Cee® 300MXD

Megasonic Developer/Cleaner

The Cost Effective Equipment 300MXD megasonic developer/cleaner combines an intuitive Windows®-based operating system, megasonic transducer (ProSys MegPie), extremely accurate spin speed control, and an extremely-high-horsepower drive for aggressive acceleration. The radial megasonic array is specifically designed to apply uniform acoustic energy to spinning substrates. The 300MXD tool features a complementing stream puddle dispense for supplying developer/cleaner solutions to the wafer surface. This tool is also capable of removing particles smaller than < 0.15-um when it is configured for post-develop/CMP cleaning applications.

Cost Effective Equipment

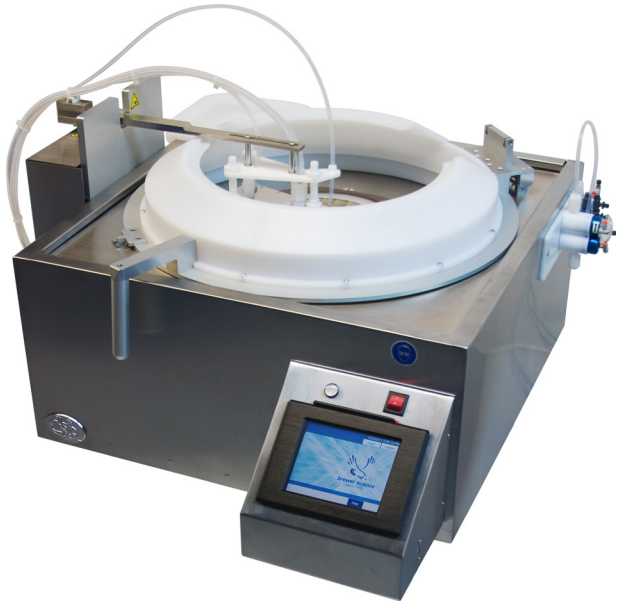
Serving the Semiconductor Industry Since 1987

Benefits

- Onboard Windows®-based PC control for enhanced interface capabilities and connectivity
- Enhanced lid-lift assist feature (gas spring opens ≥ 45°)
- Stand alone cabinet and streamlined design for minimized footprint (Chemical Storage)
- X-PRO workstation integrates stand alone cabinet with an upper exhaust enclosure for creating mini-environment (monitors and data logs ambient conditions)
- Flexible configuration for enhanced developing and cleaning applications for fragile device structures
- Stand-alone cabinet and streamlined design for minimized footprint
- Full-color, 7-inch touch screen display
- Radial arm used to transport megasonic transducer between process and home positions

Enhanced Process Applications

- High-aspect-ratio structures, photoresist developing MEMS & advanced lithography (KrF/ArF)
- Thick-film SU8 developing
- Post-develop cleaning
- Post-debonding process (adhesive cleaning on thinned < 100 -um substrates)
- Post-CMP cleaning
- Photomask cleaning
- Photoresist stripping
- Metal lift-off (heated dispense optional)
- Metal etching (heated dispense optional)



Stream Puddle System Standard

DEVELOPER/CLEANER: Cost Effective Equipment offers stream puddle dispense options on the Cee® Model 300MXD. These dispense methods are normally used in conjunction with a pressure can which holds the developer.

STREAM DEVELOPER OPTION: This developer option uses a standard automated dispense spinner and pressure cans. It functions by "streaming" the developer and deionized (DI) water onto the top of the substrate. This option:

1. Is very economical
2. Uses precision dispense valves with suck-back control
3. Minimizes material usage
4. Is compatible with aqueous and solvent-based materials

www.costeffectiveequipment.com
(573) 466-4300

STREAM DI WATER/SOLVENT RINSE: Cost Effective Equipment offers both topside and backside rinse options for cleaning applications. This dispense method is normally used with a pressure can dispenser or by using a house DI water supply.

