

### Index Spray System

This system is designed to spray various parts which may require masking and ID and OD coverage using the spin and spray concept. The machine utilizes 60 spindles mounted on a dial plate and processes two per cycle. Primer and top coat are applied in separate sealed booths to prevent cross contamination, control air, and provide primer presence verification. These machines may be built in various sizes determined by the spacing between the spindles, and each will accommodate several different part configurations by simply changing the fixtures and calling up the appropriate program.

1. Operator Load/Unload. Approximately six spindles are exposed to the operator. The machine pneumatically indexes two spindles per cycle. Part presence is sensed at the load station and tracked throughout the machine.
2. Pre-Heat Oven. This is a tunnel with forced air heating at the pre-set temperature up to 180 degrees Fahrenheit. There are approximately eighteen parts in the tunnel, and the amount of time each part is in the oven will vary with cycle time. An example; at a 10 second cycle time each part will be in the oven for 90 seconds. Cycle time is part dependant based on the length of time it takes to spray.
3. Primer Application Spray Booth. This booth is isolated from all other areas of the machine during each spray cycle. It includes four separate guns; two guns for ID spray with extension kits and two for OD spraying. All guns are servo positioned. The ID guns extend from the top with all positions (rapid, spray, home) programmable through the operator interface. The OD guns are programmable in vertical position and rotational position, again, all through the interface. Pressures and spray times are also programmed through the interface. Two spindles are presented, rotated, and sprayed each cycle.
4. Primer Presence Verification. This is a station isolated from the spray booths and uses a vision system to verify primer presence prior to top coat application. Top coat will not be applied to parts without primer. If the problem persists for three successive cycles the machine will stop and alert the operator. The vision display is located at the interface allowing the operator to see each cycle if desired.
5. Top Coat Application Spray Booth. This booth is identical to the primer application area. Again, isolated from the rest of the machine during each cycle with all functions programmable.
6. Cure Oven. This is a tunnel exactly like the pre-heat only slightly shorter. The parts come back to the operator station from here.

Our equipment utilizes a unique air flow system to handle the volatile fumes generated by spraying solvent based adhesives and paints. None of the air in this machine is recycled. Meaning there is no risk of VOC's or over-sprayed material entering the heating elements. This is a true 100% air capture system.



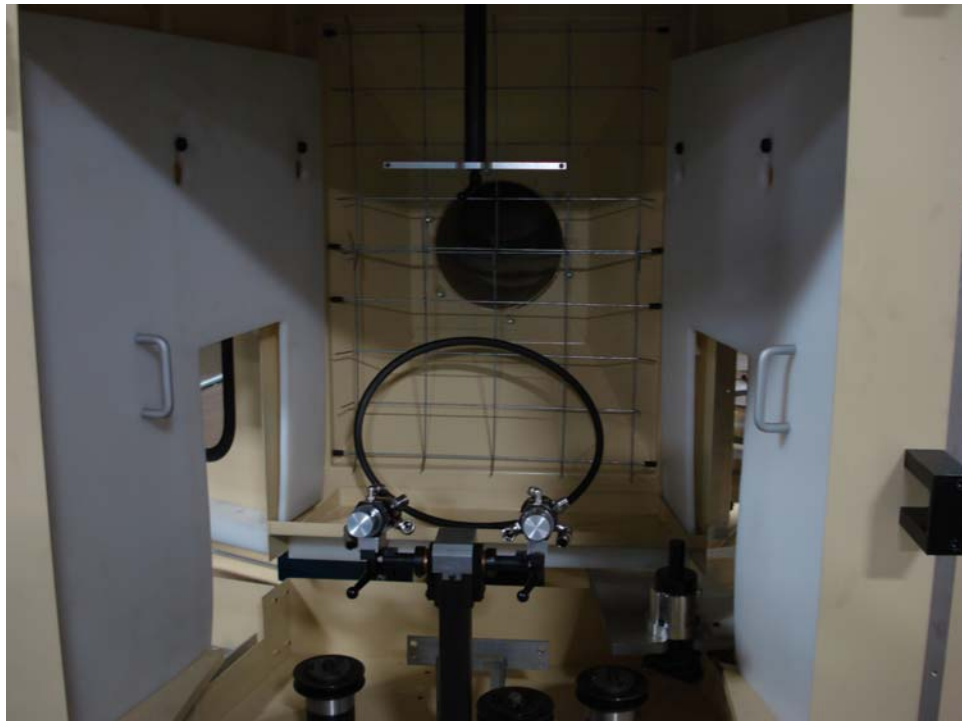
This is the load booth and operator interface. The interface is on a swing arm and travels to the spray booths for set-up. A fluorescent work light, safety gate, and part present sensors are standard.



