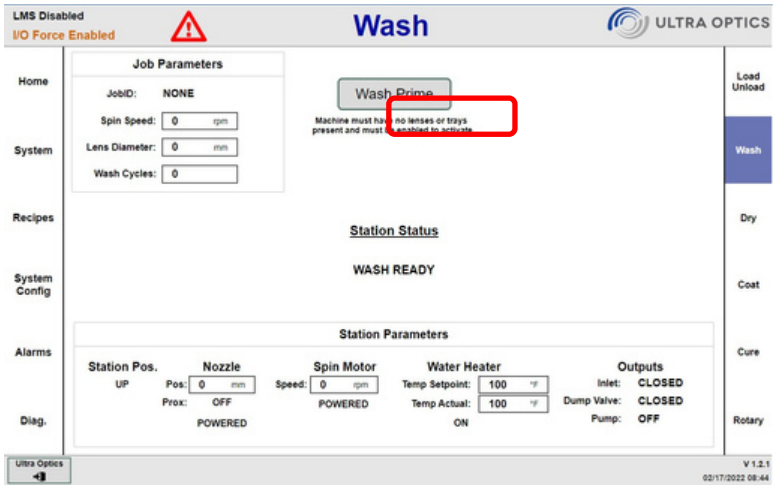
“Run” mode. The “Run” button should NOT be green. If the “Run” button is green, press it again to turn it grey as shown below.



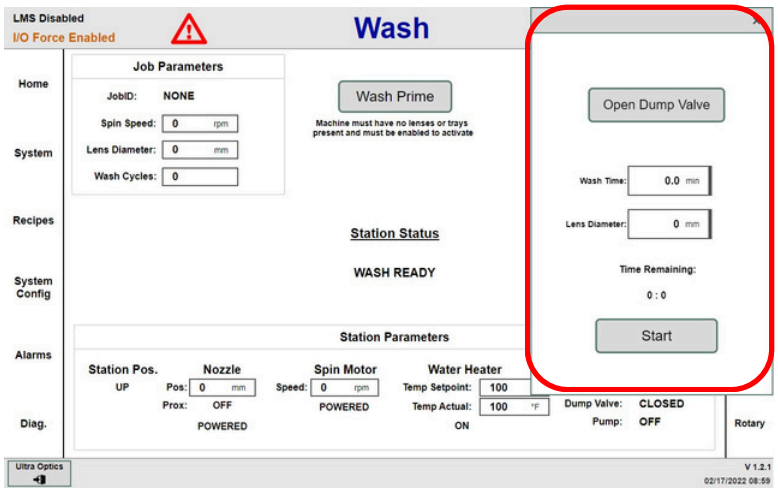

3. From the Home screen, select the “Wash” module by touching in the box



4. In the Wash screen, select “Wash Prime”




5. In the Wash Prime screen:
   a. Enter the duration of time to run the wash prime, in minutes
   b. Enter the diameter of the lens that will be used during the wash prime
      i. Note that this lens should not be a production lens as the wash prime will likely damage the lens surface. It is suggested to use an inexpensive or scrap lens for this process.




6. Select the “Start” button on the Wash Prime screen.
7. Place a test lens (off the block) into the tray with the backside of the lens facing down into the tray.
8. Place the tray with the test lens onto the inlet conveyor of the machine.
9. The wash pump should cycle (“beat”) at a rate that is approximately 70 “beats” per minute. If the pump is cycling significantly faster, it is likely that the pump is not getting water. In that case, press and hold the “Open Dump Valve” button for about five seconds. After releasing the “Open Dump Valve” button check to see if the wash pump returns to a rate of about 70 beats per minute.

a. Repeat this Dump Valve procedure as often as required to get the wash pump to prime.

10. The machine will continue to pump water through the wash system for the duration of the timer. When the time has elapsed, the machine will place the lens back in the tray.
11. Close the Wash Prime screen by touching the X in the upper right corner.
12. Go to the Home screen and touch the “Release Tray” button.

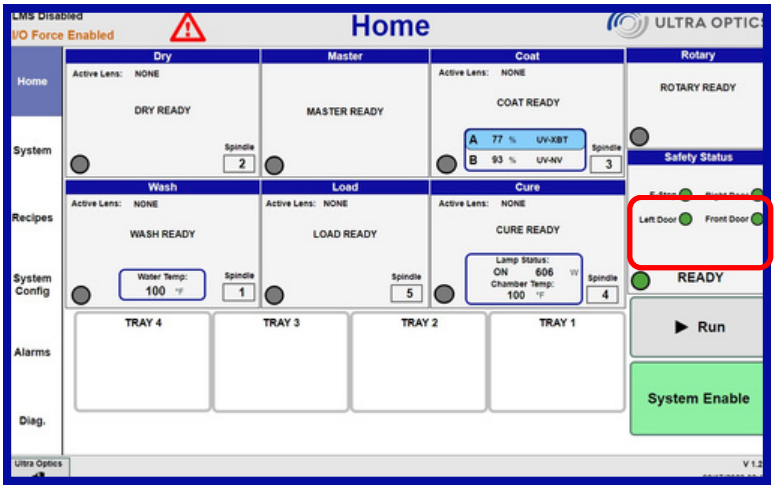
## Priming the Coating System

From time to time, it will be necessary to prime the coating system. This can occur after changing the coating filter, or any time there is air in the coating tube lines, etc. This helps ensure a good flow of coating lacquer is getting onto the lens.