Dimensions

- Machine weight: 175 lb
- Shipping weight: 450 lb
- Cabinet dimensions: 35.75" L x 29.0" D x 59.50" H

Programmability

- Controlled by onboard Windows®-based PC
- System capable of controlling ProSys Micropulse host software for high-end megasonic powered system
- User-friendly touch screen interface and display
- 250,000 spin process programs
- Virtually unlimited steps per spin program
- 0.1-s resolution for step times with a range of 0 to 9,999.9 s/step
- Spin speed 0 to 6,000 rpm (Optional 4000 rpm and 3000 rpm for additional acceleration capabilities)
- Spin speed acceleration
  - 0-30,000 rpm/s unloaded
  - 0-23,000 rpm/s 300 mm substrate
  - 0-3,000 rpm/s 350 mm x 6 mm round recessed spin chuck
  - 0-300 rpm/s 14" x 14" x .250" photomask recessed spin chuck
- Connectivity: USB/Ethernet port for communications for uploading/downloading process parameters with offline firmware standard (offline recipe number and steps unlimited)
- Simultaneous trigger of multiple (up to 16) automated dispense nozzles
- Bidirectional speed control/oscillating chuck
- Iteration software (recipe looping)
- Dispense or component outputs: 50
- Security: password protection available at no charge
- In-process/dynamic speed/acceleration control

Precision

- Spin speed repeatability: < 0.2 rpm
- Spin speed resolution: < 0.2 rpm
- Substrate sizes < 3 in to (450-mm round / 14" X 14" square)

Reliability

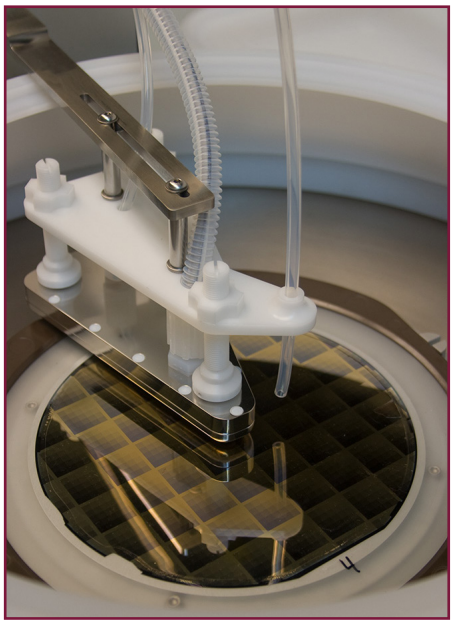
- Indirect drive system protects the spin motor from accidental contact with process chemicals and solvents
- Vacuum and lid interlock standard
- Industry-leading reliability and uptime
- 1-year full warranty on parts and labor
- Free remote technical support (phone, email, fax) for the life of the product
- Application process assistance for life of the product

Bowl, Exhaust Hood, and Megasonic Transducer Design

- All stainless steel construction
- ETFE coated spin bowl option for material compatibility
- Optional sapphire MegPie for material compatibility
- Optional Teflon®/polyethylene bowl non-disposable bowl liner
- Optional exhaust hood (process chamber)
- Optional fan filter unit (< Class 1 cleanliness inside process chamber)
- Optional teflon/polyethylene splash ring
- Drain and exhaust ports located in the bottom of bowl
- Optional nitrogen purge for an inert spin environment
- Optional auto N_2 blow-off nozzle
- Optional auto-drain separator (solvent/aqueous)

Utilities

- Power requirements: 200-240 volts AC, 2350 watts, 12.0 amp
- Drain port: 1-inch outer diameter
- Exhaust port: 1.5-inch outer diameter
- Recommended utilities: vacuum: 20 in Hg, exhaust 20 to 50 cfm
- Auto-dispense requirements: N_2 or CDA: 70 psi (15 lpm)
- DI water for developer spray and backside rinse (if hard plumbed); maximum flow: 80 PSI; regulator to be supplied by purchaser



ProSys Technical Brief

What is Megasonic cleaning?

