# Spin Developer Accessories 01

Cost Effective Equipment

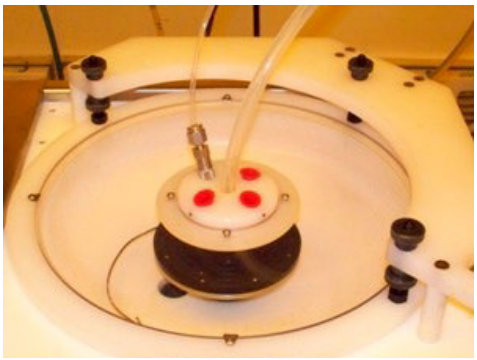
The Cee® equipment line offers customized accessories and options. Not all options are available on every machine and model.

*Serving the Semiconductor Industry Since 1987*

## Spin Bowl Material Options for Chemical Compatibility

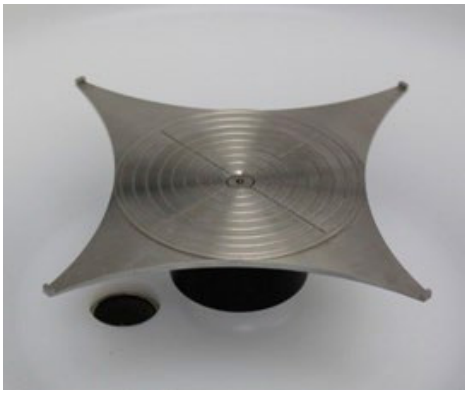
### Teflon® PTFE Spin Bowl

CEE® Apogee™ and X-Series spin coaters feature a standard PTFE Teflon® bowl and deliver the utmost in chemical compatibity for the widest array of process chemistries. Teflon® material is exceptionally easy to clean and features an extremely high thermal budget (225°C).



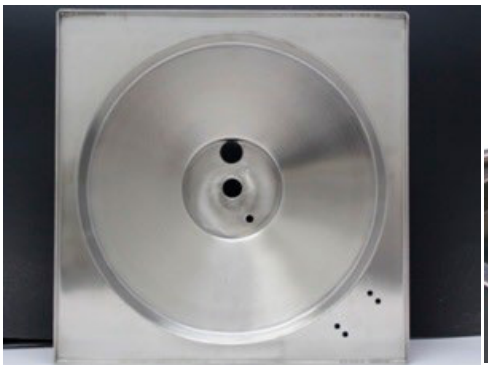
### Ultra-High Molecular Weight (UHMW) Polyethylene (PE) Spin-Bowl

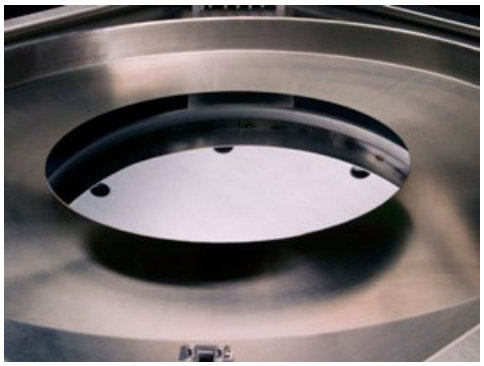
The UHMW PE spin bowl is by far the most commonly used of all our available spin bowls, and the volumes of scale allow for significant savings for our educational package. The UHMW PE material offers a much wider range of chemical compatibility than stainless steel and can be upgraded to Teflon® material.



## Stainless Steel Spin Bowl

The CEE® equipment line continues to offer a 100% stainless steel exterior material package and stainless steel spin bowl. This material provides corrosion resistance for a wide range of standard solvent and aqueous-based process materials. It features the greatest strength-toweight ratio of any bowl material offered, allows for easy cleaning, and provides a highly aesthetic appearance.





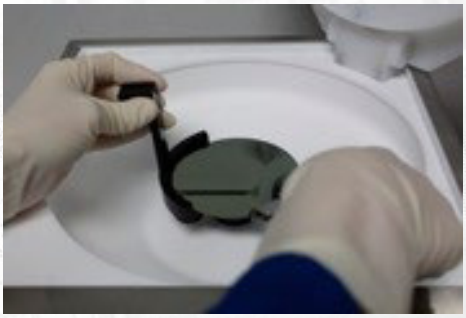
## Mechanical Centering Device Options

### Stationary Stainless Steel Centering Device Setup and Centering Fixtures

The optional stainless steel centering device is mounted stationary to the outer spin bowl flange. The device is normally housed in a vertical position outside the bowl environment and is moved into a horizontal position during the centering procedure. The appropriate centering fixture (3 inches,100/125 mm,150/200 mm) is then attached in the appropriate location, thus providing two points to accurately center the substrate. This option is very flexible for a wide array of substrate and spin chuck sizes.