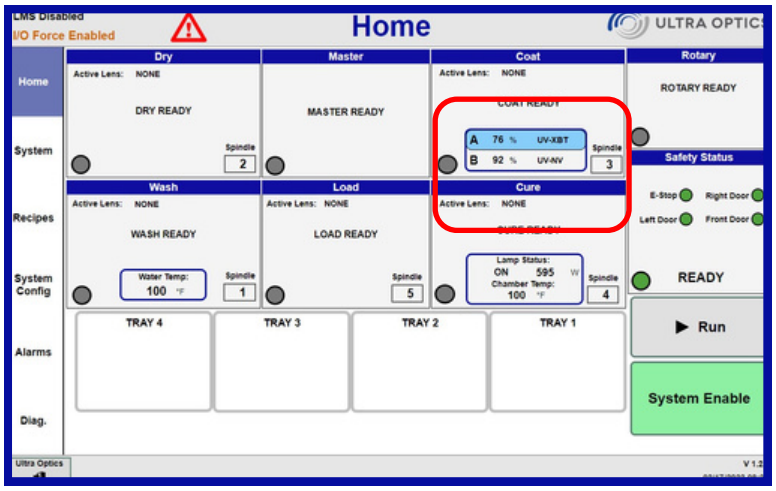
Note that this process is only done with an off-the-block lens. If the 54R is running in on-the-block mode, the wash prime function will be done with a de-blocked lens.

The following procedure should be used to prime the coating system:

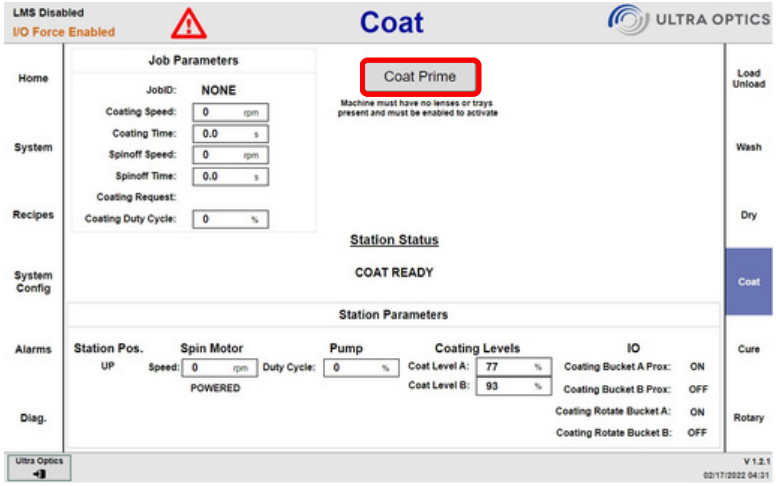
1. Make sure there aren’t any job trays on the conveyor in the machine.
2. On the Home screen, make sure the system is enabled. If the “System Enable” is not green, press it and make sure it turns green.



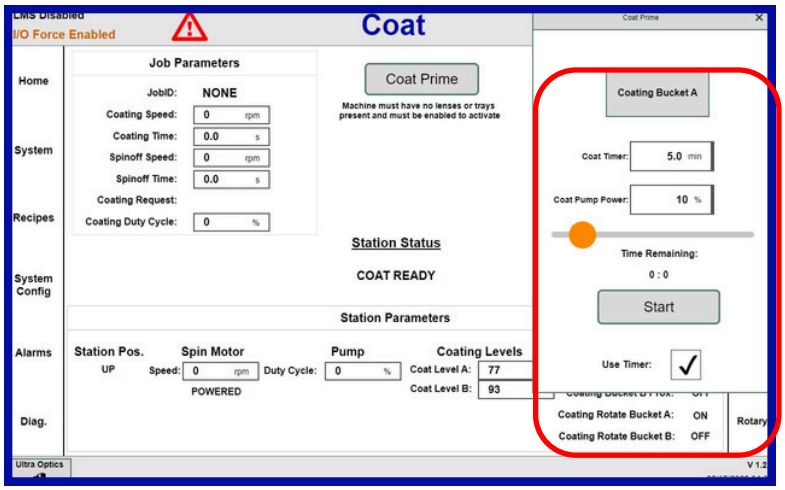
3. From the Home screen, select the “Coat” module by touching in the box