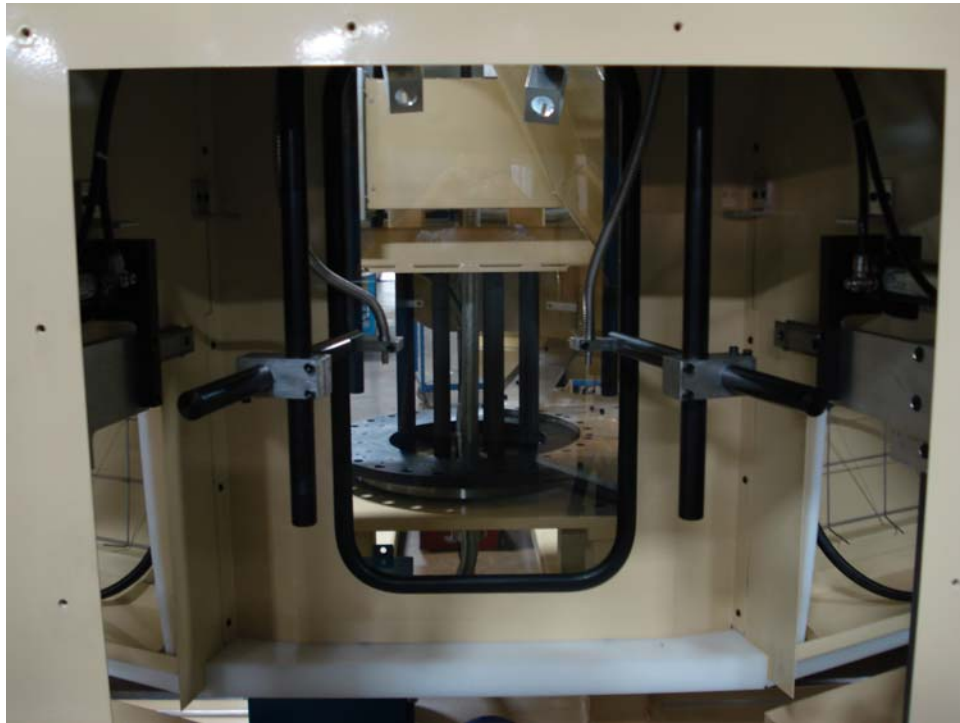
The parts first pass through the pre-heat tunnel, shown here with the access door closed.



This is the primer booth with the door closed. The window is safety glass. The door is sealed with a heavy duty latch mechanism and a switch and internal lock ensure the door stays closed during cycle.



This photo shows the inside of one of the spray booths. The white plastic panels on either side are easily removable for cleaning. The lower guns are positioned by servo motors mounted under the booth, while the upper guns (not pictured) are positioned by servos above the booth. The product rotation unit is also under the booth.



The vision station is directly in between the two spray booths. The cameras are mounted outside the booth with the lighting fiber optics mounted inside. During cycle this station is completely sealed.



This photo shows the cure tunnel with the access door open. The holes in the far side are where the heated air comes in directly beside the parts.



These are the spindle assemblies bolted to the index dial plate. The part fixture will simply sit on the top and fit over a pin. The distance between the fixtures dictates the machine size and allowable part size, 8" in this case.



The large screen is the panel view interface which controls the entire operation and all parameters of the machine. The smaller screen is the display for the vision system allowing the operator to monitor primer application during cycle.



This is an overall view of the machine. The main control enclosure is located behind the machine (blue) with the spray control cabinets located beside it.

The exhaust port is visible near the center of the machine. This is the only exhaust port and it 12" diameter. The fan is controlled by a variable speed drive and maintains a constant 2000 CFM output.

Directly above the tunnel access door is the secondary filter box. This filters the air out of the spray booths and before the main blower. It is accessible while standing on the floor, and the interface will indicate filter condition and shut the machine down when plugged.

The red stripes on the base of the machine are safety switches. These prevent the need to seal the underside of the machine with guarding making it difficult for troubleshooting and maintenance. The switches are active through the entire length and will completely shut the machine down if pressure is applied by someone crawling under to have a look.

We have found this concept to be a superior alternative to chain-on-edge systems for several reasons. There are fewer mechanical parts which eases the load on plant maintenance. There are fewer parts because there are fewer spindles, which decreases the number of fixtures required for each part. The entire system is very compact in comparison to most chain-on-edge systems, and therefore very efficient. The 8" center machine takes up approximately 12' x 20' of floor space.