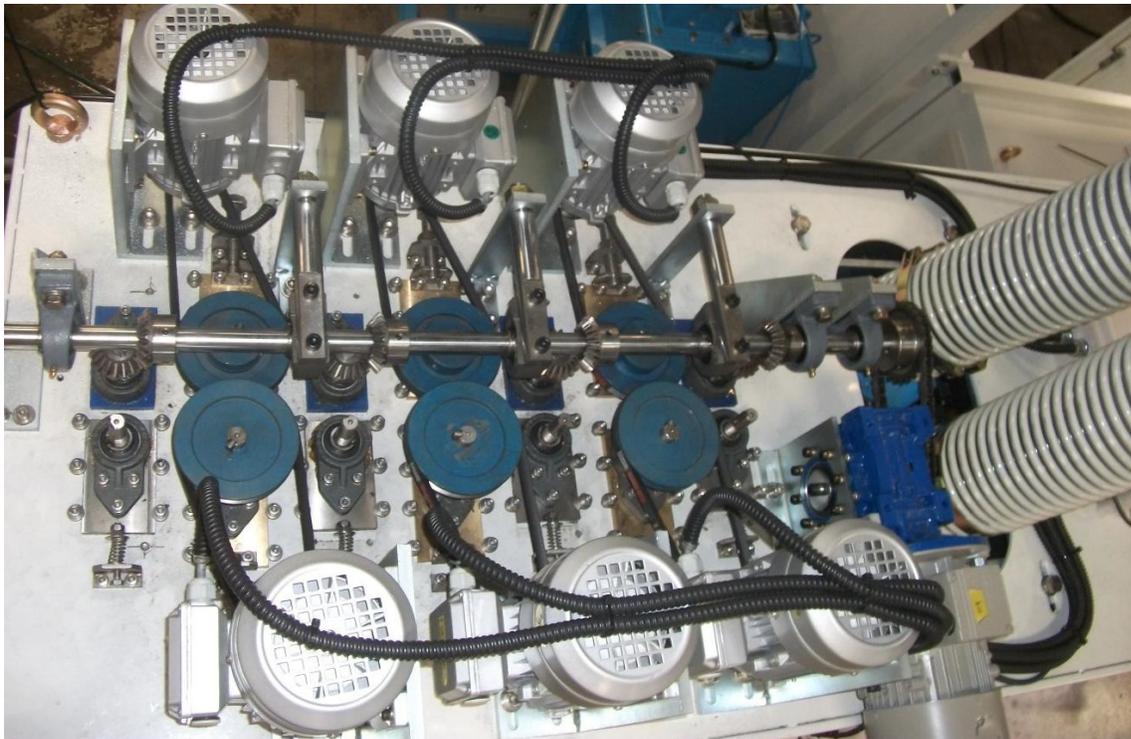
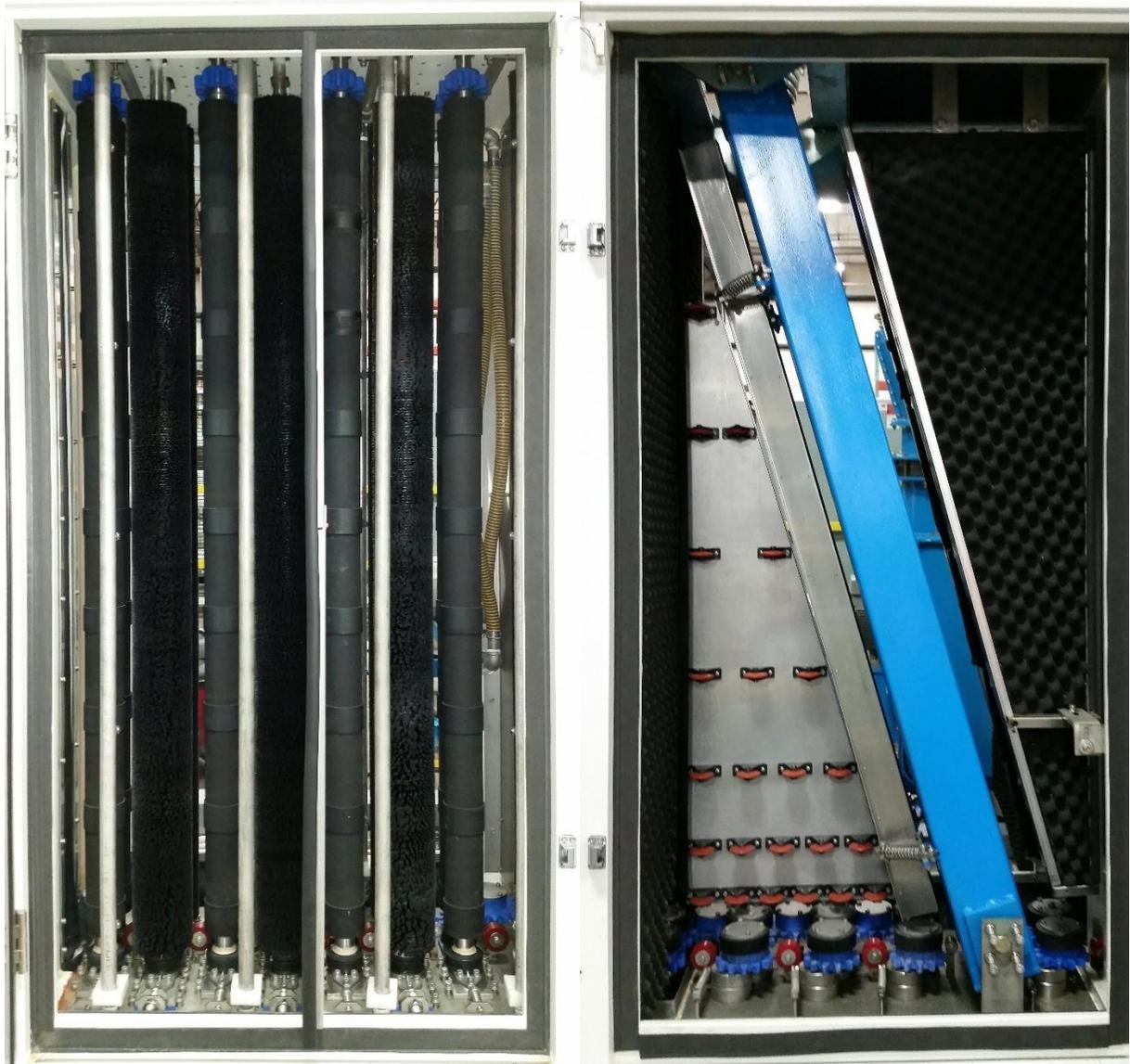


VERTICAL WASHER

MAINTENANCE INSTRUCTIONS







1. Gear Box

- a. Location: Top, out feed end
- b. Motovario gearboxes are lubricated for life, no additional maintenance required



2. Roller Chain

- a. Location: Top, out feed end
- b. Inspection: Check for dust build up. Check for tension, wear, abrasions.
- c. Type: Crown 363115-001 Chain Lube
- d. Frequency: Inspect and lubricate once per month



3. V-Belt

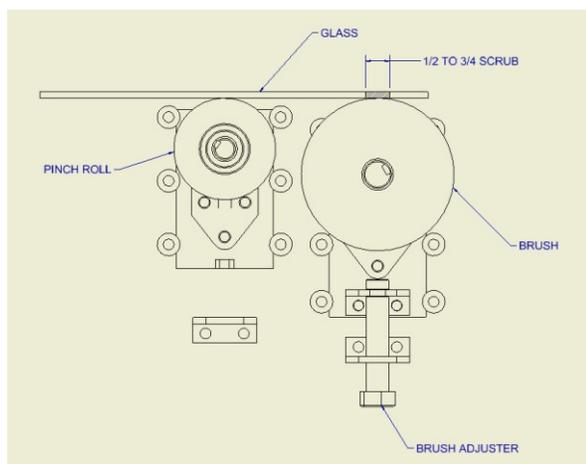
- a. Location: Top
- b. Inspection: Check for tension, wear, abrasions.

- c. Type : Front V-Belts (Dongil A-29), Rear V-belts (Dongil A-28)



4. Brushes and Rolls

- a. Location: infeed side of interior of machine.
- b. Inspection: Check for wear and abrasions on rolls.
- c. Check Brush adjustment every 300hrs of run time.
- d. Brushes will wear faster in the center of the brush.
Replace brushes when the brush becomes concave by more than $\frac{1}{4}$ "

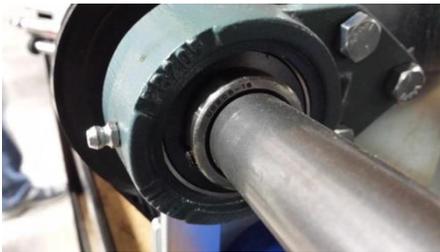


- e. Adjust brushes so that there is approximately $\frac{1}{2}$ "- $\frac{3}{4}$ " of scrub width on the glass.