### Size/Chuck Specific Handheld Centering Device

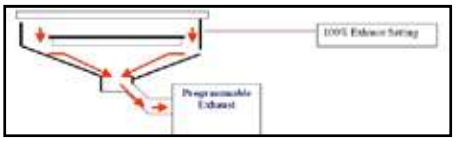
The handheld centering device can be used for specific sizes and is very cost-effective. This component will positively mate to the side of a specific chuck and allow for quick alignment of the referenced size. Handheld devices are available for 2- and 3-inch and100-, 125-, 150-, 200-, and 300-mm sizes.

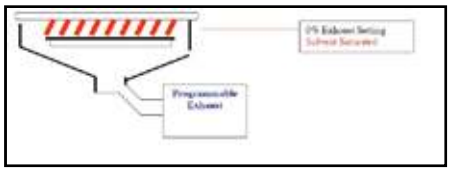


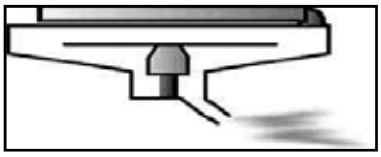
## Spin Chamber Environment Options & Accessories

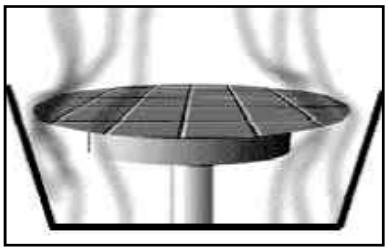
### Programmable Spin Bowl Exhaust

The programmable exhaust option can be set upon either a spin coater or a developer, most commonly on a spin coater. This option allows the user to program the amount of exhaust flow at each step of the recipe. This capability can be very beneficial for controlling the solvent enrichment in the bowl during the casting and spreading steps, as well as for exhausting solvent fumes from the bowl at the conclusion of the recipe. This option is very critical for achieving optimal coating uniformities (such as total thickness variation, or TTV) for medium- to thick-film resists.







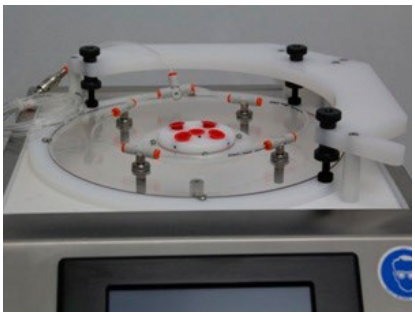
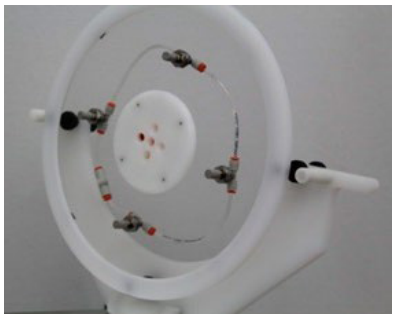
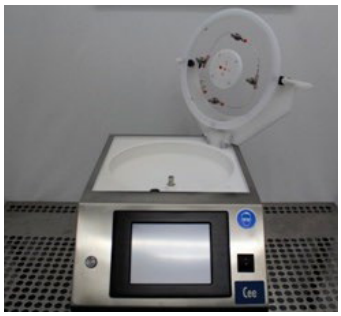


### Idle Exhaust Control Feature

The programmable exhaust (see figure below) will allow the user to set a predetermined default position and subsequently control the exhaust load/flow during ambient conditions. This capability may be beneficial for controlling or conserving the overall volume of air in the ambient lab conditions and/or for creating the optimal solvent enrichment for subsequent processes.

