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Operations Manual

Cee® AccuScan™ Dispense

Cost Effective Equipment

1 Introduction

1.1 Confidentiality Statement

Information supplied is for the use in the operation and/or maintenance of Cee® equipment. Neither this document nor the information it contains shall be disclosed to others for manufacturing or any other purpose without written authorization from Cost Effective Equipment, LLC.

1.2 Warranty

Cost Effective Equipment, LLC warrants to the original purchaser (Buyer) that equipment is free from defects in material and workmanship under normal use and service in accordance with Cee® instructions and specifications. Buyer shall promptly notify Cee® of any claim against this warranty, and any item to be returned to Cee® shall be sent with transportation charges prepaid by Buyer, clearly marked with a Return Authorization (RMA) number obtained from Cee® Customer Support. Cee's obligation under this warranty is limited to the repair or replacement, at Cee® option, of any equipment, component or part which is determined by Cee® to be defective in material or workmanship. This obligation shall expire one (1) year after the initial shipment of the equipment from Cee®. This warranty shall be void if:

- Any failure is due to the misuse, neglect, improper installation of, or accident to the equipment.
- Any major repairs or alterations are made to equipment by anyone other than a duly authorized representative of Cee®. Representatives of Buyer will be authorized to make repairs to the equipment without voiding warranty, on completion of the Cee® training program.
- Replacement parts are used other than those made or recommended by Cee®.

CEE® MAKES NO OTHER WARRANTIES, EXPRESSED OR IMPLIED, WITH RESPECT TO EQUIPMENT. NO WARRANTY IS MADE AS TO THE MERCHANTABILITY OF THE EQUIPMENT NOR ITS FITNESS FOR ANY PARTICULAR PURPOSE. In no event shall Cee® be liable for consequential loss or damages, however caused. No person or representative of Cee® is authorized to assume for Cee® any liability in connection with equipment nor to make any change to this warranty unless such change or modification is put in writing and approved by an authorized representative of Cee® in writing.

This warranty shall be governed by the laws of the state of Missouri, U.S.A.

1.3 Returned Materials

Any materials, parts, or equipment returned to Cost Effective Equipment, LLC must be clearly labeled with a Return Material Authorization (RMA) number.

To obtain an RMA number, contact:

Cee® Customer Support
Telephone ..... +1-573-466-4300
Email ..... support@costeffectiveequipment.com
Web Address ..... www.costeffectiveequipment.com
Physical Address ..... 6 Industrial Drive; St. James, Missouri 65559

1.4 Environmental Considerations

Cee® fosters sustainability through innovation in the durability and reliability of our precision tools and equipment. Individual component modules are engineered for serviceability ensuring long lasting performance. Processes are designed to minimize use & consumption of chemical compounds ensuring accurate, replicable, industry-leading results every time.

Cee® diligently screens suppliers to ensure conflict-free sourcing of minerals and product components are constructed of recycled materials wherever possible.

Cee® equipment operates without the use of ozone depleting substances (ODSs) including chlorofluorocarbons (CFCs), methyl chloroform, hydrochlorofluorocarbons (HCFCs), carbon tetrachloride, perfluoro compounds (PFCs), or other volatile compounds/organic solvents.

1.5 General Safety Hazards / Precautions

Read this manual in its entirety before operating or servicing the machine.

1.6 Electrical

High voltage is present in the machine. Disconnect power before servicing.

Stored electrical energy is present in the machine. Before servicing, allow sufficient time for discharge. The servo amp contains a charge light. Do not service the machine until this light has been extinguished.

This unit must be connected to an outlet with proper grounding.

1.7 Mechanical

This machine may contain compressed gases which can provide motive force for components and can expand violently upon decompression. Disconnect N_2 or CDA before removing any panels.

Ensure that all panels are on and in their correct locations before powering up or operating.

Caution: Pinch points present. Please adhere to all warning labels and exercise caution to avoid injury.

