

www.costeffectiveequipment.com

+1-573-466-4300

Operations Manual

Apogee® Mechanical Debonder




Cost Effective Equipment

1	INTRODUCTION.....	3
1.1	CONFIDENTIALITY STATEMENT	3
1.2	WARRANTY	3
1.3	RETURNED MATERIALS	3
1.4	MODEL AND REVISIONS	3
1.5	ENVIRONMENTAL CONSIDERATIONS	4
1.6	GENERAL SAFETY HAZARDS / PRECAUTIONS	4
1.7	ELECTRICAL	5
1.8	MECHANICAL.....	5
1.9	CHEMICAL.....	5
1.10	LOCKOUT/TAGOUT PROCEDURES AND INFORMATION.....	6
1.11	INTENDED USE OF MACHINE.....	6
2	EQUIPMENT DESCRIPTION	8
2.1	USER CONTROLS	8
2.2	DIMENSIONS	8
2.3	FEATURES & PROGRAMMABILITY.....	9
2.4	RELIABILITY AND THROUGHPUT	9
2.5	UTILITIES	10
3	INSTALLATION.....	11
3.1	CLEARANCE REQUIREMENTS	11
3.2	FACILITIES REQUIREMENTS	12
3.3	ENVIRONMENT	13
3.4	UNPACKAGING & INSPECTION.....	13
3.5	SYSTEM INSTALLATION & SETUP.....	13
3.6	START UP	13
4	DATASTREAM™ TECHNOLOGY	14
4.1	SYSTEM PARAMETERS	14
4.2	MANUAL CONTROLS – APOGEE® MECHANICAL DEBONDER.....	15
4.3	RUNNING RECIPES	19
4.4	EDITING RECIPES	20
4.5	TOOL SPECIFIC SETTINGS – APOGEE® MECHANICAL DEBONDER	21
5	MECHANICAL DEBONDER USE & OPERATION.....	22
5.1	PROCESS FLOW	22
6	TROUBLESHOOTING & DIAGNOSTICS.....	23
6.1	SYSTEM PERFORMANCE FAILURES.....	23
6.2	WAFER ALIGNMENT FAILURES	23
6.3	WAFER DEBONDING FAILURES	24
7	PREVENTATIVE MAINTENANCE	25
7.1	SERVICE AND REPAIRS	25
7.2	FAULT CONDITION	25
7.3	SAFETY CHECKS	25
7.4	MECHANICAL/UTILITIES CHECKLIST	26
7.5	CLEANING USER INTERFACE ASSEMBLY	26
7.6	CLEANING CHUCK.....	27
7.7	CLEAN CLAMP RING.....	28

1 **Introduction**

1.1 **Confidentiality Statement**

Information supplied is for 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’s 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:

Cost Effective Equipment, LLC 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 **Model and Revisions**

The model and serial number information for the Cee® Apogee® Mechanical Debonder are located on the rear panel. Software version information can be found on the *About* screen. Refer to the [*DataStream™ Manual*](#) for screen shots and a detailed explanation of the system software.

1.5 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® favorise la durabilité grâce à l'innovation dans la durabilité et la fiabilité de nos outils et équipements de précision. Les modules de composants individuels sont conçus pour une facilité d'entretien garantissant des performances durables. Les processus sont conçus pour minimiser l'utilisation et la consommation de composés chimiques, garantissant à chaque fois des résultats précis, reproductibles et à la pointe de l'industrie.
	Cee® diligently screens suppliers to ensure conflict-free sourcing of minerals and product components are constructed of recycled materials wherever possible.	Cee® sélectionne avec diligence les fournisseurs pour garantir que l'approvisionnement en minéraux est sans conflit et que les composants des produits sont fabriqués à partir de matériaux recyclés dans la mesure du possible.
	Cee® tools and equipment operate 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.	Les outils et équipements Cee® fonctionnent sans utilisation de substances appauvrissant la couche d'ozone (SACO), notamment les chlorofluorocarbures (CFC), le méthyle chloroforme, les hydrochlorofluorocarbures (HCFC), le tétrachlorure de carbone, les composés perfluorés (PFC) ou d'autres composés volatils/solvants organiques.