5. Transfer Roller

- a. Location: Vertical bed surface, out feed interior
- b. Inspect and replace as needed



6. Exterior bearings

- a. Location:,top
- b. Type: NLGI 2 EP Lithium
- c. Frequency: Grease every 219,000 units



7. Air filter

- a. Location: Fan blower
- b. Type: F885SP PAPER FILTER
- a. Frequency: Replace as needed

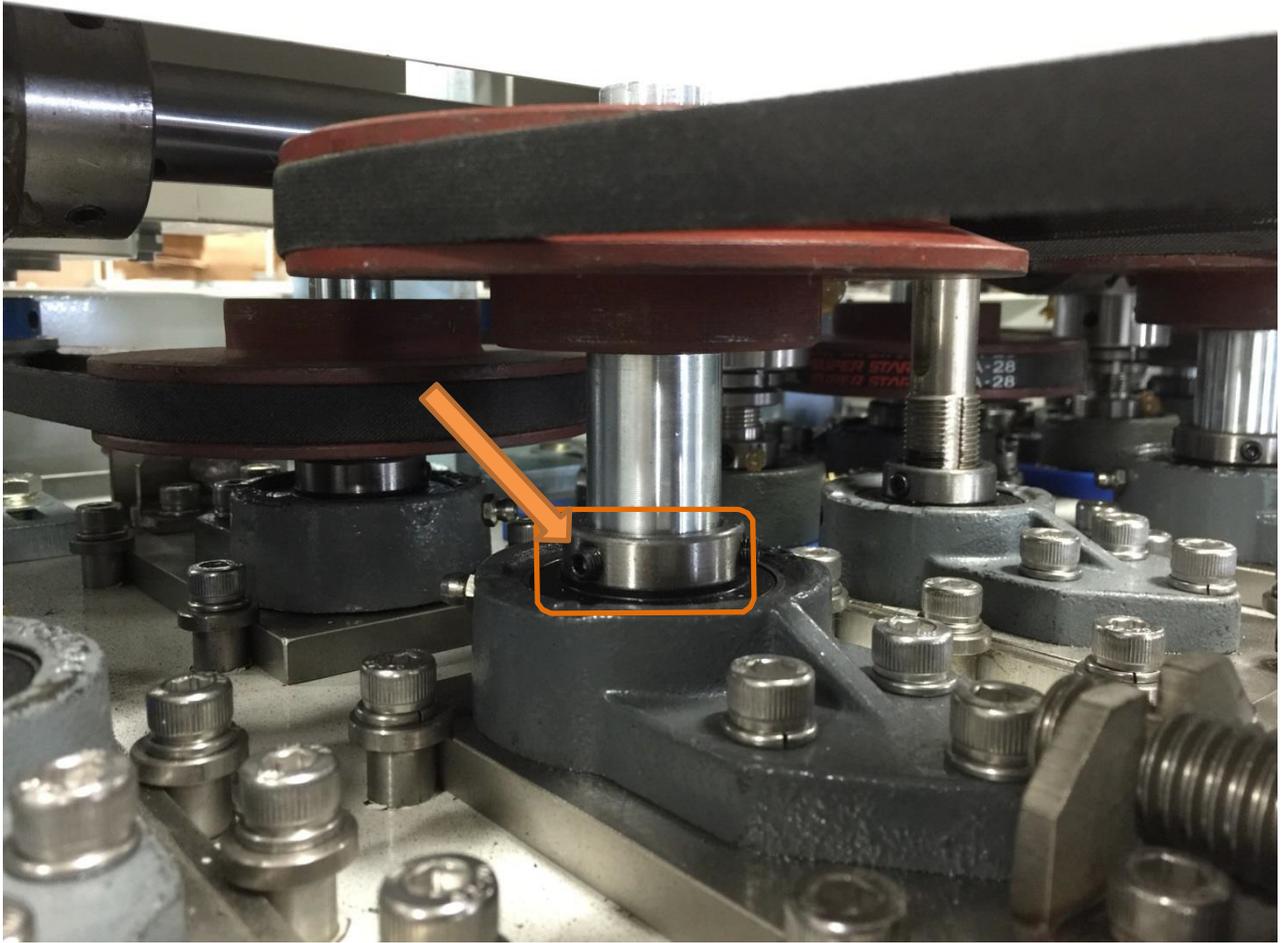
HOW TO CHANGE THE ROTATION OF THE BRUSHES ON A WASHER:



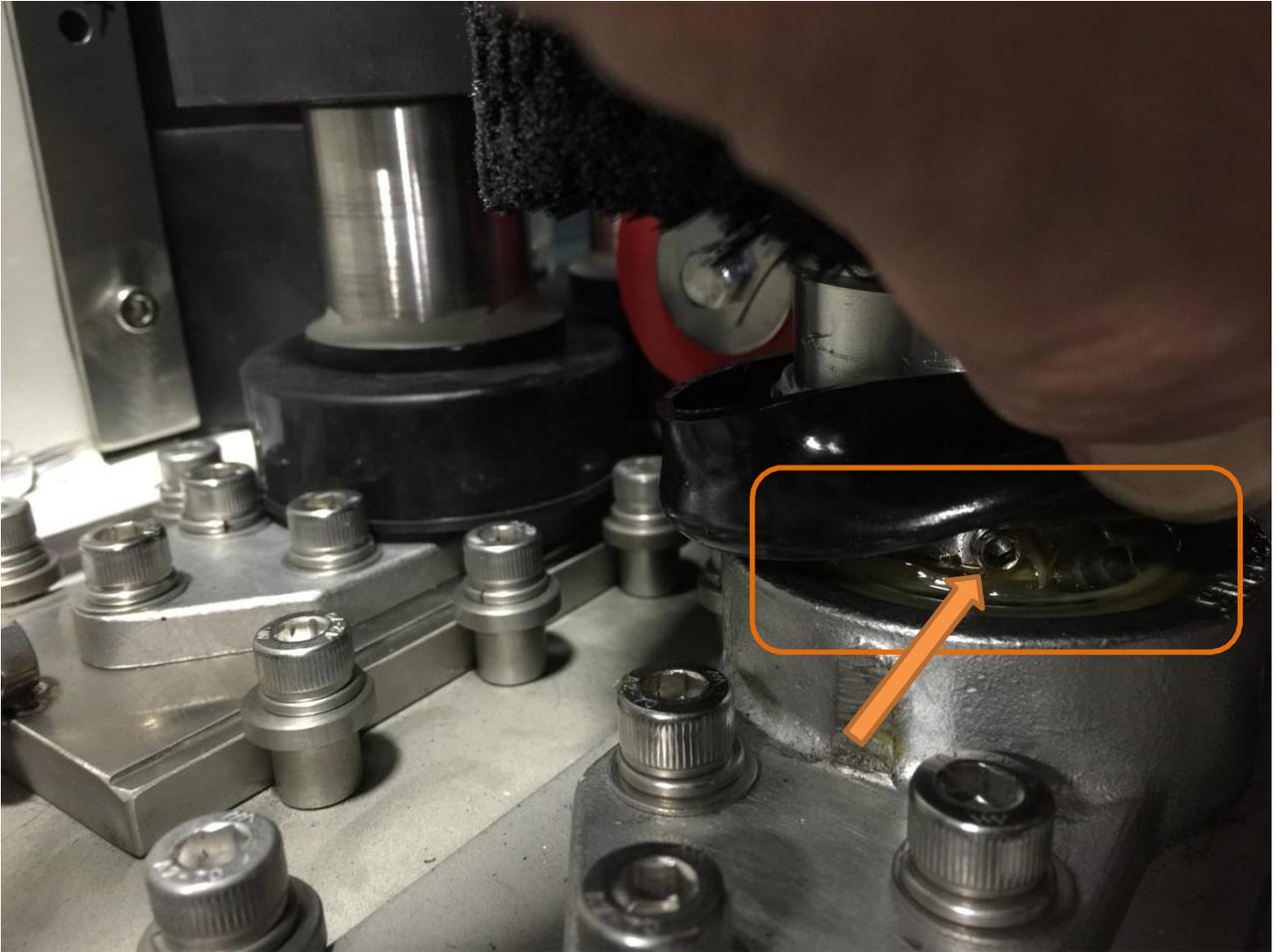




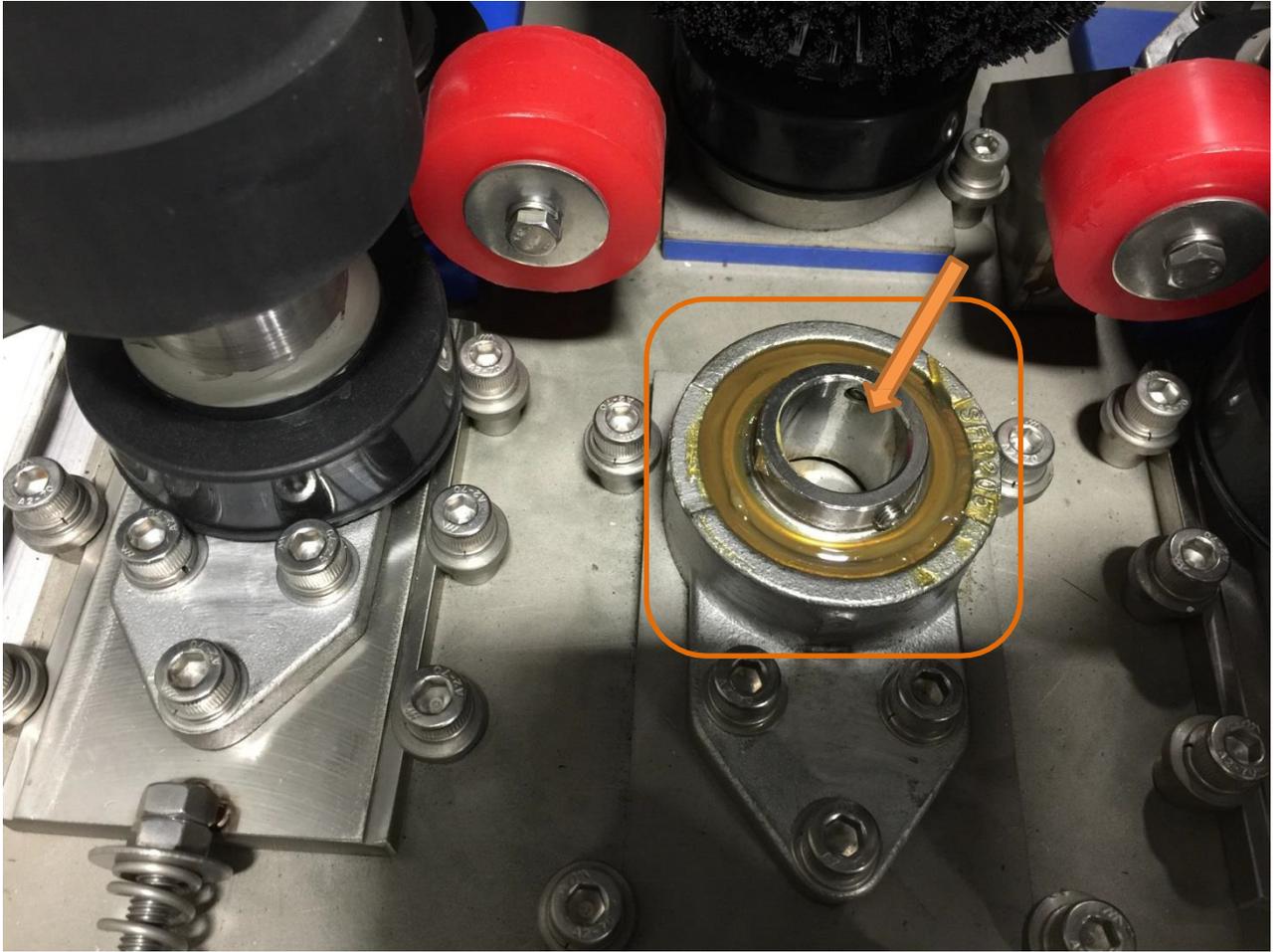
1. Remove the (6) screws on the upper flange of the brush.