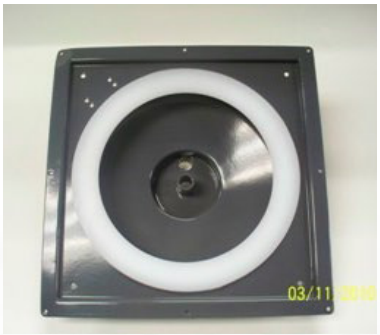
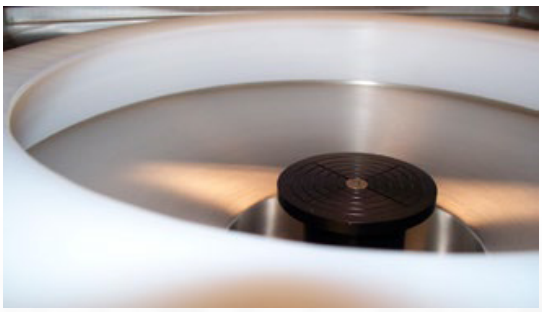
## Manual $N_2$ Purge Lid

This accessory features four diffusers mounted in the spin bowl cover and allows a user to purge a (regulated) nitrogen supply into the bowl environment. This option includes a manual regulator to optimize the nitrogen flow rate and minimize the oxygen levels in the spin bowl. This feature offers a complementing programmable exhaust option for creating positive pressure inside the bowl chamber.

## Splash Ring

The polyethylene splash ring sits within the outside diameter of the spin bowl and is constructed of ultrahigh-molecular-weight polyethylene material. This option will optimize the exhaust air flow at the edges of the spin chuck/substrate and mitigate the risk of materials hitting the straight sidewall of the spin bowl and rebounding to the device side of the wafer. The splash ring is inserted into the top of the bowl and provides a chamfered edge for catching cast materials. The splash ring also provides optimal conditions for edge uniformity to improve total thickness variation (TTV).

## Reusable, Disposable Polypropylene Bowl Liners

These bowl liners are beneficial for reducing cleanup time after processing. The polypropylene liners exactly match the interior dimensions of the spin bowl. The standard liner (shown on left) allows the excess material to drain normally through the system. Many customers purchase two liners and swap them at the end of every business day. The contaminated liner is simply soaked in a solvent bath for cleaning. The liners are relatively robust and typically last 6-9 months in a lab environment. A raised lip version (shown on right) is also offered which captures any cast material in the liner for direct removal and prevents waste from entering the standard drain system.

## Spindle Drive Options (Speed and Torque)

### 6,000rpm High-Torque Option

One option for CEE® spin coaters is a spindle drive with the highest horsepower in the industry. The 6,000-rpm maximum torque option is recommended for customers interested in coating thick, heavy, irregularly shaped, or extremely large substrates (such as photomask blanks). CEE® equipment is able to process full 6 in x 6 in × 0.250 in photomasks with recessed spin chucks. Photomask weight is typically 2-3 pounds, depending on the material . Photomasks can achieve a speed of 6,000 rpm with an acceleration of 3,000 rpm/s. The 6,000-rpm maximum speed option will ensure that you can aggressively snap-spin the material and mitigate uneven drying of the film from center to edge.

### 12,000rpm, Medium-Speed, Medium-Torque Option

The 12,000-rpm option allows for all speeds from 1-12,000 rpm to be programmed and controlled. However, this enhancement will minimize the overall torque/acceleration capability by 10%-15%, compared to the 6,000-rpm option. The 12,000-rpm option is most often used for extremely small substrates, from <1 cm through 2 inches. We generally recommend the 12,000-rpm option for all standard-thickness semiconductor applications and the 6,000-rpm option for thick, heavy, irregularly shaped, or extremely large substrates.

### 16,000rpm, High-Speed, Low-Torque Option

Because of their specialized hardware and software, CEE® spin coaters offer the option of spin speeds of up to 16,000 rpm. Substrate size and acceleration rate become very critical issues when spinning at these higher speeds. A specialized captive and/or recessed chuck is strongly recommended for achieving the required center/balance position and maintaining positive grip of the substrate.

**Indirect Drive: 6,000rpm Option**

- Maximum acceleration for heavy/large and irregular shaped substrates
- 6" x 6" x 0.25" photomask recessed spin chuck (2lbs/0.9kg): 6000rpm/s, standard thuckness Si (<1lb/0.4kg): 23,000 rpm/s ramp

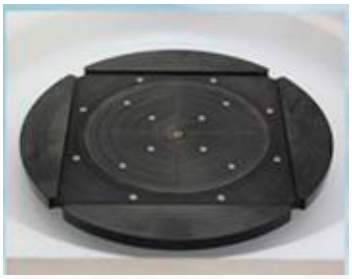
**Indirect Drive: 12,000rpm Option**

- Optimal speed and acceleration levels for SEMI® standard thicknesses (50-200mm).
- 200mm Si with vacuum chuck (<1lb/0.4kg): 20,000 rpm/s ramp.