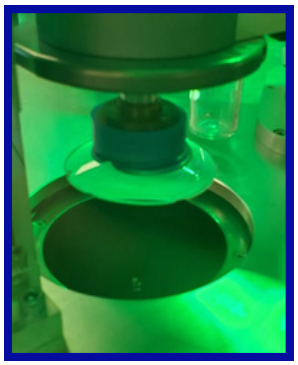

4. Select “Coat Prime”



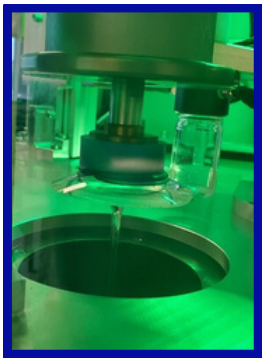

5. In the “Coat Prime” window, enter the following information (see picture below):
    a. Which coating reservoir to prime, A or B
    b. If you wish to have the machine automatically stop the process after a certain period of time:
        i. Check the box “Use Timer”
        ii. Enter the length of time, in minutes, to run the coating pump
        iii. If you don’t do this, the coating pump will run continuously until stopped manually.
    c. Adjust the coating pump power by touching and entering a value in the box, or by moving the orange slider.
        i. It is suggested to start this at a low level such as 10%. Then observe the height of the coating stream. Based on the resulting height, use the input box or the orange slider to adjust the coating pump power to achieve desired height.



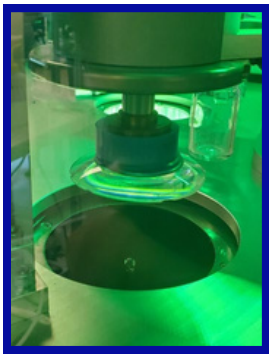

6. The lens will not drop down into the coating station, it will remain up so that you can look through the window of the machine and see the coating height.
7. Adjust the Coat Pump Power so that the coating height comes to the top of the bowl.



(Coating too low)



(Coating too high)

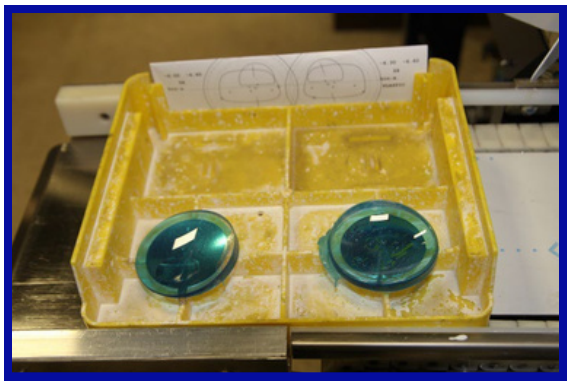


(Coating level good)

8. When the coating pump stops, the machine will index the lens to the cure station and will cure whatever coating may have gotten on the lens.
9. The lens will not be returned to the tray. The machine will hold the tray until the user releases it by selecting the release button on the touch-screen.
10. Repeat this procedure for the other coating bucket if both are being used.

## Work Feed into the Machine

Work will be fed into the machine in the standard job trays. The blocked lenses need to rest in the tray with the backside (concave) facing up, and the block properly nested in the tray. If the machine is running off the block lenses, the lenses must be concave (back) side down and must be within the round “pockets” of the tray. The tray needs to have the work ticket in place by double-folding it and placing it into the tray as shown in the following picture:

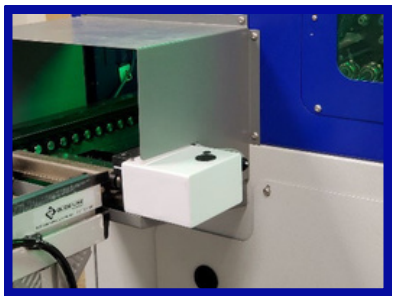


The work ticket/paperwork needs to be in the tray, double folded with the bar code facing away from the lenses. If the paperwork is not double folded, it will interfere with the robotic arm and be dislodged from the tray. If the bar code is facing the wrong direction, the system will not be able to properly process the work.

The conveyor on the front of the 54R will pull trays into the machine as space permits. The system controller will monitor the presence of trays and allow them to move forward by actuating stop pins located on the bottom of the conveyor.