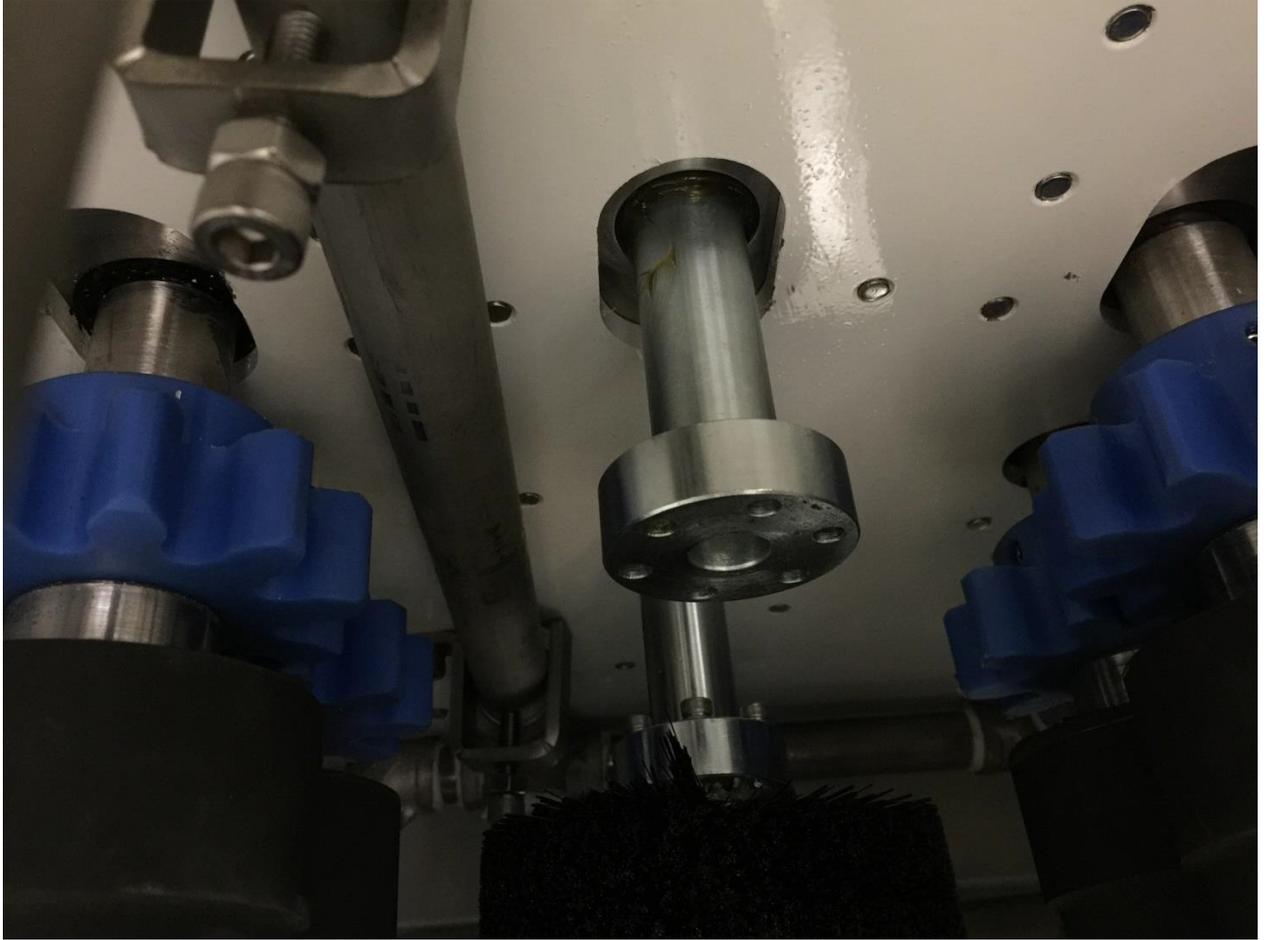
2. Loosen (2) set screws on upper bearing and lift shaft until it separates from brush



3. Loosen (2) set screws on lower bearing



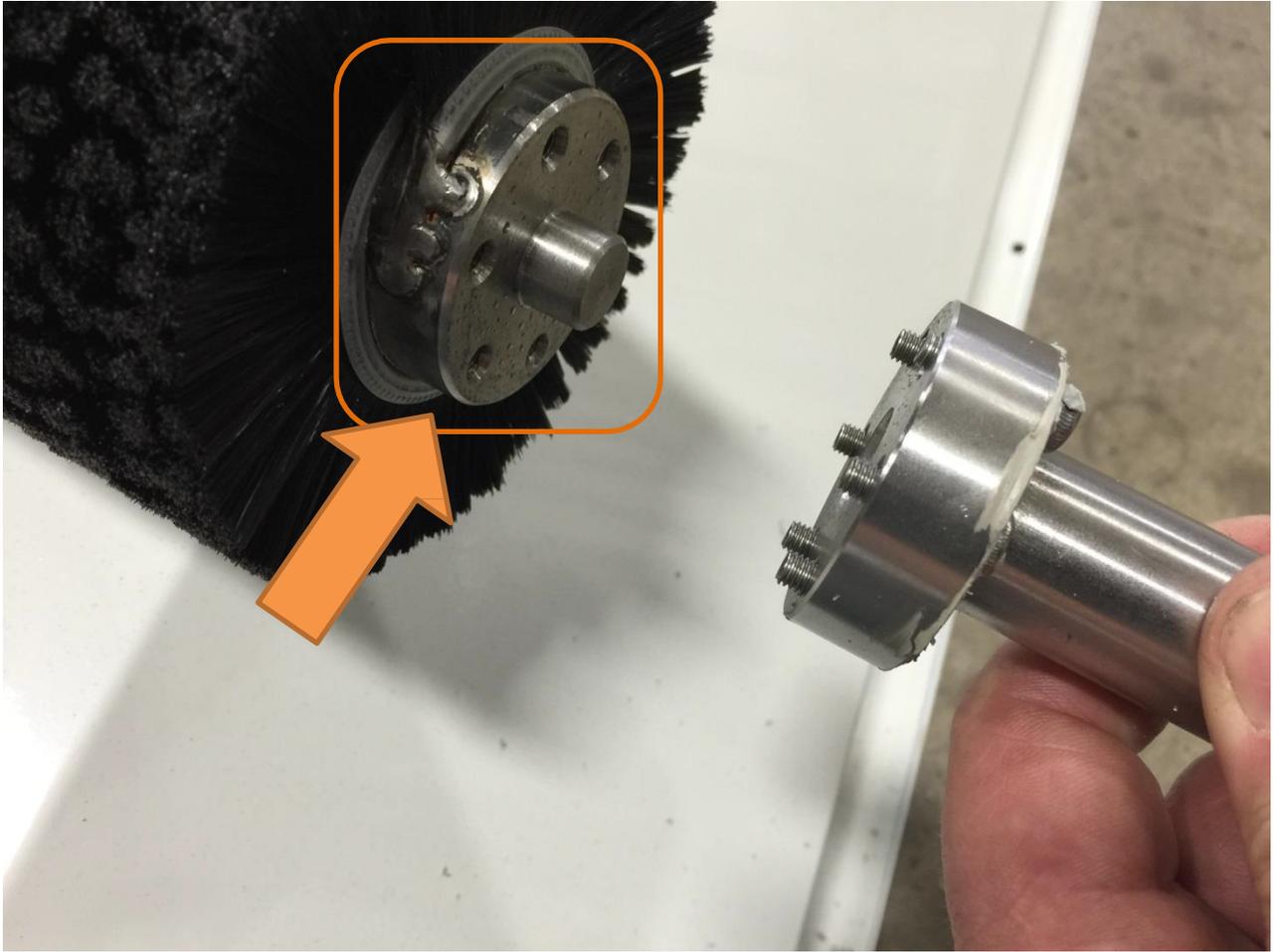
4. Lift brush out of lower bearing





5. Remove rubber seal by sliding it off the shaft. This will allow access to the six mounting screws





6. Remove the (6) screws on the lower shaft



7. Flip brush around and reassemble

4-1-2-1. How to Adjust the Brush and the Roller

A. The front brush and two rubber rollers in the washing room are assembled in the slide plate in a pair. Therefore, before glass is input, they are always open. Under this circumstance, glass is sensed, the air cylinder gets operated by the signals of the encoder, and the slide plate gets operated in order. The basic distance of the machine is about 35mm. Before working, be sure to check the distance of the machine and also check whether the air cylinder is loosened so the work can be done smoothly.

B. The back brush and the rubber rollers in the washing machine become the standards of the machine so except for any inevitable cases, any adjustment is forbidden. For the troubles resulting from the negligence in following this caution, the manufacturer shall not take any responsibility.

C. The brush motor is assembled in the slide base together so it works together when the brush and the rubber rollers work. For the brush, 1/2HP 6P motor is used and for the driving belt, A36-A37 is used. The basic revolution of the brush is 500RPM and during Low-E glass work, its speed is automatically adjusted by the inverter. ※The brush should be out by 1.5mm compared with the fixed roller. (Possible to be adjusted suitably for each factory conditions)

D. In case the distance of the front roller is not consistent, adjust the distance of all the rollers based on the back roller. ※When the machine is shipped out of the factory, the distance of the back roller is consistent so no adjustment is necessary. For the adjustment of a roller, open the front roller and the upper brush as much as possible and work on it.