1.8 Chemical

Cee® does not supply or dictate chemicals to be used in conjunction with the AccuScan™ Dispense. Enclosure material data will be reviewed during equipment design and configuration to ensure compatibility with the customer's proprietary process.

Prior to introducing new chemicals, refer to your chemical supplier's factory specifications and MSDS. Material Safety Data Sheets (MSDS) contain crucial information regarding chemical safety, including details about hazardous components, physical properties, spill and leak procedures, waste disposal guidelines, and personal protective equipment requirements for handling. Ensure chemical compatibility of all chemicals and materials being used inside the machine. This includes all wetted parts of the storage, supply, dispense, and waste systems.


All dispensed materials are held in one common waste storage tank. Ensure chemical compatibility and verify potential for negative interactions between chemicals before use.


Flammable Chemicals. No open flames/sparks.


Avoid the use of materials with an auto-ignition point ≥30°C.


Relieve pressure before opening canisters, tanks, cartridges, or syringes to refill.


Relieve pressure and shut off chemical valves before servicing supply lines, dispense valves or other components such as EBR/BSR tubes, dispense nozzles, spray tips, or spinner lid.


Flush tubing and valves with an appropriate solvent and drain system before servicing.


When draining the waste tank, use appropriate containers and connection methods.


Ensure proper ventilation/exhaust is always used.


Always wear appropriate Personal Protective Equipment. This includes safety glasses, gloves, and other equipment, as needed, to protect from mechanical and chemical hazards.

Exhaust and fume management is important to prevent the release of hazardous materials and ensure a safe working environment. Users should assume that all fumes are hazardous and take appropriate precautions to ensure system exhaust is functional per the guidelines outlined in the Preventative Maintenance section of your Apogee® Spin Coater Operations Manual.

1.9 Lockout/Tagout Procedures and Information

Before servicing, turn off the machine and remove the power inlet cord by disconnecting the plug where it enters the machine.

Note: There are no LOTO (Lock Out/Tag Out) facilities supplied with the Cee® AccuScan™ Dispense. It is the responsibility of the customer/installer/end-user to ensure that the suitable LOTO devices are provided on utilities being supplied to the Cee® Apogee™ Spin Coater in accordance with applicable laws, regulations, and/or company policies.

For more information, please contact Cee® Customer Support.

1.10 Intended Use of Machine

The Cee® AccuScan™ Dispense is intended for use as a semiconductor/optical application machine.

The Cee® AccuScan™ Dispense is not intended for use in food or medical applications or for use in hazardous locations.

The Cee® AccuScan™ Dispense is intended for use only by trained personnel wearing the proper personal protective equipment. Anyone not trained in the proper use of the Cee® AccuScan™ Dispense and having not fully read this manual, should not operate the equipment.

The Cee® AccuScan™ Dispense is intended for use in a cleanroom environment to provide the proper processing conditions for the substrates. If it is used outside of a cleanroom environment, substrate cleanliness may be compromised.

The Cee® AccuScan™ Dispense is not intended for use in a hazardous or explosive environment.

Normal Operating Conditions

The Cee® AccuScan™ Dispense is designed for indoor use only.

Ambient Temperature.....10˚C - 30˚C

Relative Humidity.....≤80%

Altitude.....up to 3000 m

Pollution Degree.....2

Overvoltage Category.....II

If the Cee® AccuScan™ Dispense is used in a manner not specified by Cee® or with accessories not provided by Cee® the protection provided by the equipment may be impaired.

2 Equipment Description

The Cee® AccuScan™ Dispense is designed for use with Apogee® Spin Coater and Apogee® Spin Developer systems, to provide precise and uniform dispensing for semiconductor substrates. This automated dispense system enhances the efficiency and accuracy of the process, ensuring optimal performance in semiconductor fabrication.