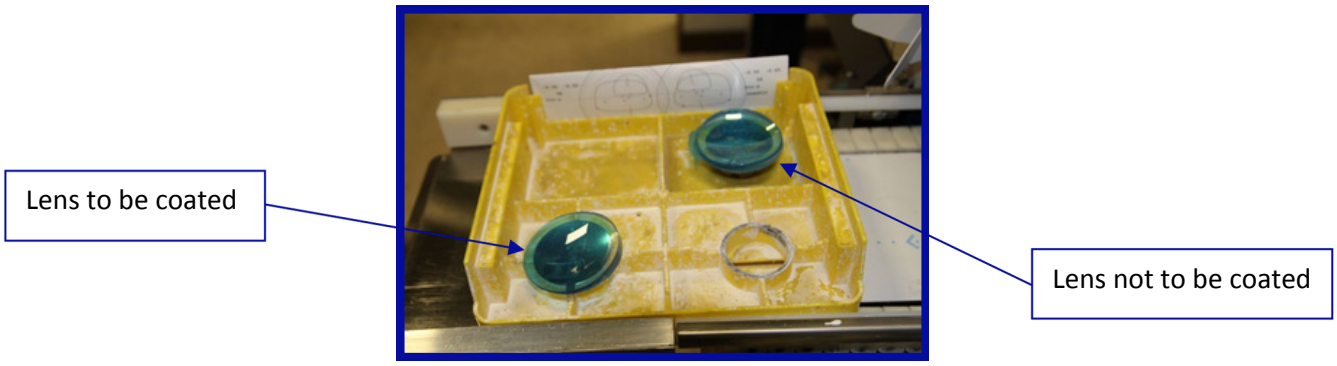
## Adjusting the Conveyor Speed

The speed of the conveyor can be adjusted to go faster or slower. Keep in mind that it is not necessary for the conveyor to go very fast. To adjust the speed, located the small white metal box on the end of the conveyor, outside of the machine. There are two round, black plastic plugs on the bottom side of the box (they are just like the black plugs found on the top side of the white box). Remove the smaller of the two plugs on the bottom. With a small potentiometer screwdriver, adjust the speed by turning the potentiometer to the right (clockwise) to slow the conveyor down, or turn it to the left (counter-clockwise) to increase the speed of the conveyor.



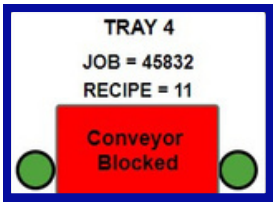
## Loading Re-Work

If the need arises to coat just one lens out of a pair on a particular job, simply place the lens that does not need to be coated onto the opposite side of the tray and keep the lens that does need to be coated in one of the standard locations on the tray as shown in the following picture. This allows the processing of a single lens from a pair, without the two lenses being physically separated and risk of misplacement.



## Blocked Conveyor Exit

The 54R has a sensor to detect if the exit conveyor is blocked. When this happens, the controller will give a warning for the operator. That warning will look like this:




There is no need to do anything on the controller, or acknowledge an alarm. Simply resolve the blocked conveyor condition and the red alert on the screen will go away. It is important to note that the machine will stop processing additional jobs until this condition is resolved.

# Recipes

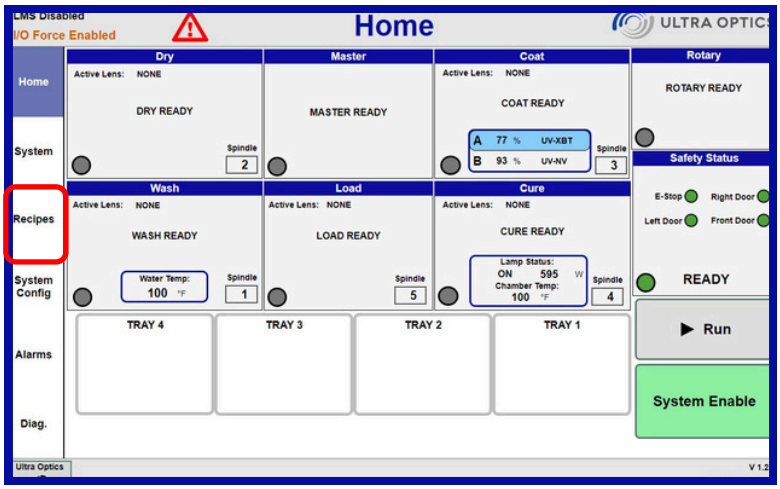
## How to Use the Recipe System

The 54R utilizes a recipe system for the processing of each job. This method allows users to process each job in a manner that is optimized for the desired results without needing to sort the work and utilize multiple machines. Individual recipes can be created and stored which define which coating to apply, adjust the coating thickness for optimized tinting or AR, adjust the cure power and time, etc. The recipe system can also be used to tell the machine to only wash the lenses, but not apply coating, or even to just allow the job to pass through the machine without any action to the lenses.
To utilize this system, first make sure that the 54R has successfully been connected to your network and your LMS system. The recipe system cannot operate without communication with the LMS system. Next, create and save a recipe in the 54R machine controller per the procedure shown below. Next, enter the recipe number into the CPID field of your LMS system for those jobs that should be processed according to that recipe definition. When the job trays come to the infeed of the 54R, the barcode scanner will read the barcode on the job ticket. The 54R controller will then communicate with the LMS system and retrieve the CPID field associated with that job number. When the lenses from this tray are loaded into the processing modules of the machine, it will utilize the specific parameters as defined in the recipe when processing those specific lenses. The next job tray that enters could well have a different CPID/recipe number and the machine will adjust in real time to those process parameters.