**Indirect Drive: 16,000rpm Option**

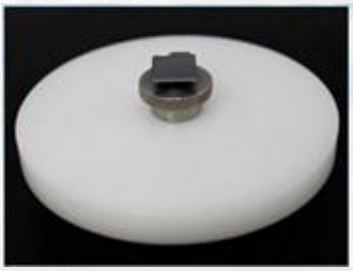
- Intended for small pieces or substrates with minimal radial velocity: 1cm x 1cm die (<0.5lb/225g): 16,000rpm/s ramp.
- Recommend custom captive/recessed chucks to attain proper alignment and maintain grip

Increasing Drive Ratio



Heavy Loads: 6" x 6" Recessed Photomask Spin Chuck

Moderate Loads: 4" Vacuum Chuck for 200mm Si Round



Limited Loads: 5/16" Spin Chuck for 1cm x 1cm die

## Ancillary Spin Coater Accessories

### X-PRO II Workstation

The CEE® X-PRO II workstation offers customized exhaust enclosures that integrate with their stand-alone cabinets and create a virtual clean room environment (commonly known as a mini-environment). The upper enclosures can be designed for ductless or ducted exhaust for preventing vapor fumes from contaminating the ambient lab environment. The enclosure can also be enhanced with fan filter units for vertical laminar flow and/or a particle filter (HEPA, ULPA, or carbon amine filtration) that can have various efficiencies (E*). The hood is also compatible with optional programmable meters for detecting and logging (with X-Series software) environmental conditions including air pressure, flow, humidity, and temperature stability and uniformity. The Apogee™ & X-Series software will automatically monitor these conditions in real time and provide users with the ability to program yellow-light warnings and/or red-light fault parameters. The workstation seamlessly combines Cee® precision equipment with these enhancements to create optimal turnkey processing solutions and deliver increased production yields in a small-scale lab setting.
*E = Percentage of restrained particles under defined conditions

## Stand-Alone Stainless Steel Cabinate with Exhaust

CEE® products offer a matching stainless steel finished cabinet with exhaust which provides secondary containment for all process chemicals, including the waste tank. This setup creates a fully capable stand-alone piece of equipment, and the system can be shipped fully assembled/installed in the cabinet. This option can also be combined with an upper exhaust enclosure for controlling vapor fumes and/or creating a mini-environment. The exhausted cabinet and upper enclosure options are both SEMI S2 and CE compliant.

## Drain Bottle Assembly with Full-Bottle Sensor

We offer a complete drain bottle assembly kit (with full-bottle sensor) for capturing spin-coating and developer (aqueous/solvent) waste. This assembly includes a 1- or 5-gallon drain bottle, drain hose, full sensor, and clamps for connecting to a CEE® spin coater. The capacitive sensor will alert when the bottle is full and allow the current recipe to conclude; however, it will not allow additional recipes to be initiated until the bottle is drained. This option ships with all necessary connecting hardware including:

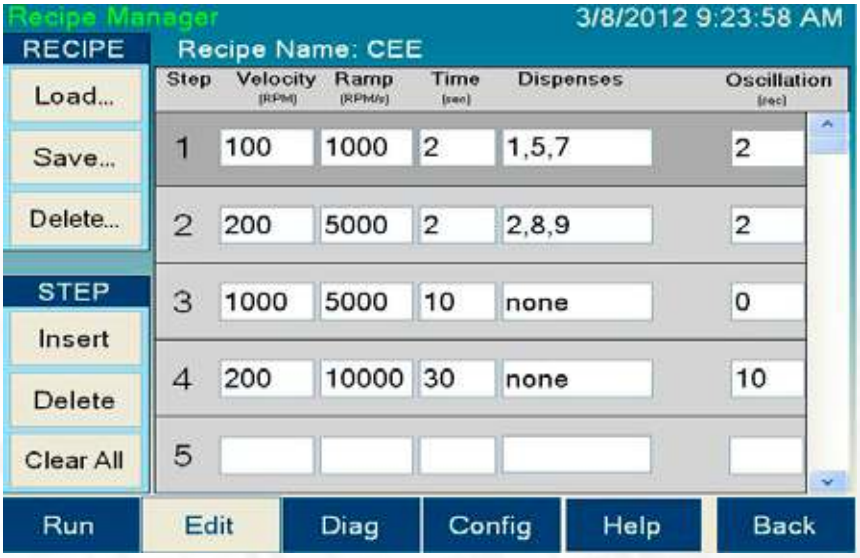
- 1-Gallon (or 5-gallon) drain bottle
- 6ft of PTFE drain hose
- x2 1" hose clamps
- Custom drain bottle snout
- Capacitive sensor for triggering the bottle-full condition