2.1 Components

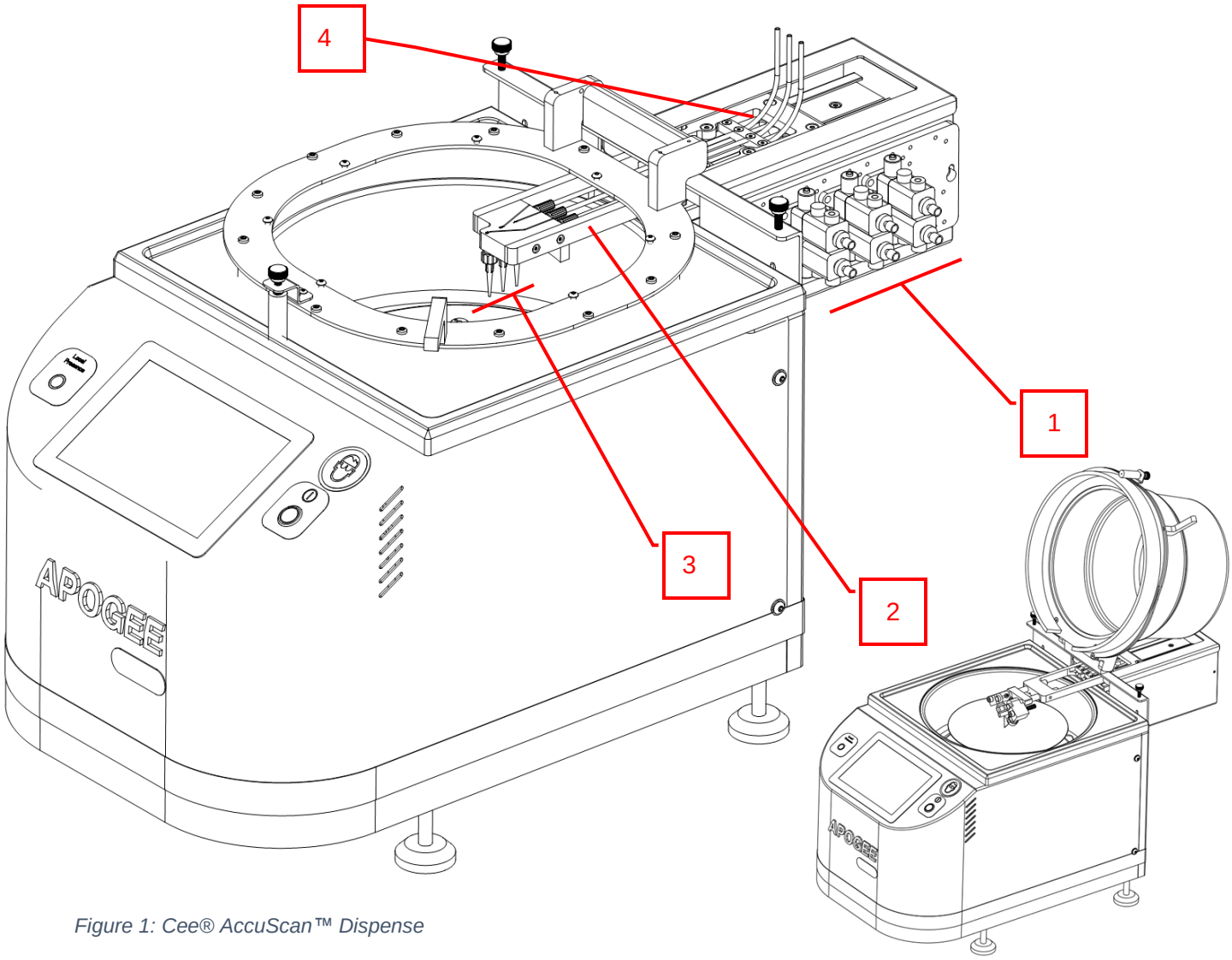


Figure 1: Cee® AccuScan™ Dispense

1. dispense valves..... for adjustment of dispense flow rate
2. scanning dispense arm ..... recipe-controlled arm for precise material dispensing
3. dispense nozzles..... accommodates up to 3 dispense nozzles w/ assorted tips
4. dispense lines ..... PFA tubing carries material from reservoir to nozzle