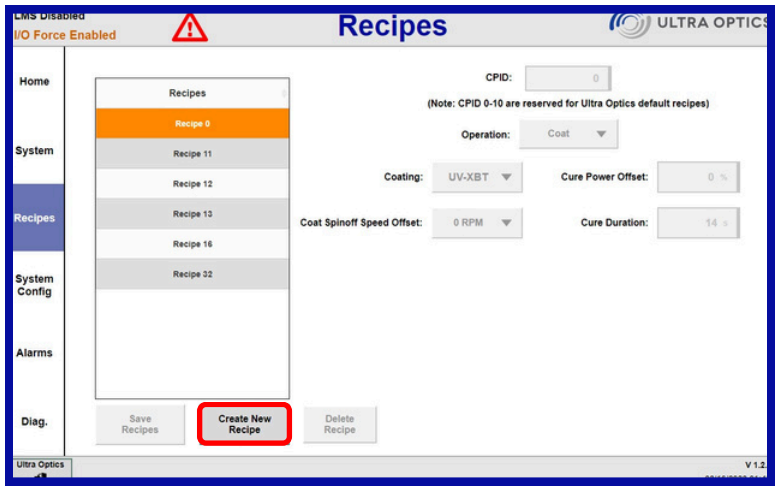
## How to Program a Recipe

The following procedure should be used to create/program a recipe into the controller:

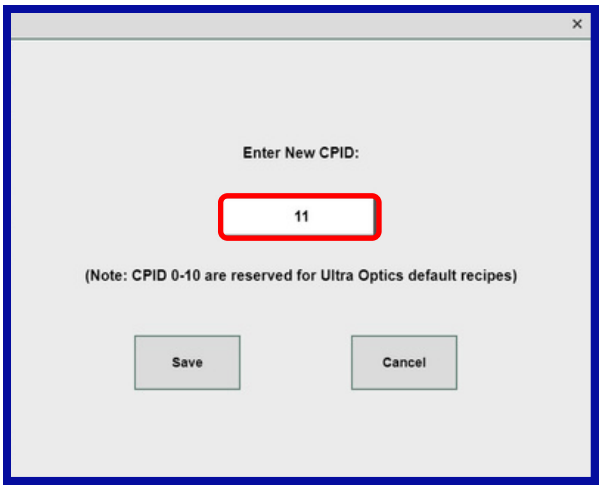
1. From the Home screen, select the “Recipes” button on the left side of the screen