E. When the distance of the brush is not consistent or the brush is worn out, check whether the distance of the roller is consistent or not and then, adjust the distance of the brush by about 1.5~2mm higher than the roller.

F. How to adjust the brush (back) : Users can adjust it easily. Using M18 bolt and nut, adjust it if the brush is worn out.

G. How to adjust the brush (front) : Users can adjust it easily same as for the back. Using M18 bolt and nut, adjust it if the brush is worn out. For overall distance, adjust the air cylinder.

H. On the brush, an individual motor is mounted and it revolves at 3:1 ratio of V-pulley. 6P motor is used so the brush revolves at 500RPM, but it can be adjusted, depending on the kind of glass. ※The brush is 0.15mm thick, which is convenient for Low-E glass work.

4-1-2-2. Driving Part of the Brush

A. Change the brush's driving pulley and belt

- ① V-belt can be slightly loosened as the machine is used.
- ② It doesn't matter to use the pulley as long as the belt can't be slipped.
- ③ In order to change the brush pulley, remove the belt, unscrew the fixing bolt of the pulley, and then, change for new pulley.
- ④ In order to change the motor pulley, remove the fixing bolt of the motor base, separate the motor from the main body of the machine, and then, change the pulley.
- ⑤ The belt becomes lengthened as the machine is used, so periodically adjust the tension of the belt.

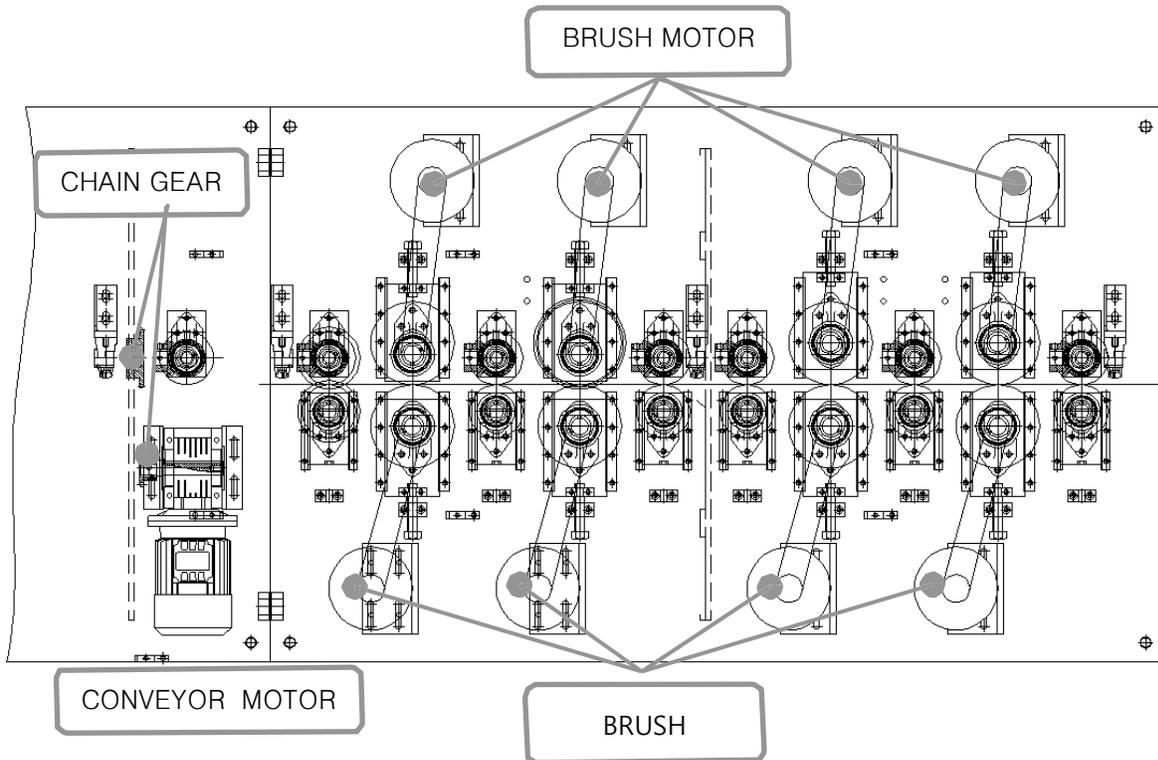
B. Change the brush

- ① Remove the upper brush motor, the motor base, and the chain gear.
- ② Remove the bearing and the bracket for fixing the upper brush.
- ③ Open the upper door, move the upper brush right and left, and disassemble it from the machine.
- ④ After remove the upper brush from the machine, disassemble the lower brush from the machine in the same way as the upper brush.
- ⑤ Assemble in the reverse order of the disassembly. When assembling, check whether the water pipe is blocked or not and then, assemble after solving a problem if any.
- ⑥ When assembling the upper and the lower brush, check the bearings in advance, change them if they have any trouble, refill grease, and then, assemble.

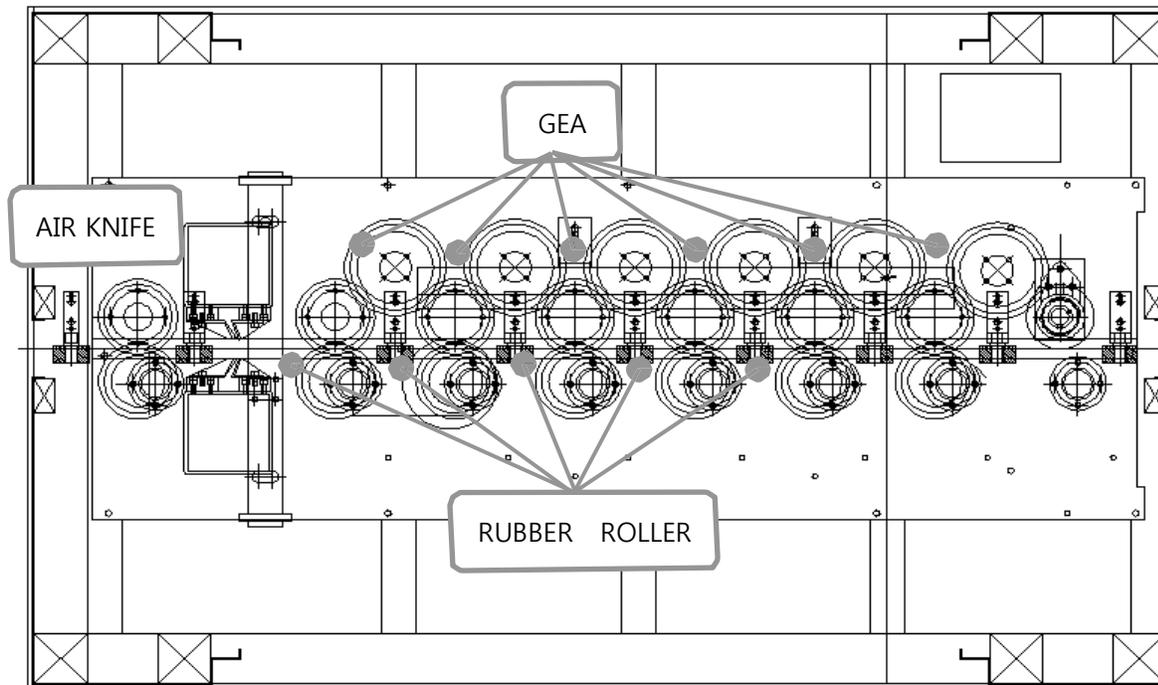
4-1-2-3. Driving Part of the Roller

A. All the rollers in the washing machine are driven by a motor. The back is driven by the motor and the front is driven by the air force, tightened to glass.

B. The main body of the washing machine, the input conveyor, and the output conveyor are connected by a separate motor, but get operated at the same time, so their speed can be adjusted by a volume. (Refer to the below picture)



C. The roller in the dry room is operated by interlocking of resin gears that are connected to the long roller.



D. The driving of the washing part connects all the powers through the combination of the motor and the bevel gear on the top of the machine.

※ Before using the machine, operate it with no load to the full (for about 30 minutes) for smooth washing and drying. For the damage on the rollers while working that is caused by a lack of air pressure, the manufacturer shall not take any responsibility.

** Change rubber roller

- Disassemble the chain and the chain gear of the roller, and then, disassemble the bevel gear and the axle.
- Disassemble the roller bearings from the bearing bracket (Required to indicate "I-" during disassembly)
- For the front roller, remove the brush and the roller base under the circumstance that one guide is not removed.
- Disassemble the frame by moving the roller up and down.
- Change any defective gear and check the bearings (check the grease)
- Assemble in the reverse order of the disassembly

4-1-2-4. BRUSH & ROLLER SLIDE

A. There are 4 pairs of brush, all of which can be adjusted individually. The front brush and the roller are attached to the slide base, and at the same time, they are adjusted by the cylinder. The distance of the brushes can be individually adjusted, depending on their abrasion status. At this time, the adjustment bolts of the brushes can adjust 2mm distance per 1 revolution, and users should adjust it, depending on the conditions of the brushes. ※ In case the brushes are worn out, refer to the way of adjusting the brushes and adjust.

B. The distance adjustment bolts for the brushes can adjust 2mm per 1 revolution.

C. Roles of the brushes

- ① It is possible to choose high or low speed of the brushes on the control panel. (In order to wash coated glass, choose low speed and wash glass.)
- ② The speed of the brushes is adjusted by the inverter, which protects the coated side of glass.
- ③ Set the distance of the brushes suitably for glass, which lengthens the lifetime of the brushes.

4-1-2-5. Drying System and Blower Filter

A. The drying system is set to be washed, up to maximum 12mm, when it is shipped out of the factory.

B. All the others, except for the drying system, are automatically adjusted, depending on the thickness of glass. ※For the troubles caused by user's careless handling, the manufacturer shall not take any responsibility.