2.2 Applications

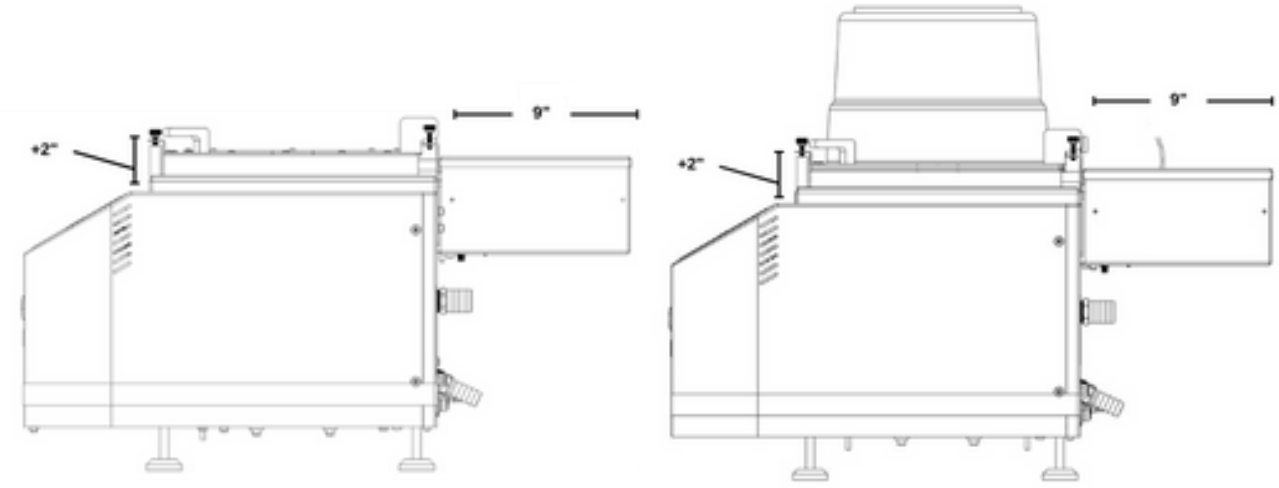
- Pre-dispense: dispense in park position to clear nozzle before on-wafer dispensing.
- Standard dispense: move the nozzle to 0mm to dispense in the center of the wafer.
- Offset dispense: dispense material offset from the center to leave an uncoated area in the middle of the wafer.

- Scanning dispense: move the arm from center to the edge while dispensing.
- Edge bead removal: precisely set the arm position to remove material at the edge of the wafer.

2.3 Dimensions

When installed, the unit adds 9” (228.6mm) to standard Apogee® process module depth and 2” (50.8mm) to standard Apogee® process module height.[1]

Adds 2” (50.8mm) to the Apogee® equipment height.
Adds 9” (228.6mm) to the Apogee® equipment depth.



2.4 Features & Programmability

- Precision mechanism for accurate and uniform dispensing across the substrate surface
- Accommodates various substrate sizes and geometries
- Equipped with up to [x3] drip-free dispensing nozzles
- Recipe controlled positioning and speed via DataStream™ technology
- Real-time monitoring and feedback for precise control over dispensing process

2.5 Reliability

- Industry-leading reliability and uptime
- One-year full warranty on parts and labor
- Complimentary remote technical support for the life of the product
- Application process assistance for life of the product

2.6 Specifications

- Resolution: 0.1mm
- Accuracy: ± 50µ
- Precision: ± 50µ

[1] Please refer to your Apogee® Operations Manual for standard dimensions.