1.6 General Safety Hazards / Precautions

	Read this manual in its entirety before operating or servicing the machine.	Lisez ce manuel dans son intégralité avant d'utiliser ou d'entretenir la machine.
	The unit is very heavy and proper precautions should be taken when handling the machine to minimize the risk of injury. Labels are placed on the machine to identify areas where caution is needed during operation.	L'unité est très lourde et des précautions appropriées doivent être prises lors de la manipulation de la machine pour minimiser le risque de blessure. Des étiquettes sont placées sur la machine pour identifier les zones où des précautions sont nécessaires pendant le fonctionnement.
	Sound pressure measurements greater than 80dB(A) are considered hazardous. The following sound pressure measurements were obtained from the Cee® Mechanical Devonder at a distance of 3 ft (0.9 m) from the system: Stand-by Mode: 40dB(A) Normal Operations: 40dB(A)	Les mesures de pression acoustique supérieures à 80 dB(A) sont considérées comme dangereuses. Les mesures de pression acoustique suivantes ont été obtenues à partir de la Cee® Apogee® Mechanical Debonder à une distance de 3 pieds (0,9 m) du système: Mode veille: 40 dB(A) Fonctionnement normal: 40 dB(A)

1.7 Electrical

	High voltage is present in the machine. Disconnect power before servicing.	Une haute tension est présente dans la machine. Débranchez l'alimentation avant l'entretien.
	Stored electrical energy is present in the machine. Before servicing allow sufficient time for discharge.	L'énergie électrique stockée est présente dans la machine. Avant l'entretien, prévoyez suffisamment de temps pour la décharge.
	This unit must be connected to an outlet with proper grounding.	Cet appareil doit être connecté à une prise avec une mise à la terre appropriée.

1.8 Mechanical

	This machine may contain compressed gases which can provide motive force for components and can expand violently upon decompression. Disconnect N2 or CDA before removing any panels.	Cette machine peut contenir des gaz comprimés qui peuvent fournir une force motrice aux composants et peuvent se dilater violemment lors de la décompression. Débranchez le N2 ou le CDA avant de retirer les panneaux.
	Ensure that all panels are on and in their correct locations before powering up or operating.	Assurez-vous que tous les panneaux sont allumés et à leur emplacement correct avant la mise sous tension ou l'utilisation.
	When opening lids be aware of the pinch point at the hinge cover. Open lids only by using the handles on the lids.	Lorsque vous ouvrez les couvercles, faites attention au point de pincement au niveau du cache de la charnière. Ouvrez les couvercles uniquement en utilisant les poignées des couvercles.
	When operating lid, be aware of the risk of the lid falling and crushing/closing down on fingers/hands.	Lorsque vous utilisez le couvercle, soyez conscient du risque de chute et d'écrasement/fermeture du couvercle avec les doigts/mains.

1.9 Chemical

Cee® does not supply or dictate chemicals to be used in conjunction with the Cee® Apogee® Mechanical Debonder. 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

Cee® ne fournit ni n'impose aucun produit chimique à utiliser avec la Cee® Apogee® Mechanical Debonder. Les données matérielles seront examinées lors de la conception et de la configuration de l'équipement pour garantir la compatibilité avec le processus exclusif du client.

Avant d'introduire de nouveaux produits chimiques, reportez-vous aux spécifications d'usine et à la fiche signalétique de votre fournisseur de produits chimiques. Les fiches signalétiques (MSDS)

	details about hazardous components, physical properties, spill and leak procedures, waste disposal guidelines, and personal protective equipment requirements for handling.	contiennent des informations cruciales concernant la sécurité chimique, notamment des détails sur les composants dangereux, les propriétés physiques, les procédures en cas de déversement et de fuite, les directives d'élimination des déchets et les exigences en matière d'équipement de protection individuelle pour la manipulation.
	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.	Assurer la compatibilité chimique de tous les produits chimiques et matériaux utilisés à l'intérieur de la machine. Cela inclut toutes les parties mouillées des systèmes de stockage, d'alimentation, de distribution et de déchets.
	Potential for flammable Chemicals. No open flames/sparks.	Potentiel de produits chimiques inflammables. Pas de flammes nues/étincelles.
	Relieve pressure and shut off chemical valves before servicing supply lines, dispense valves or other components.	Relâchez la pression et fermez les vannes chimiques avant d'entretenir les conduites d'alimentation, les vannes de distribution ou d'autres composants.
	Ensure proper ventilation/exhaust is always used.	Assurez-vous qu'une ventilation/évacuation adéquate est toujours utilisée.
	Always wear appropriate Personal Protective Equipment. This includes safety glasses, gloves, and other equipment, as needed, to protect from mechanical and chemical hazards.	Portez toujours un équipement de protection individuelle approprié. Cela comprend des lunettes de sécurité, des gants et tout autre équipement, si nécessaire, pour se protéger des risques mécaniques et chimiques.
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 section Error! Reference source not found. of this manual.		La gestion des gaz d'échappement et des fumées est importante pour empêcher le rejet de matières dangereuses et garantir un environnement de travail sûr. Les utilisateurs doivent supposer que toutes les fumées sont dangereuses et prendre les précautions appropriées pour garantir que l'échappement du système est fonctionnel conformément aux directives décrites dans la section 6 de ce manuel.