C. Basically, the drying room should be clean so the rubber rollers in it should be clean all the time.

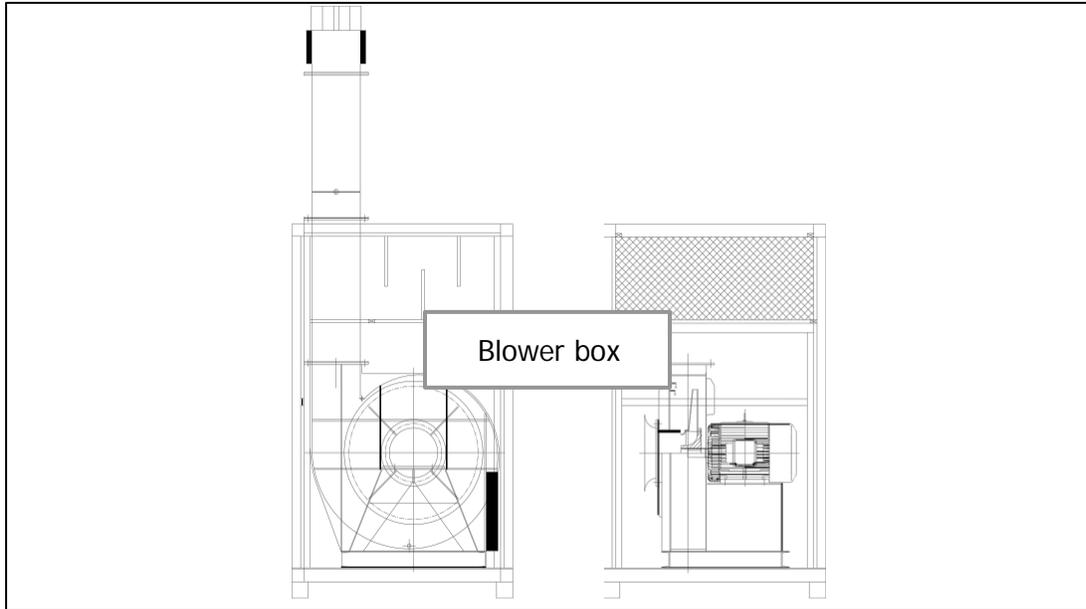
D. The rinsing system in the drying part is very important for making glass clean. Therefore, be sure to supply clean water and make the surroundings clean all the time for good washing. Besides, be sure to check if the rinse nozzle is blocked.

E. Clean wind is the basic for drying. The surroundings of the blower should be clean all the time. Check the inhale filter of the blower and the external filter of the washing machine frequently, and clean them. ※ Make the inside of the machine clean for good drying conditions.

F. The blower inhales air from the outside and dries glass. After the machine starts to work, hot wind doesn't come out so for the first 30 minutes, it is desirable to lower the speed of the machine.

G. The case that drying conditions become bad after the blower filter is cleaned can happen sometimes. In this case, the inside of the blower can be contaminated so idle the blower of the drying room for about 30 minutes to make the inside of the machine clean. ※Clean the inhalation filter once a week and replace it four times a year. Users can determine the cycle of the cleaning and the change, depending on the conditions of the inhalation filter.

H. The blower should be located in the place that it can inhale clean air all the time, through which good drying conditions can be obtained.



4-1-2-6. Water Pump and Water Purification Filter

A. The water pump is divided into three parts: (1) brush1,2 (2) brush3,4 (3) rinsing

B. The water pump should have priming water for its first operation. It should not be idled. Before operating the machine, it needs to check the water level of the water tank to minimize any troubles with the pump. The manufacturer shall not take any responsibility for the troubles resulting from the negligence in following this caution.

C. The water tank is divided into three, each of which is mounted with a water heater maintains the temperature in the water tank. The temperature of the water tank is set at about 60% and it should not be set a higher temperature than it.

D. Each water pump is mounted with a water purification filter, in which there are three filters.

Specification : 50 μ , Filter size: \varnothing 60-500mm, Replacement cycle: Once a week

WASHER MAINTENANCE

SPECIAL NOTICE: If the inside of a glass washer is dirty, including the tanks and plumbing, the washer cannot produce clean glass.

CAUTION: When a vinegar solution is used to clean a washer, be sure to isolate all water filtering and DI systems from the washer. This can be accomplished by either removing interconnecting hoses or filter element. Check your system plumbing for details. Vinegar contamination of filtering and DI system will be detrimental to their operation.

CAUTION: When preparing a vinegar solution, only use household white distilled vinegar which has an acidity level between 4% and 7%, as mandated by the U.S. Food and Drug Administration (FDA). A higher acidity level can cause degradation of pinch rolls and roll coverings.

In addition to dirt and grease that can collect on rollers and brushes, there is a coating (slime) that can build up on the inner surfaces of the sheet metal that surrounds the brushes, tanks and plumbing. This coating can be a combination of minerals in the water, powder packing from the glass, and algae growth.

If this coating is not eliminated from the inside of the washer, it will be recirculated through all the internal components of the washer. The result will be dirty glass coming out of the washer.

The recommended solution to controlling this coating is as follows:

- x Other than a mild detergent or cleanser, do not use any other chemicals for cleaning the internal components of the washer

Denatured alcohol is also acceptable for use. Some chemicals can damage the washer components and/or the coating on the glass that is being processed. Always disconnect a filter system before cleaning with vinegar, as vinegar will damage the filter elements.

- x Periodically check inside washer by carefully running your hand along the inside of the sheet metal, including lips, edges, and corners of the sheet metal and tanks. If these items have a slimy coating, follow the instructions in this manual for cleaning of the washer.

- x If deionized water is being used in the washer, make certain that the system has an ultraviolet light in the recirculating system to control algae build-up. A word of caution: an ultraviolet light is only effective when water passes through it. Algae can still form inside the washer especially when the washer is not in use. Algae will also form when using non-deionized city water.

There is no substitute for periodic and thorough maintenance of the entire washer.

These checks should be performed daily or at each shift change.

Daily Visual Checks

ITEM	ACTION
Worn, Loose, Torn, and Broken Parts	Inspect the following items: <ul style="list-style-type: none"> x Water Lines (supply and drains) x Blower Tubing x Chains x Belts

ITEM	ACTION
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	<ul style="list-style-type: none"> x Electrical Cables and Terminals x Fasteners x Control Panel Indicator Bulb
Guards	Guards must be all securely attached.
Infeed / outfeed eyes	Wipe eyes with a dry-clean cloth.
Static Eliminator Bars	Wipe off bars with a dry-clean cloth.
Wash and Rinse Tanks	Inspect for presence of glass. If present, check rolls and brushes for damage (e.g., imbedded glass, broken bristles, etc.). Clean tanks and in-line filters (and replace small particle filter cartridge or bag). If rolls or brushes are damaged, they may need replaced.
Rolls and Brushes	Check rolls and brushes for imbedded glass, broken or worn bristles, etc. They may need to be replaced if damaged. Check for presence of grease on rolls. If present, clean all rolls and brushes with a mild detergent then follow up with a water rinse. Afterwards, use a cloth dampened lightly with denatured alcohol. Never soak a roll in a solvent. It will be necessary to refill tanks with clean water.
Water Hoses	Check that connections are tight.
Water Lines	Check joints for leaks.
Spray bars	Drain, clean, verify nozzles are free of debris

Weekly (40 Hours) Maintenance

Perform the following periodic maintenance on a weekly basis. Also, after the first week of operation, grease all bearings with one to two pumps (no more than two pumps)

CAUTION: Too much grease will ruin the bearing seals and cause the bearings to eventually seize. If grease is released at the bearing seal, then the bearing seal has been damaged and water can enter the bearing at this point.

CAUTION: When applying lubricant, use care not to drop any into the tanks or get any on the rolls or brushes. If this occurs, the rolls and brushes will need to be cleaned

with denatured alcohol, and the tanks drained and cleaned. The recirculation plumbing may also require cleaning and possibly filter replacement.

Weekly (40 Hours) Maintenance

ITEM	ACTION
Air Filters	Clean or replace air filter(s). Be sure to use exact replacements. An incorrect filter could affect washer performance.
Wash and Rinse Tanks	Remove the standpipe in the holding tank and drain. Check the immersion heaters (below).
Immersion Heaters	Check the immersion heaters for scale build up. Even a thin build up will cause the elements to split. Use any commercially available detergent for removing mineral deposits to clean the heaters.
Fasteners, Setscrews, Electrical Terminals, and Attached Items	Check all around machine for looseness of parts. Tighten, as needed, all fasteners, setscrews, and electrical terminals. These checks should be performed at least every 40 hours or as frequently as equipment use and experience dictates.

Six-Week (250 Hours) Maintenance

Perform the following periodic maintenance on a 6-week basis.

CAUTION: Too much grease will ruin the bearing seals and cause the bearings to eventually seize. If grease is released at the bearing seal, then the bearing seal has been damaged and water can enter the bearing at this point.

Six-Week (250 Hours) Maintenance

ITEM	ACTION
Chain and Belts	Check condition and tension of chain and belts.
Brush Bristles	Check condition of bristles. Clumped bristles are an indication of a need for brush height adjustment.
Brush Bearings	Apply one to two pumps (no more than two pumps) of Lubricant to all brush bearings.
Blower Inlets	With the filter removed, clean blower inlet and silencer with a vacuum cleaner.
Roll Sprockets and Spur Gears	Check sprockets and spur gears for looseness and wear. Tighten setscrews.
Deionization System	Refer to manufacturer's Instructions for periodic maintenance.
In System Tank cleanout	Wipe out and flush system (reference procedure below)

In-System Tank Cleaning

The tanks should be kept clean of algae and residue by periodically performing the following procedure. It is recommended to perform this procedure during an off-shift as it will take about four hours. It is also suggested to never use a water softener as it may be contributing to the deposits of salt residue in the system.

NOTE: Read SPECIAL NOTICE at the beginning of this Section before continuing with the procedures below.

1. Drain tanks and thoroughly rinse them to remove existing algae and residue.
2. Wipe the tanks clean to remove any residue from the rinse procedure.