- Arm speed range: 0-50mm/s
- Working Range: 0-106mm
- Max dispenses: 3 (spin) | 2 + N2 Blow-off (developer)
- Max viscosity: 5,000cps (spin) | 100cps (developer)
- Max wafer thickness: 13mm (spin) | 8mm (developer)

3 Installation

3.1 Clearance Requirements

The scanning dispense arm increases the height of the Apogee® equipment lid. The additional clearances required beyond standard dimensions are outlined below.

top..... 2” (127mm)
rear ..... 9” (228.6mm)

3.2 Environment

The Cee® AccuScan™ Dispense should be operated in a clean, low humidity environment.

3.3 System Installation & Setup

The Cee® AccuScan™ Dispense is pre-installed and configured at the factory. Once the Apogee® equipment is set up and powered on, it is ready to use. Consult the Apogee® equipment operations manual for installation guidance.

3.4 Start Up

The Scanning Dispense Arm will automatically turn on when Apogee® equipment is powered. Upon powering the equipment, the arm will home and move to the idle position.

3.5 System Checks

Please note that the following system checks are to be conducted in addition to those outlined in your Apogee® Equipment Operations Manual.

On the ***Process*** screen, navigate to ***Tools>Manual Control*** and perform the following system checks for initial validation of the Cee® AccuScan™ Dispense.

Scan Arm- Set :

Enter 0*mm* for the **Set Point**. Select *Nozzle 1* as the **Dispense Tip**. Enter a value of *2 sec* into the **Time** field. Press *Apply* and observe the arm move into position.

Enter *130mm* into the **Set Point** and press *Apply*. The arm will move back into the idle position. Provided that the arm responds to these commands, it is functional and ready for operation.

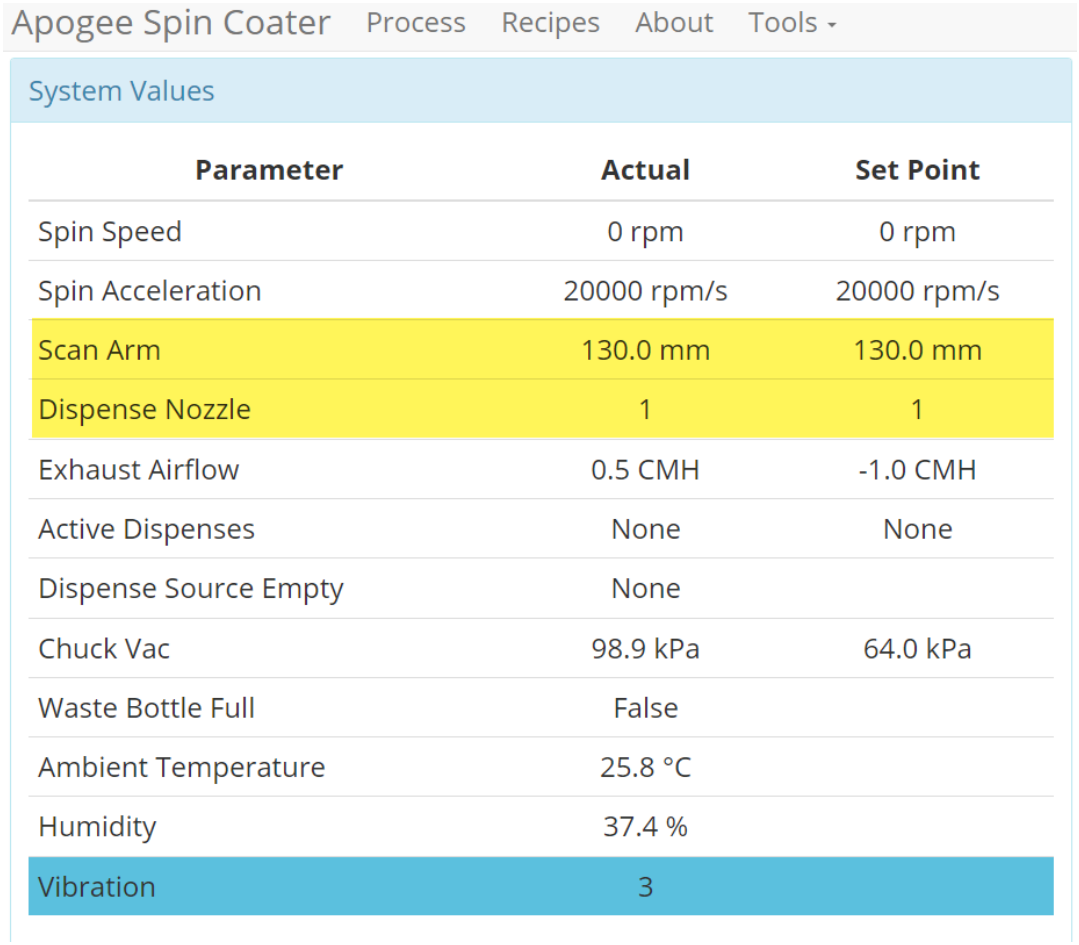
Once operations have been validated, the Cee® AccuScan™ Dispense is ready for use. Begin by creating a recipe. See the DataStream™ Manual for more information.