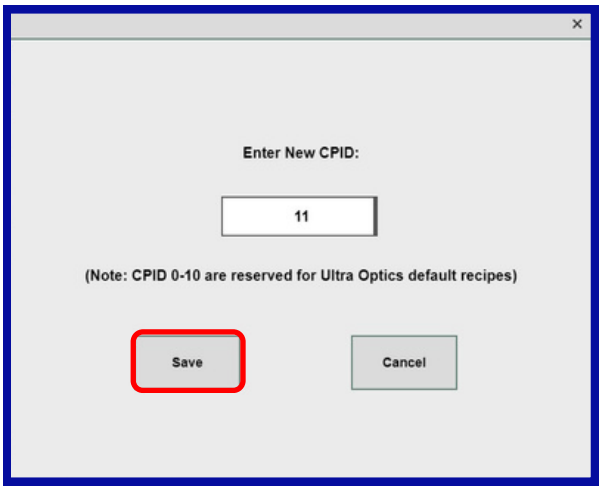

2. Select the “Create New Recipe” button near the bottom of the screen



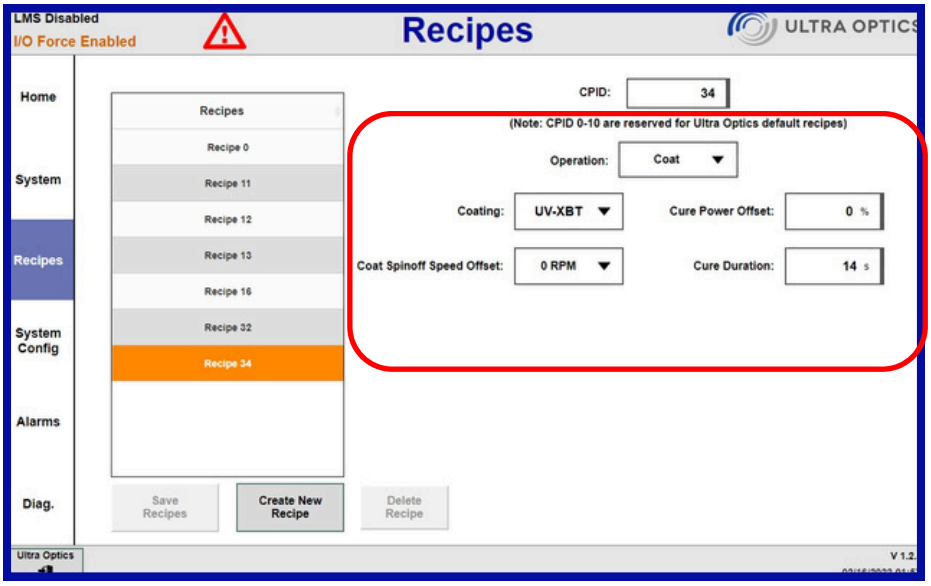

3. Enter a new CPID/recipe number in the white box shown below:
    a. Number must be two numerical digits, greater than 10
    b. Do not pick a number that has already been used
    c. Note that the CPID/recipe number that is selected here will need to be the same value as used in the CPID field of the job record in the LMS.




4. Press the “Save” button



5. Define the recipe parameters




a. Operation
   i. Coat – if selected, the lenses for this job will be washed and coated
   ii. Wash – if selected, the lenses for this job will be washed and dried, but will not be coated
   iii. Pass through – if selected, the 54R will not do anything to the lenses and just let the tray pass through

b. Coating – select which coating to be applied to that job.
   i. If you select a coating that is not currently in the machine, the machine will error/alarm whenever a job calling for this coating comes to the machine.

c. Coat Spinoff Speed Offset – from the list, select the increase/decrease in spin-off speed to use for this job. Generally, increasing the spin-off speed tend to reduce the resulting coating thickness and decreasing the spin-off speed will tend to increase the resulting coating thickness.
   i. Example – if the “Coat Spin off Speed” is set to 2,000 RPM on the “System Config” screen, and the “Coat Spinoff Speed Offset” is set to -200 RPM here, then the machine would use a spinoff speed of 1,800 (2,000 – 200) RPM for this particular job.

d. Cure Power Offset – enter the amount of increase/decrease to use for the UV cure power.
   i. Example – if the “Cure Percent” cure power is set to 60% in the System Config Screen, and in this recipe the value of 5% is entered in the “Cure Power Offset”, then the machine will increase the power to 65% while curing the lenses for this job. Similarly, if the value of -5% is entered here, then the machine will decrease the power to 55% while curing the lenses for this job.

e. Cure Duration – enter the amount of time, in seconds, for the cure process

6. When all of the parameters have been entered/selected, the select the green “Save Recipes” button in the lower left portion of the screen.

## Maintenance

The 54R system is designed to provide many years of reliable and efficient processing of ophthalmic lenses. Its ability to provide this service is significantly enhanced with proper maintenance. Due to the many integrated systems within the 54R, it is highly recommended that service and maintenance is only done by trained technicians. Failure to do so could result in damaged equipment, increased down time, or injury of personnel.

### Scheduled Maintenance

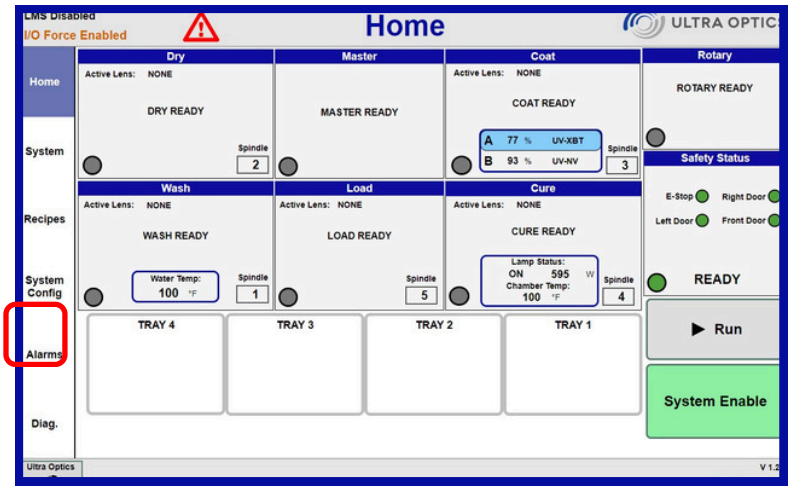
The ~~following table should~~ be used as a guide for performing regular preventative maintenance on the 54R to maintain ultimate system efficiency and up-time. It is expected that the user of this machine is capable and performs the following maintenance items at the scheduled intervals.