3. Fill tanks with clean water and add household white distilled vinegar which has an acidity level between 4 and 7% to each tank. Add one gallon of vinegar to the holding tank of water and one gallon to the rinse tank. Remove filter bags before cleaning with vinegar.
4. Operate the washer in wash only mode to circulate the vinegar-water solution through the entire system to treat the rolls, brushes, and spray lines for at least two hours by running.
5. Drain the entire system including, tanks, and lines. Rinse tanks to remove any debris that may have resulted from the circulation of the vinegar-water solution. Wipe tanks clean.
6. Fill tanks with clean water to begin operation again.

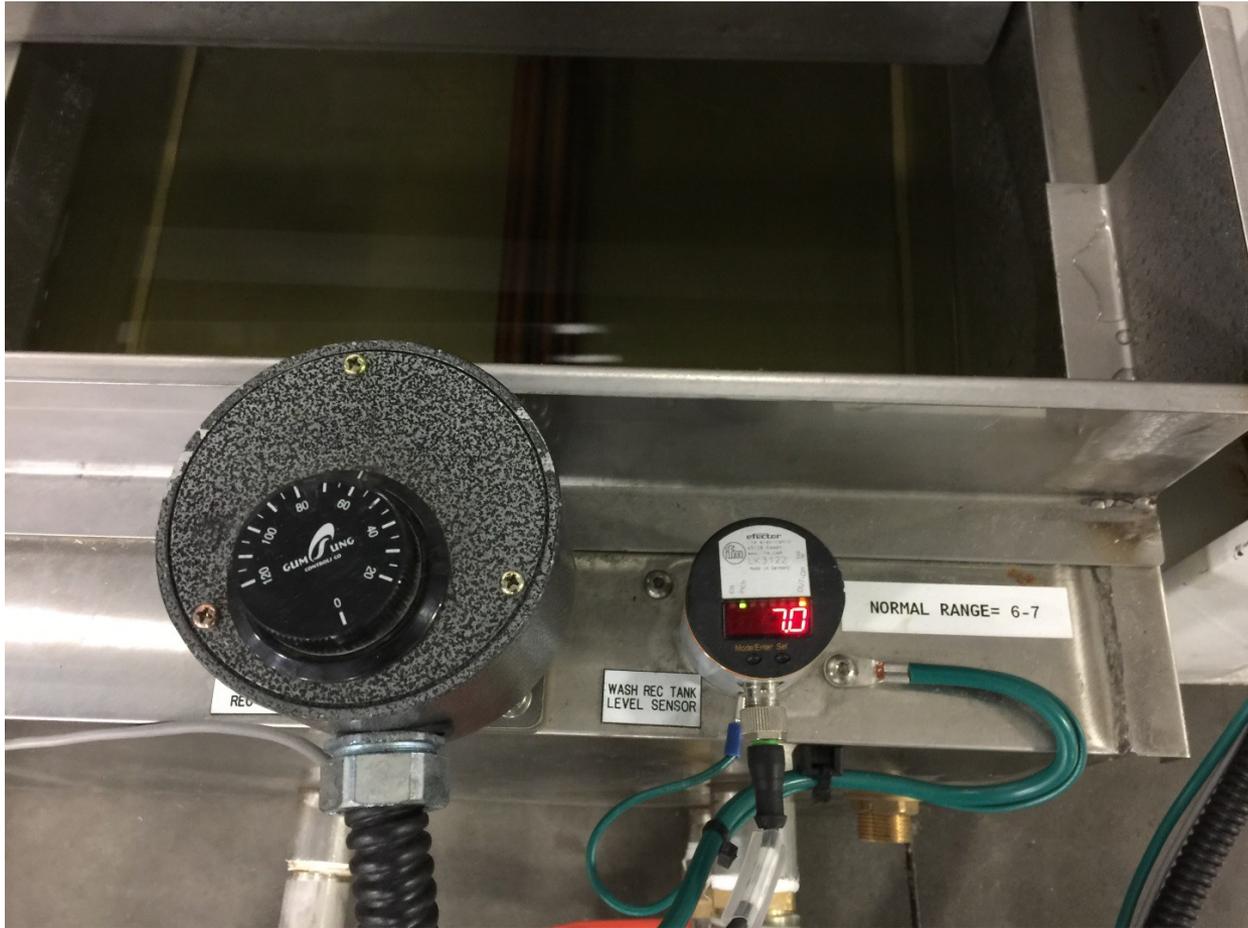
Vertical washer



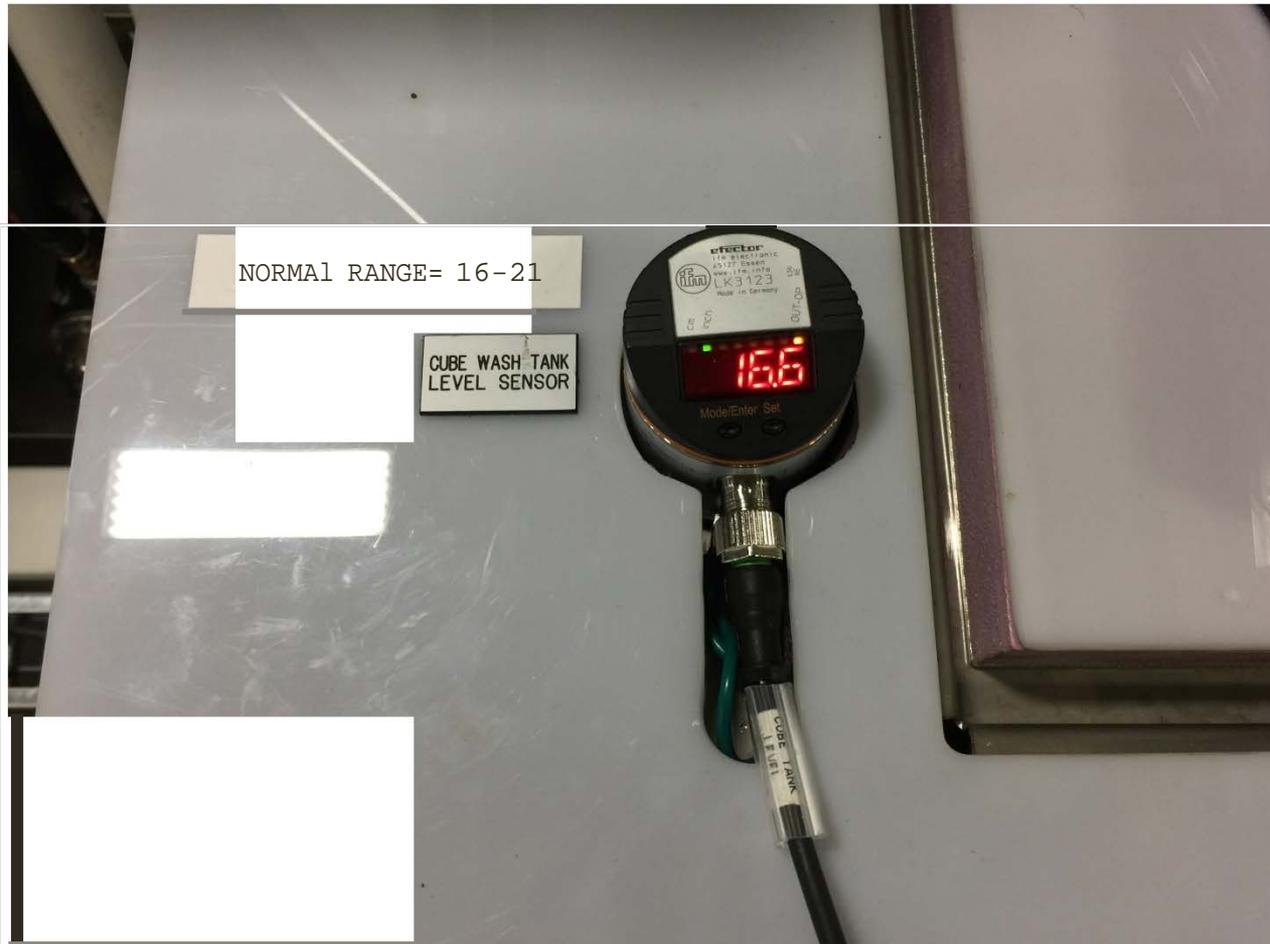
Fill valve



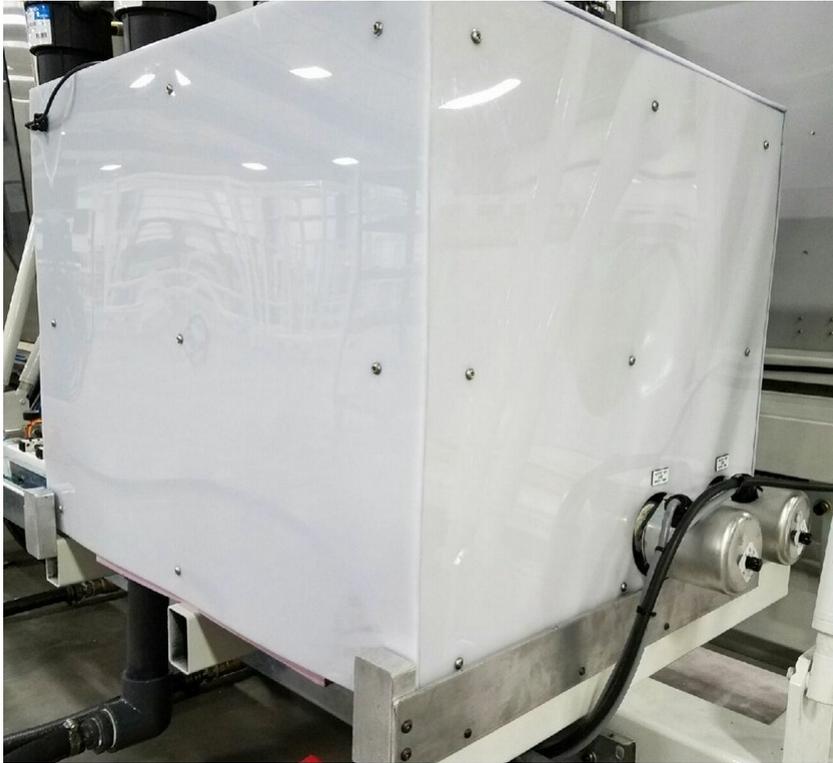
Recovery tank level sensor and heater



Holding tank level sensor



Holding tank heaters



Water flow or Pressure differential can be identified by looking at the gages on the top side of the filter housings.