In the event of a fault condition, power cycle the tool to restore function

4 DataStream™ Technology

This section covers information *specific to Cee® AccuScan™ Dispenses* and is intended as a companion to the DataStream™ Technology Software Manual. ***Please review the DataStream™ Operations Manual*** for detailed guidance on software usage.

4.1 System Parameters



Parameter	Actual	Set Point
Spin Speed	0 rpm	0 rpm
Spin Acceleration	20000 rpm/s	20000 rpm/s
Scan Arm	130.0 mm	130.0 mm
Dispense Nozzle	1	1
Exhaust Airflow	0.5 CMH	-1.0 CMH
Active Dispenses	None	None
Dispense Source Empty	None	
Chuck Vac	98.9 kPa	64.0 kPa
Waste Bottle Full	False	
Ambient Temperature	25.8 °C	
Humidity	37.4 %	
Vibration	3	

Scan Arm---------- Shows the current [Actual] and desired [Set Point] position of the arm (mm).

Dispense Nozzle---------- Reflects the dispense nozzle selected for the current process step.

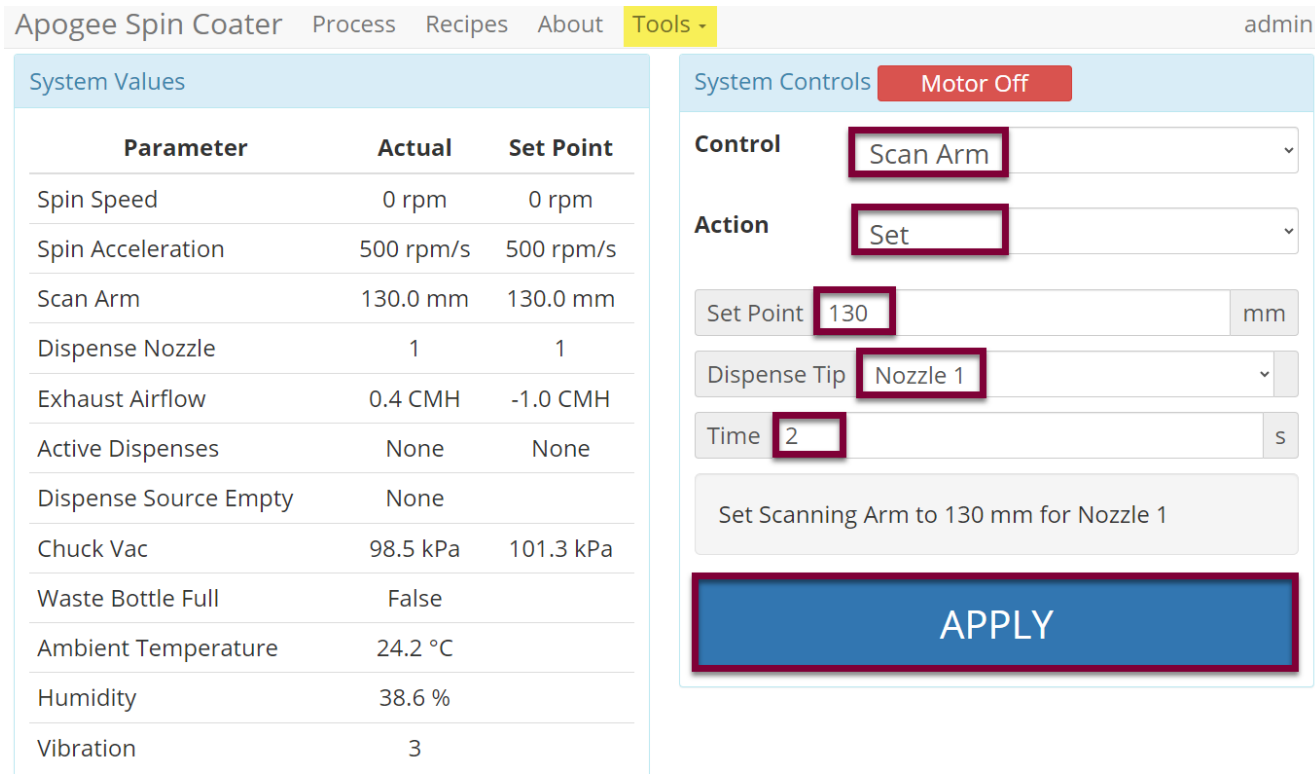
4.2 Manual Controls – Cee® AccuScan™ Dispense

The Manual Control activity is an advanced feature that allows users to run most operating processes outside of a recipe. This mode is useful for tasks such as prototyping processes, verifying equipment operation, and recovering from aborted processes. To access the activity, navigate to ***Tools > Manual Control***. Actual and set point parameter values are displayed on the left. A drop-down menu of available controls is located on the right.

If using remote feature, the user must confirm local presence to execute manual commands.

Refer to the *DataStream™ Manual* for guidance on the Local Presence feature.

Scanning Arm



Select a Control of Scan Arm and the Action will default to *Set.*

Enter a value for the Set Point to define the desired position of the Scanning Dispense Arm.

Select the desired nozzle from the Dispense Tip dropdown menu.

Enter a value for the Time to define the duration required to move to the target position.

Click APPLY

4.3 Editing Recipes

Begin by defining the desired Velocity (rpm) and Ramp (rpm/s) for a given step. Positions can be configured for each recipe step. Define the nozzle and then enter the desired position (in millimeters) from substrate center. Time will determine the total step time and the speed of the arm's movement. If a dispense is triggered, the specified nozzle will dispense for the duration of the step.

Example: assumes a 150mm wafer

Step 1 Dispense nozzle 1 moves to the center of the wafer over a period of 2 seconds.