## Vacuum Pumps

Cost Effective Equipment offers vacuum pumps that enable operation of the full CEE® equipment product line. The pumps offered can supply vacuum for one or two small machines (Net Motion) and/or provide the vacuum utilities for an entire fab (Edwards). The oilless Net Motion vauum pump is suitable for clean room use, extremely compact, and very quiet (< 55 dB).

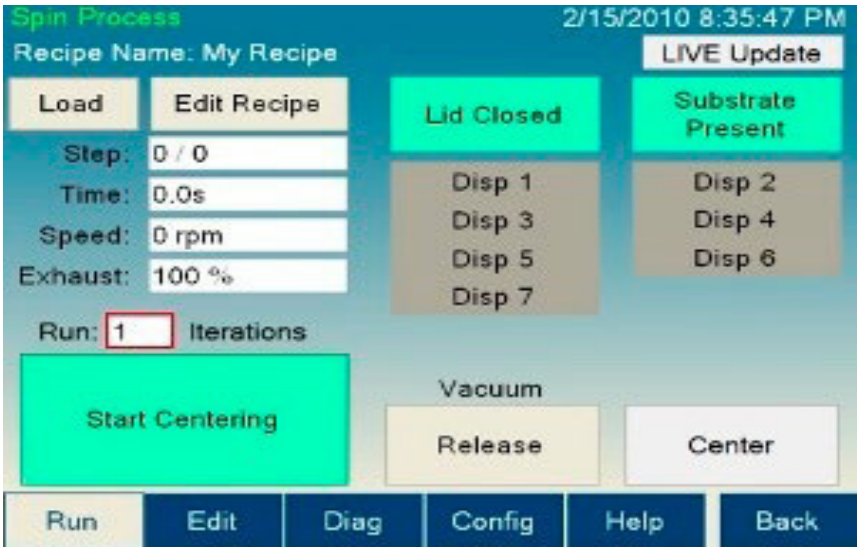
## Bidirectional, Oscillating Speed Control

This option enables the user to oscillate the spin chuck direction to enhance the agitation effect for many develop, etch, and rinse materials. The time between oscillations is entered in seconds, and the system uses the previously programmed speeds and accelerations. (Oscillation mode is not available on all models.)



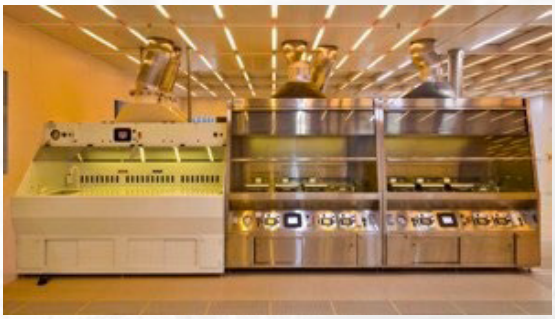
## Program Recipe Iteration Looping

This option enables the user to create a multistep spin process that repeats consecutively based on the number of iterative loops programmed. By entering a value greater than 1 in the “Iterations” field, the iterative software will cause the process to run for the specifie number of times. The tool will sound a slight alarm between runs, and the processes may be aborted in normal fashion. (Iteration looping is not available on all models.)




## Remote Flange Mount Option (F-Designation)

CEE® equipment offers flange-mounted modules for all 200-mm spin coaters, bake plates, developers, and combination equipment, and this option is compatible with its specially designed wet bench/glove box. Customers can choose from either a deckmountable stationary display or a remote display control box (with umbilical cord). This option allows the unit to be mounted flush to the working surface, and the touch screen interface is mounted remotely on the deck or head casing. Cost Effective Equipment also has a long history of working with many of the industry’s leading wet-bench manufacturers and can offer modules compatible with third-party wet benches. A typical module of this type measures approximately 13 in (W) × 19 in (D) × 12 in (H), including the lid.



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