1.10 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® Apogee® Mechanical Debonder. 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® Mechanical Debonder in accordance with applicable laws, regulations, and/or company policies.

For more information, please contact [Cee® Customer Support](#).

1.11 Intended Use of Machine

The Cee® Apogee® Mechanical Debonder is intended for use as a semiconductor/optical application machine.

The Cee® Apogee® Mechanical Debonder is not intended for use in food or medical applications or for use in hazardous locations.

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

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

The Cee® Apogee® Mechanical Debonder is not intended for use in a hazardous or explosive environment.

Normal Operating Conditions

The Cee® Apogee® Mechanical Debonder 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

Permissible Voltage Fluctuations 100-120/208-230VAC ±10%



If the Cee® Apogee® Mechanical Debonder 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.

Si la Cee® Apogee® Mechanical Debonder est utilisée d'une manière non spécifiée par Cee® ou avec des accessoires non fournis par Cee®, la protection fournie par l'équipement peut être altérée.

2 **Equipment Description**

Maximize versatility with the newest generation debonder for small-volume production and research & development applications. The Cee® Apogee™ Mechanical Debonder accommodates a broad variety of adhesive materials and thermal budgets to maximize versatility. User-friendly, and fully programmable, our track-quality system offers a low-footprint solution guaranteed to minimize stress on your device substrates and your bottom line.