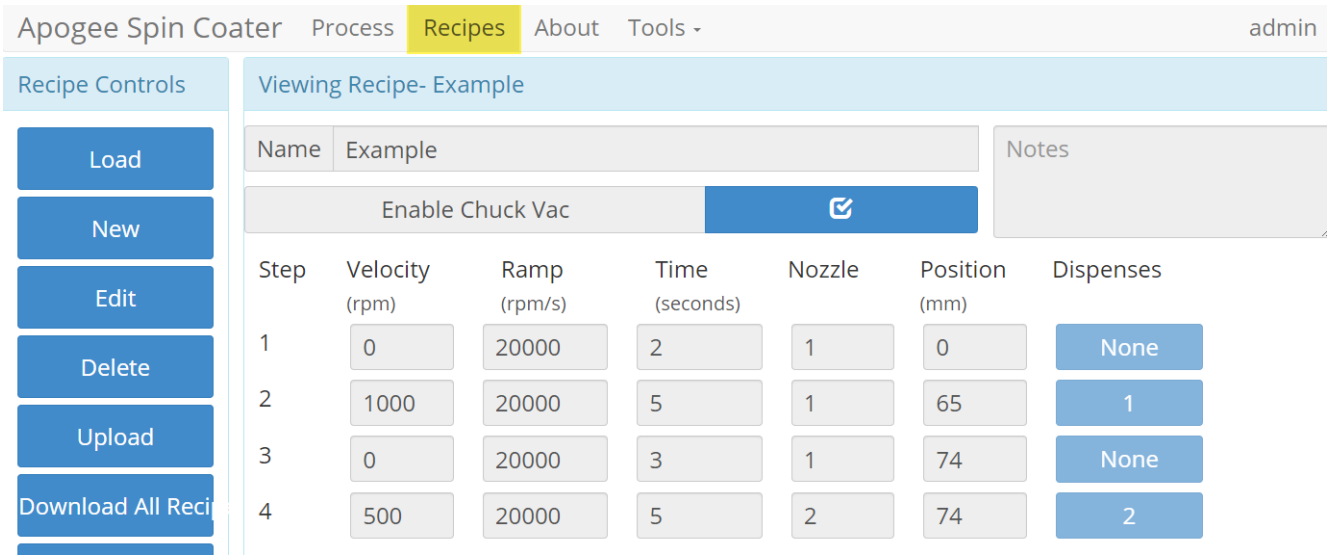
Step 2 Wafer spins at 1000rpm as Dispense 1 is triggered. Nozzle 1 dispenses from the wafer's center, moving outward 65mm over the course of 5 seconds.

Step 3 Dispense Nozzle 2 is positioned at the wafer's edge.

Step 4 Wafer spins at 500rpm while Nozzle 2 dispenses a 1mm edge bead removal over the course of 5 seconds.

**The AccuScan™ Dispense will return home at the end of the process.*

***The AccuScan™ Dispense will not return home when operated via manual controls. See section 4.2 for details.*



Velocity---------- substrate rpm

Ramp---------- substrate rpm/s

Time ---------- defines the time in which the arm will reach its target position

Nozzle ---------- the nozzle that the position is based from

Position[2] ---------- adjusts the arm to the specified location

Dispenses---------- triggers the dispense of material for each nozzle

[2] A 0mm setting aligns the nozzle center with the substrate center. For fan spray, a positive adjustment may be necessary to accommodate spray width.

5 Preventative Maintenance

This maintenance manual provides personnel with procedures and guidelines for conducting routine maintenance on the Cee® AccuScan™ Dispense. Below is a chart of recommend maintenance scheduling.

5.1 Service and Repairs

Safety Notice: Important Repair Information for Cee® Equipment

In order to maintain safety and performance standards, only authorized representatives of Cee® are permitted to conduct repairs or alterations on Cee® equipment.

When servicing the machine, use only replacement parts made or recommended by Cee®.

Use only Cee® supplied shielded cables with this machine.

Unauthorized repairs may lead to serious risks such as equipment malfunction, damage, personal injury, or even death.

5.2 Fault Condition

In the event of a fault condition, power cycle the tool to restore function.

5.3 Safety Checks

Inspect spin coater lid for the following defects each day prior to use:

- loose assemblies
- improper closure

5.4 Mechanical/Utilities Checklist

Evaluate	Frequency	Detail
Connections	Bi-Annually	Inspect all connections for proper installation.

5.5 Cleaning

To clean Cee® AccuScan™ Dispense, use the mildest solvent possible such as acetone or isopropyl alcohol. ***Do not use caustic acids or bases.*** Contact Cee® Customer Support with any questions or concerns.

6 Table of Revisions

Doc Rev #	Author	Description of Change(s)	Reviewed/Approved By	Date