| Frequency | Maintenance Item | Description |
|---|---|---|
| Daily | Wipe wash and bowls and bowl deck. | Dampen a clean cloth with Ultra Optics ClearView lens cleaner and wipe and clean.<br>**WARNING Turn ultraviolet lamp off and allow machine to cool before cleaning with any flammable material such as IPA or others.** |
| | Wipe inside of coating bowl. | Use a lint-free rag dampened with acetone or IPA to wipe out the inside of the coating bowl and clean the screen. |
| | Empty drain tee and clean screen. | On bottom of wash bowl is a tee trap. Remove the bottom plug and clean out any debris from the trap. |
| | Check coating level in reservoir. | Refill as needed. |
| | Check coating fountain height. | Fountain should come up to the top edge of coating bowl. |
| | Confirm wash pump is properly primed. | During a wash cycle, count the number of audible “beats” by the wash pump. It should “beat” 30 - 35 times. |
| | Wipe any sensors. | Use ClearView to wipe clean: barcode reader, photo eyes, etc. |

| | | |
|---|---|---|
| Weekly | Inspect suction cups for debris or deterioration. Check UV lamp | Replace as necessary Replace at 1,000 hours, or low output. |
| | hours and/or output.<br>Check air pressure regulator. | Both regulators should be adjusted to read 80 psig. |
| | Clean out top Hepa filter housing. | Turn machine off before cleaning. Replace top pre-filter as needed |
| | | • P/N 3923T999 |
| | Check vacuum pressures of all spindles. Inspect complete | *Go to Vacuum Diagnostic screen on* HMI. |
| | vacuum chuck<br>assembly for dried coating or debris. Confirm all fans are | Clean as needed. |
| | operable.<br>Clean pump-out box. | Check two HEPA blowers as well as the two fans on UV light box. |
| | | Make sure there is no debris inside as this can cause damage or cause the water to over-flow. |
| | Check air dryer filters. | Replace all three if:<br>• needle points to “change”<br>• filters are moist/dirty<br>• every six months |
| Bi-Weekly | Replace coating filter. | P/N 4404 |
| | Change HEPA pre-filters. | P/N 3923T999 |
| | Inspect vacuum jars on rotary. | Empty/clean as necessary |
| Monthly | Flush coating reservoir and bowl. | Use solvent for flush and rinse. Contact UO Support for more information. |
| | Inspect and replace suction cups as necessary. | Refer to Spare/Replacement Parts section at the end of this document for UO part number(s). |
| | Inspect and replace spindle parts as necessary. | Refer to Spare/Replacement Parts section at the end of this document for UO part number(s). |
| | Ensure positive air flow. | Hold tissues over openings and confirm the tissue blows out, away from the machine. Hepa fans should be on high setting at all times. |
| Yearly | Replace HEPA filters. | Refer to Spare/Replacement Parts section at the end of this document for UO part number(s). |
| | Replace air dryer filter pack. | Refer to Spare/Replacement Parts section at the end of this document for UO part number(s). |
| | Inspect and clean UV light box. | **WARNING Be sure power to the machine is turned off and the UV light box has had 15** |

| | | |
|---|---|---|
| | | **minutes to cool down before opening. Do not use flammable cleaners in this area.** |
| | Lubricate robot spline. | Use lithium grease along entire spline. |
| 3-4 years | Change robot battery. | Refer to Spare/Replacement Parts section at the end of this document for UO part number(s). |

From time the machine will go into various alarm modes. When this happens, the alarm is captured and can be readily viewed on the HMI by touching the “Alarms” button as shown below:

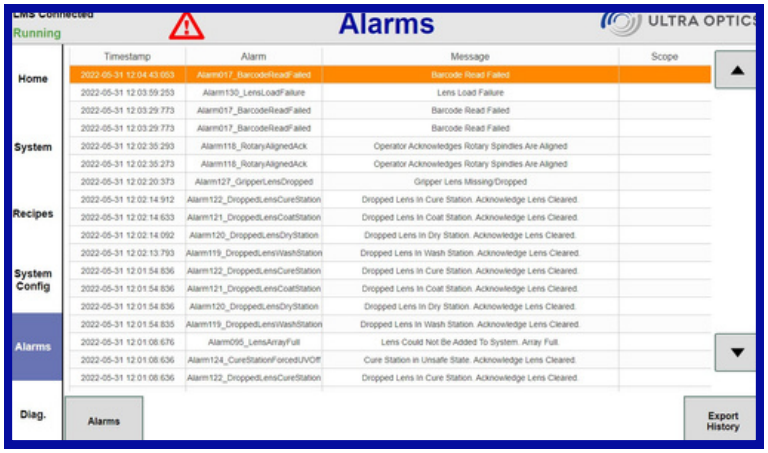



Once at that screen, the user can see the recent alarms.