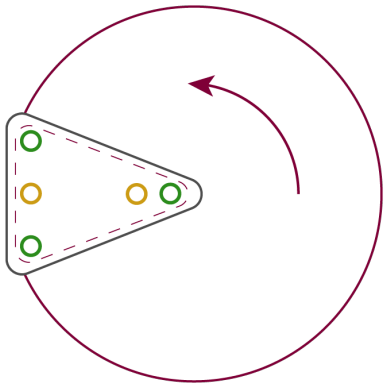
Megasonic cleaning is emerging as an increasingly important, widely accepted cleaning method for contamination-sensitive products. A growing number of manufacturers in the integrated circuit, hard drive, raw silicon, mask, and flat panel display industries, and other industries affected by contamination are turning to megasonic cleaning to help meet stringent cleanliness requirements.

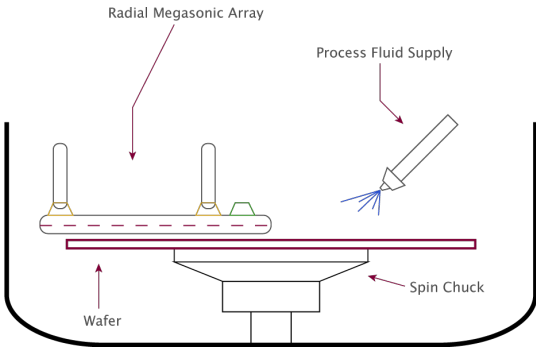
Megasonic cleaning uses the piezoelectric effect to enable removal of submicron particles from substrates. A ceramic piezoelectric crystal is excited by high-frequency AC voltage, causing it to vibrate. This vibration generates an acoustic wave that is transmitted through a cleaning fluid, producing controlled cavitation. As the wave passes across the surface of an object, it causes particles to be removed from the material being cleaned.

How does it work?

Cavitation, the formation and activity of bubbles (or cavities), is believed to be an important mechanism in the actual particle removal process because cavitativon has sufficient energy to overcome particle adhesion forces and cause particles to be removed. Controlled megasonic cavitation becomes acoustic streaming, which pushes the particles away so they do not reattach to the material being cleaned.

The pressure amplitude, or megasonic power, required to achieve cavitation has been proven to depend on the pulse width, dissolved gas content in the cleaning fluid, and the power input. Megasonic cleaning is controlled by varying the power input. Pulsing the input power provides better control over cavitation than applying continuous input power. Exposure time and megasonic power are the most significant variables affecting megasonic cleaning. As megasonic power or exposure time increases, particle redeposition decreases. Pulsed input power (pulsed-wave megasonics) achieves greater acoustic power levels in a cleaning bath than continuous input power (continuous-wave megasonics) at the same average input. Typical exposure times are 10 to 30 minutes.





Radial Uniformity
Every part of the wafer receives the same dosage.

Megasonic cleaning compared to ultrasonic cleaning

The difference between ultrasonic cleaning and megasonic cleaning lies in the frequency that is used to generate the acoustic waves. Ultrasonic cleaning uses lower frequencies and it produces random cavitation. Megasonic cleaning uses higher frequencies at 1000 kHz and it produces controlled cavitation. An important distinction between the two methods is that the higher megasonic frequencies do not cause the violent cavitation effects found with ultrasonic frequencies. This significantly reduces or eliminates cavitation erosion and the likelihood of surface damage to the product being cleaned. Parts that would be damaged by ultrasonic frequencies or cavitation effects can often be cleaned without damage in a megasonic bath using the same solution. With ultrasonics, cavitation occurs throughout the tank, and all sides of submerged parts are cleaned. With megasonics, only the side of the part that is facing the transducer(s) is cleaned.

Applications

The megasonic cleaning technique is effective for removing 0.15-micron particles from silicon wafers and other products without damage. The method is currently being used by manufacturers of integrated circuits, flat panel displays, and hard disks, as well as by mask makers and raw silicon suppliers. Megasonic cleaning may be used with a variety of chemistries. Although it is used primarily for particle removal, it may also be used to increase the efficiency of chemical cleaning with surfactants or detergents. Removal of other contaminants depends on the solutions in the tank.

F. 6.6.7050.A3 Effective Date 10/05/2017