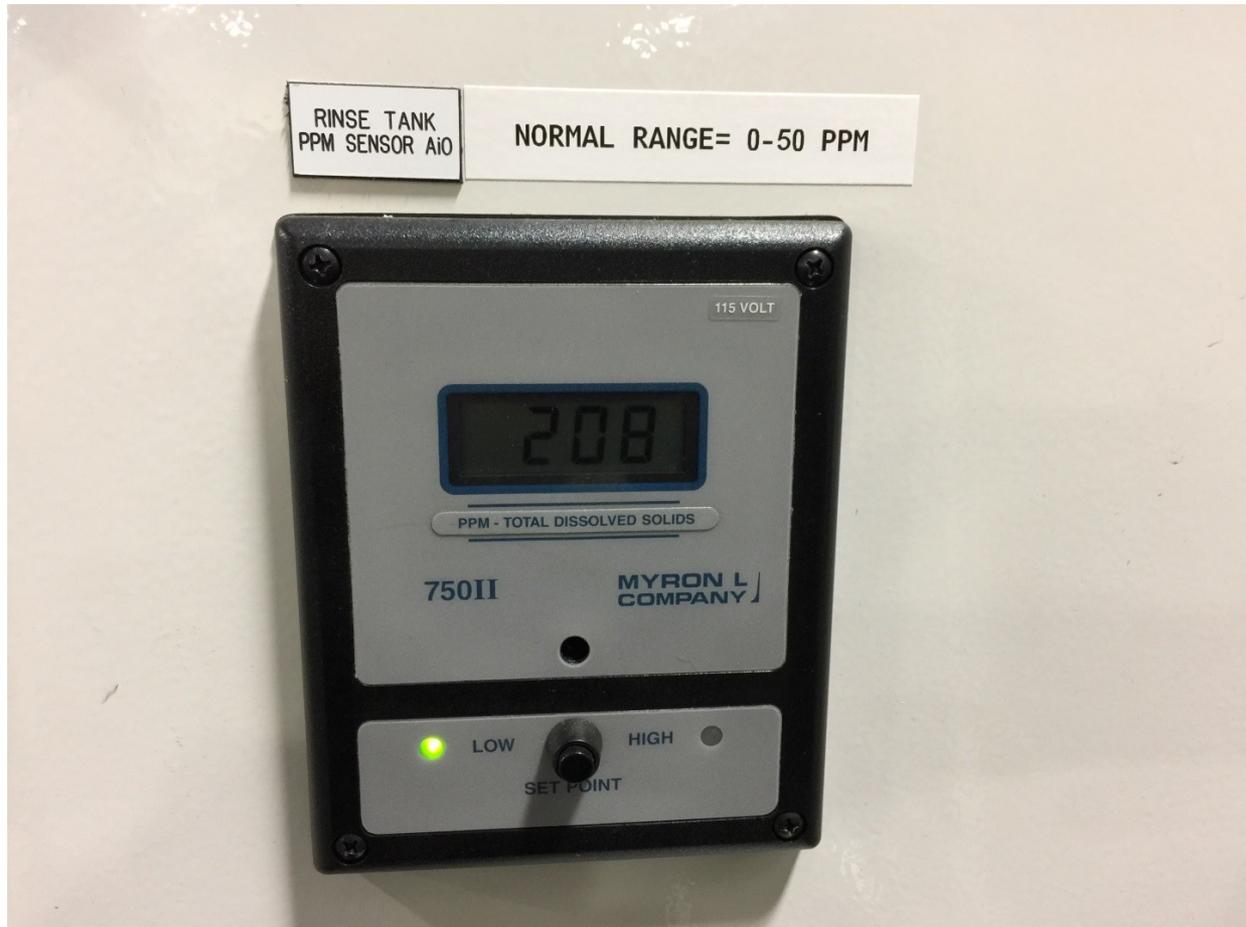
Wash return filters run at a lower pressure compared to rinse supply pressure