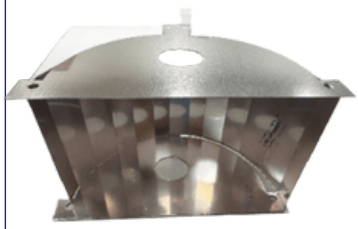
It is possible to see the previous alarm history by touching the “Alarm History” button as shown below:

The alarms will be listed in order based on the time the alarm happened. The most recent alarms will be on the top of the list. The user can scroll through the list of recent alarms by using the up/down arrow keys as shown below:

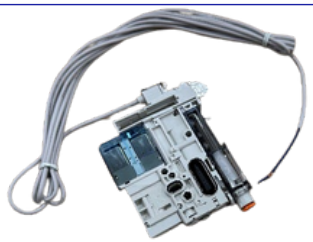

It is also possible to download the alarm list/log. This is done by touching the "Export History" button shown below:

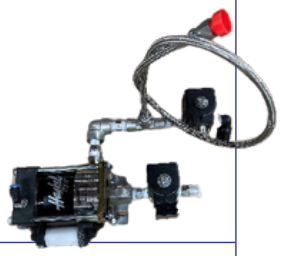
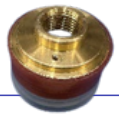


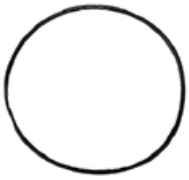

When this is done, the controller will download all of the available alarms (since the last download) and store that as a file in the controller's memory as a delimited file that could be opened in common spreadsheet applications. To get this file,

| Ultra Optics Part Number | Recommended Spare Replacement Quantity (per machine) | Description | Picture |
|---|---|---|---|
| 20230 | 0 | Spindle motor – wash/dry/cure stations |  |
| 20104 | 0 | Spindle motor – coating station |  |
| 20184 | 1 | UV Cure bulb |  |
| 80031971 | 1 | Cure station reflector kit |  |
| 20133 | 2 | Cylinder up/down sensors – used on wash, dry, coat, cure stations |  |

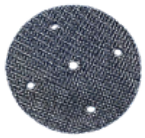
| | | | |
|---|---|---|---|
| IE5331 | 2 | **Inductive Proximity Sensor M8** |  |
| 20440 | 2 | **Wash/Dry Sensor** |  |
| 20513 | 0 | **54R Conveyor Cable Assembly** |  |
| 4404 | 2 | **Coating filter** |  |
| 3923T999 | 4 | **HEPA air pre-filter** |  |
| 1470 | 2 | **HEPA air filter** |  |

| | | | |
|---|---|---|---|
| AME250C-N02 | 0 | **Absorbing Super Mist Separator** |  |
| AMH250C-N02C-T | 0 | **Micro Mist Separator w/ Prefilter** |  |
| 20164 | 1 | **Vacuum Generator** |  |
| 20380 | 0 | **Barcode scanner** |  |
| 20281 | 0 | **Station pneumatic lift cylinder – used on wash, dry, coat, cure stations** |  |

| | | | |
|---|---|---|---|
| CRES-ILB-12-0007-UOPT | 0 | **Water heater** |  |
| 20006 | 1 | **54R Wash Pump** |  |
| 1373 | 2 | **NV Coating Pump** |  |
| VCUR-415 5/8-18 | 5 | **Spindle suction cup for ON the block coating** |  |
| 20403 | 1 | **Robot suction cup** |  |

| | | | |
|---|---|---|---|
| 20517 | 5 | **Vacuum Cup – Spindle 54R** |  |
| 20336 | 0 | **Drive Coupler** |  |
| 20442 | 10 | **Delrin Insert** |  |
| 20443 | 10 | **O-Ring, 35mm x 1mm** |  |

| | | | |
|---|---|---|---|
| 20441 | 10 | **O-Ring, 8mm x 1mm** |  |
| 20369 | 5 | **O-Ring - 327** |  |
| 20367 | 10 | **Bearing 10mm** |  |
| 20276 | 1 | **Cure box cooling fan** |  |
| 20136 | 0 | **Cure shutter extend pneumatic cylinder** |  |

| | | | |
|---|---|---|---|
| HLS 1MEG | 0 | Water quality sensor |  |
| 20144 | 2 | Conveyor stop cylinders |  |
| 20145 | 0 | Air ionizer |  |
| 9317T111 | 2 | Coating bowl screen |  |
| 7549-600 | 2 | Sprayer Nozzle Assembly |  |