Gage on wash return 0-15 normal operating range 4-6

Gage on rinse supply 0-30 normal operating range 9-13



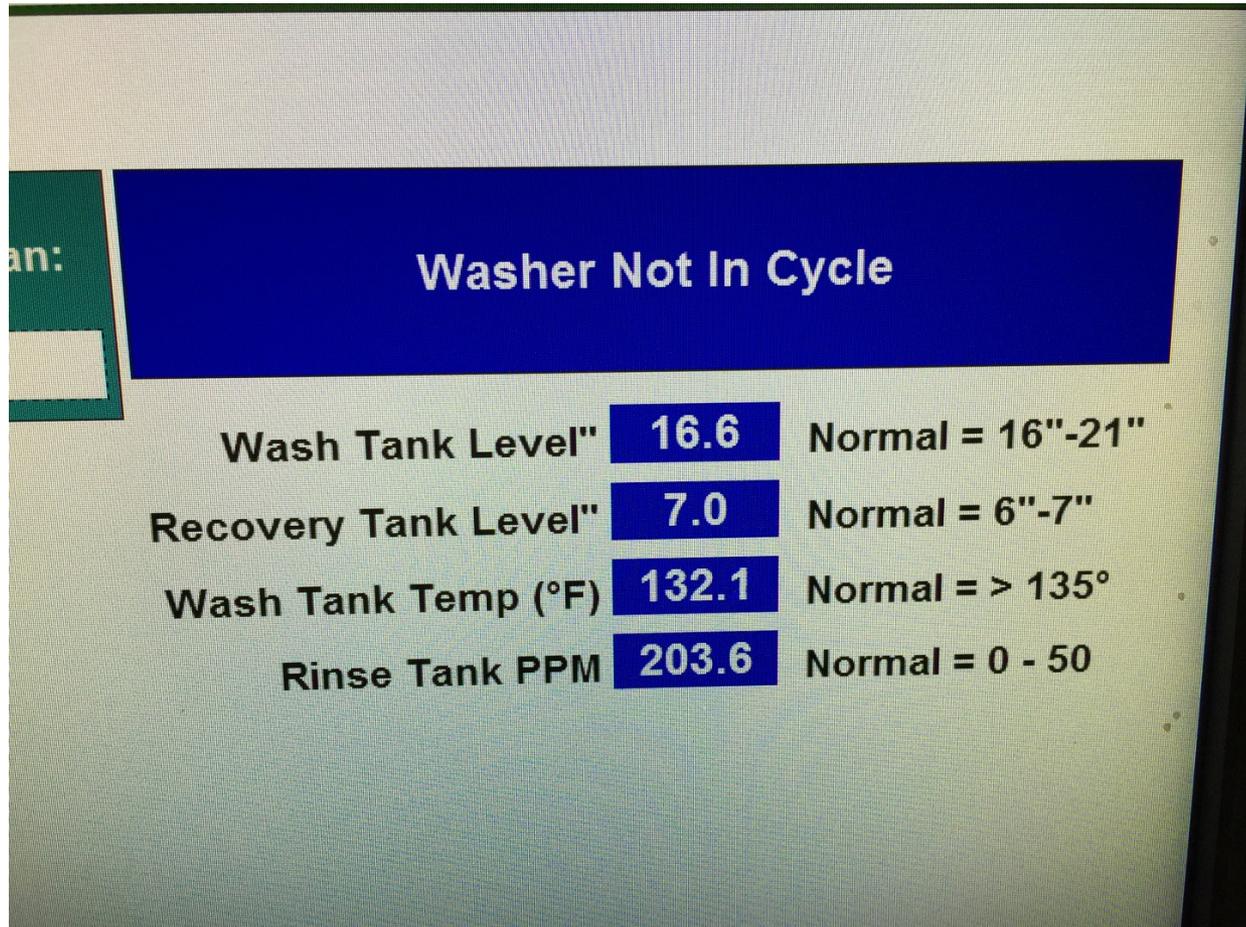
PPM sensor control



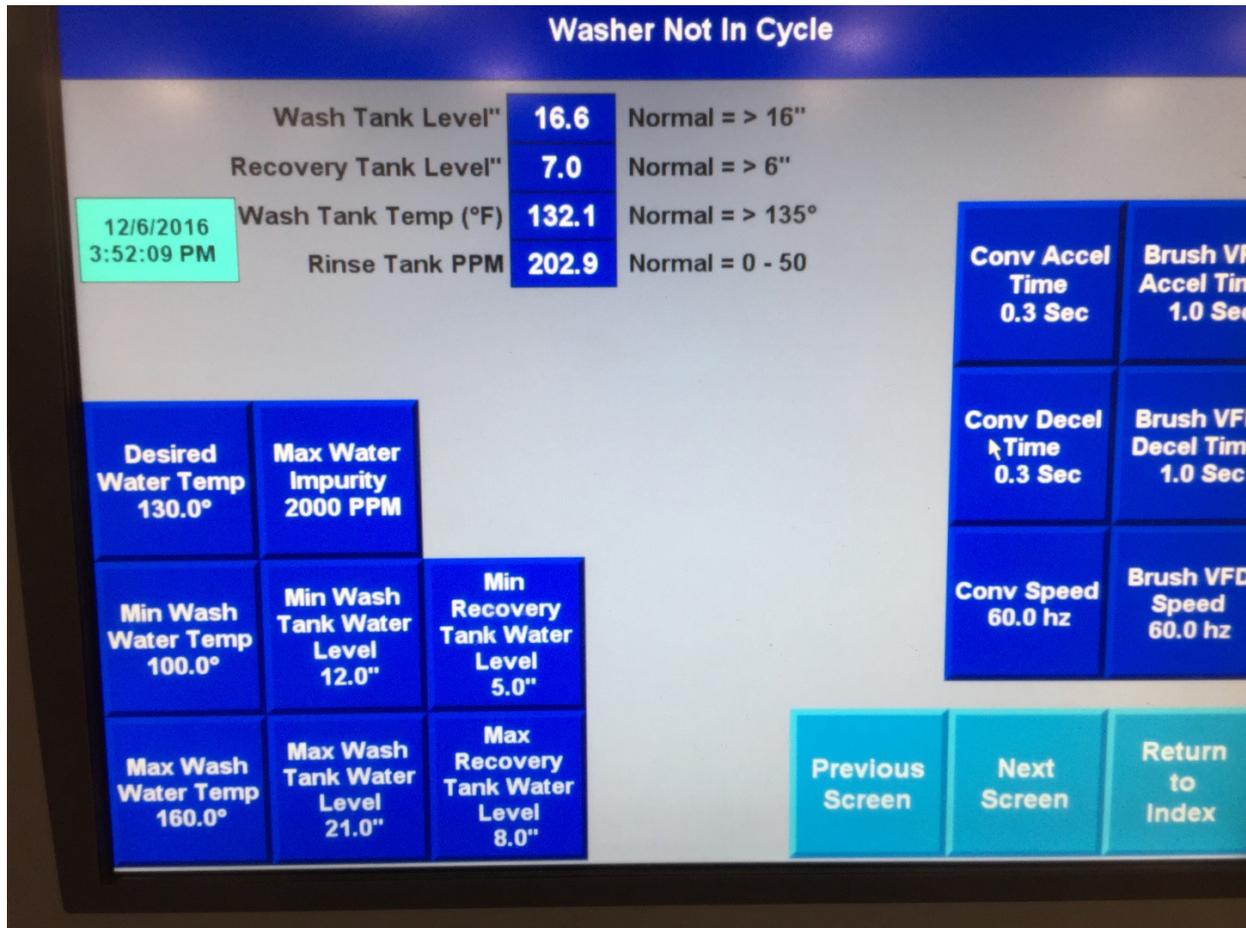
PPM sensor



Sensor monitoring



Sensor set points



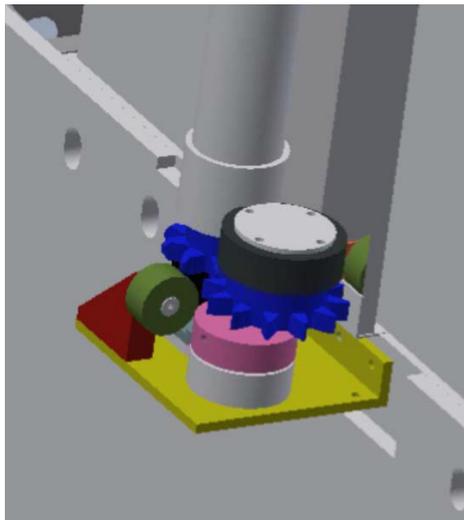
Washer

Safety door interlock

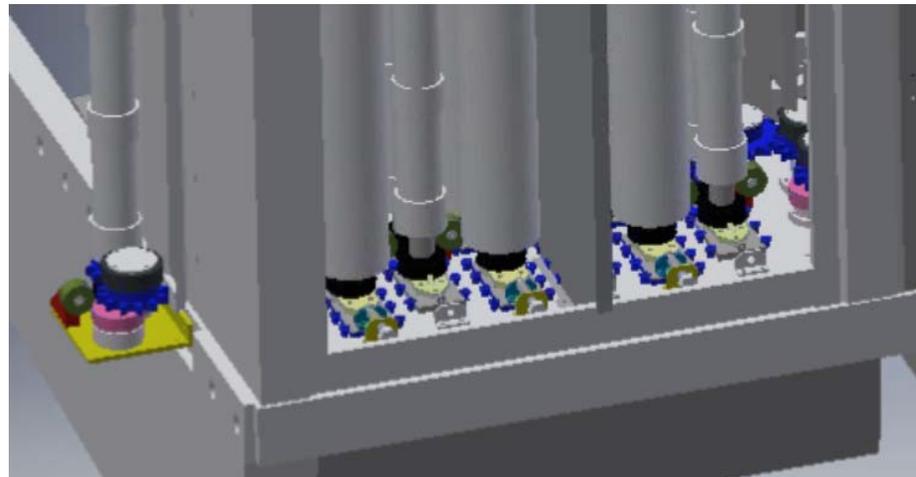
Drive components



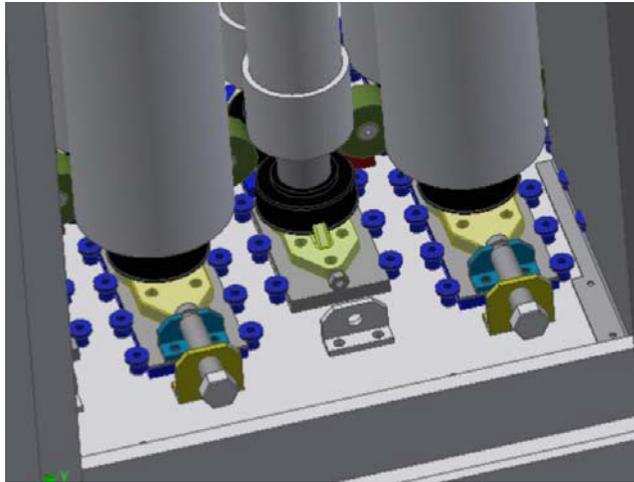
Exposed View of Washer Top / Belt Drive System



Washer Infeed Pinch
Roller

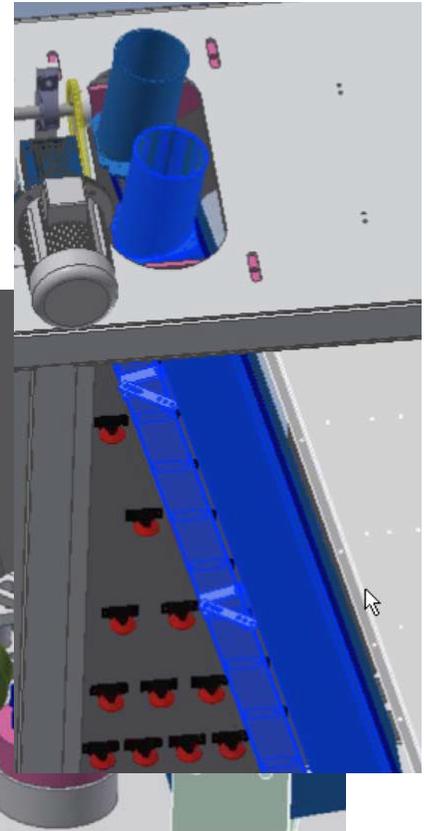


Exposed View Washer
Brush Adust and Spring
Tension Pinch Roller

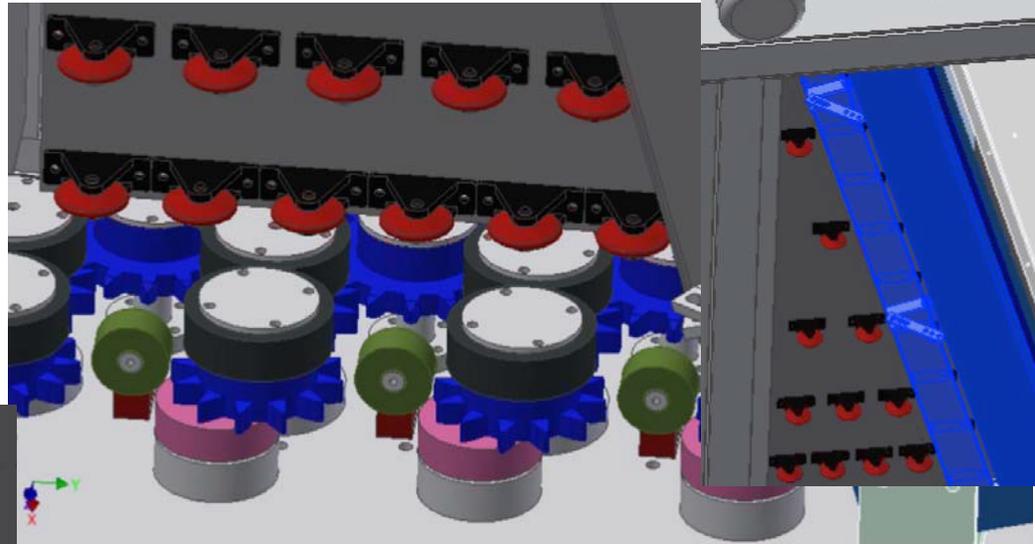


Wash Side / Brush
Adjust

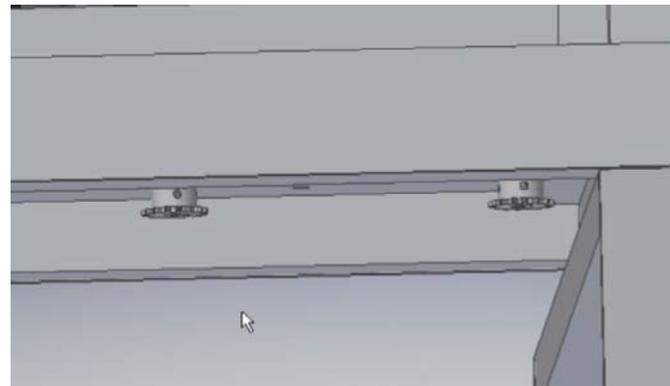
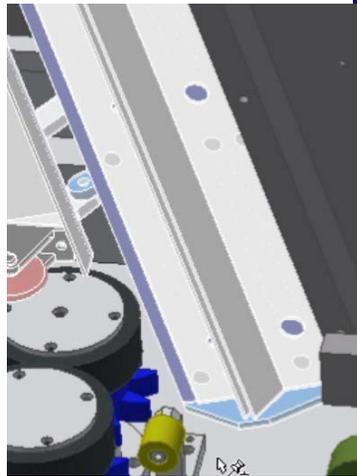
Air Knife /
Blower Inlet



Dryer Side Pinch
Rollers



Exposed View of
Air Knife



Drive Sprockets
for Final Pinch
Rollers / Dryer
Side