2.1 **User Controls**

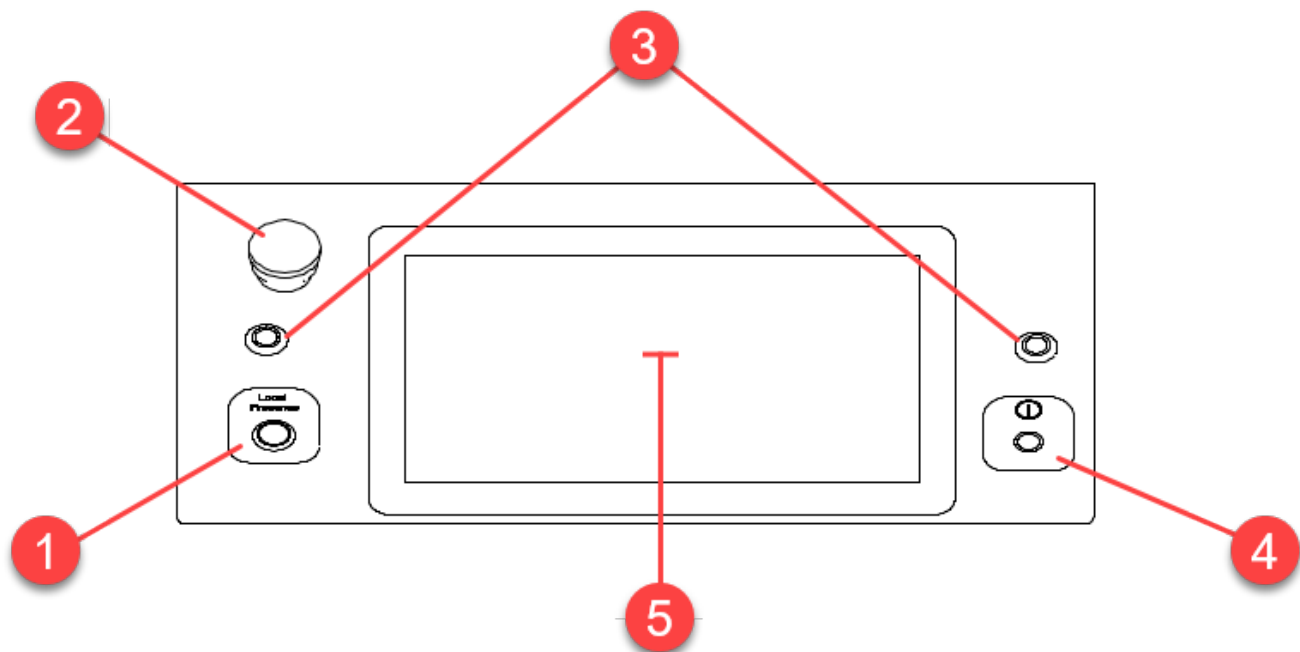


Figure 1 Apogee™ Mechanical Debonder User Controls

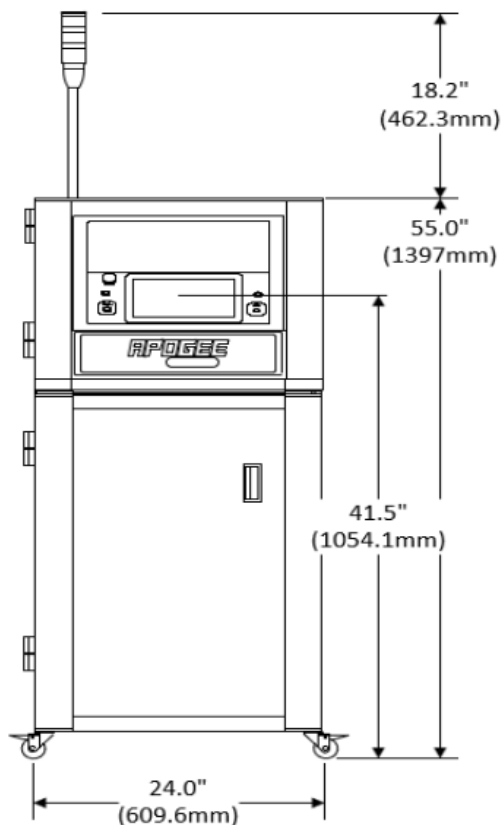
local presence button ¹	used for remote access
EMO ²	immediately shuts down all process functions
drawer close	hold both buttons simultaneously to close drawer
power button	used to turn the tool off and on
touch screen interface.....	facilitates GUI for interaction with DataStream™ Technology

2.2 **Dimensions**

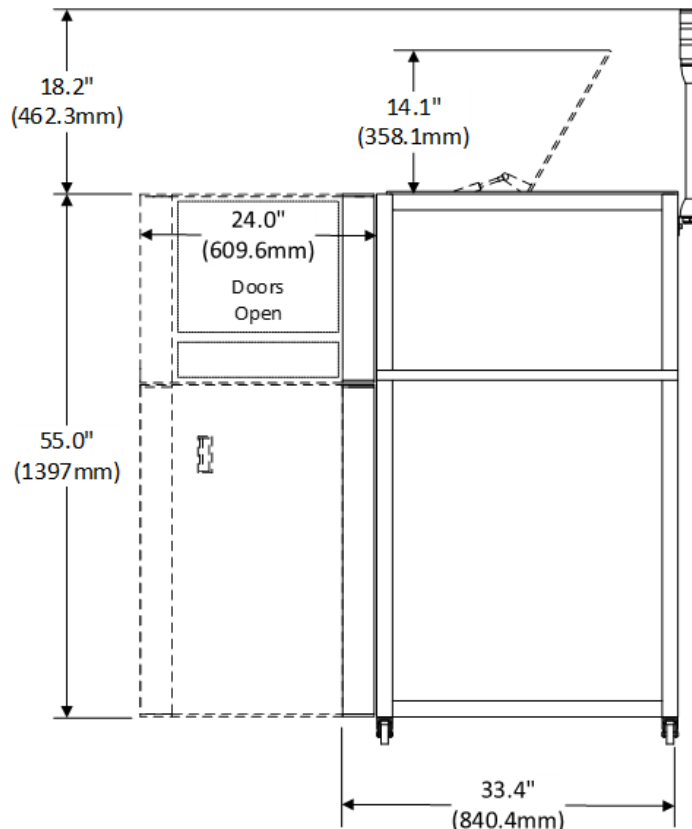
25" (635mm) W x 36" (916mm) D x 72.5" (1842mm) H
Machine Weight 337lbs (153kg)

¹ Refer to the [DataStream™ Manual](#) for more detailed information.

² Emergency Machine Off (EMO)



Front View with Dimensions



Side View with Dimensions

2.3 Features & Programmability

- full-color touchscreen graphical user interface (GUI)
- supports unlimited user-defined program steps for each recipe
- 0.1 second step time resolution (9,999.9 seconds maximum step time)
- view process status and/or download for offline analysis
- process traceability for every wafer
- graphical process charts and logs for force and cycle time
- upload/download process parameters with DataStream™ technology
- low stress to device wafer
- excess force sensing: failsafe error recovery

2.4 Reliability and Throughput

force range.....0-100N (1-22lbs)

total throughput.....up to 20 wph

yield> 98%

substrate sizes50mm to 300mm (round)

operating temperature.....room temperature

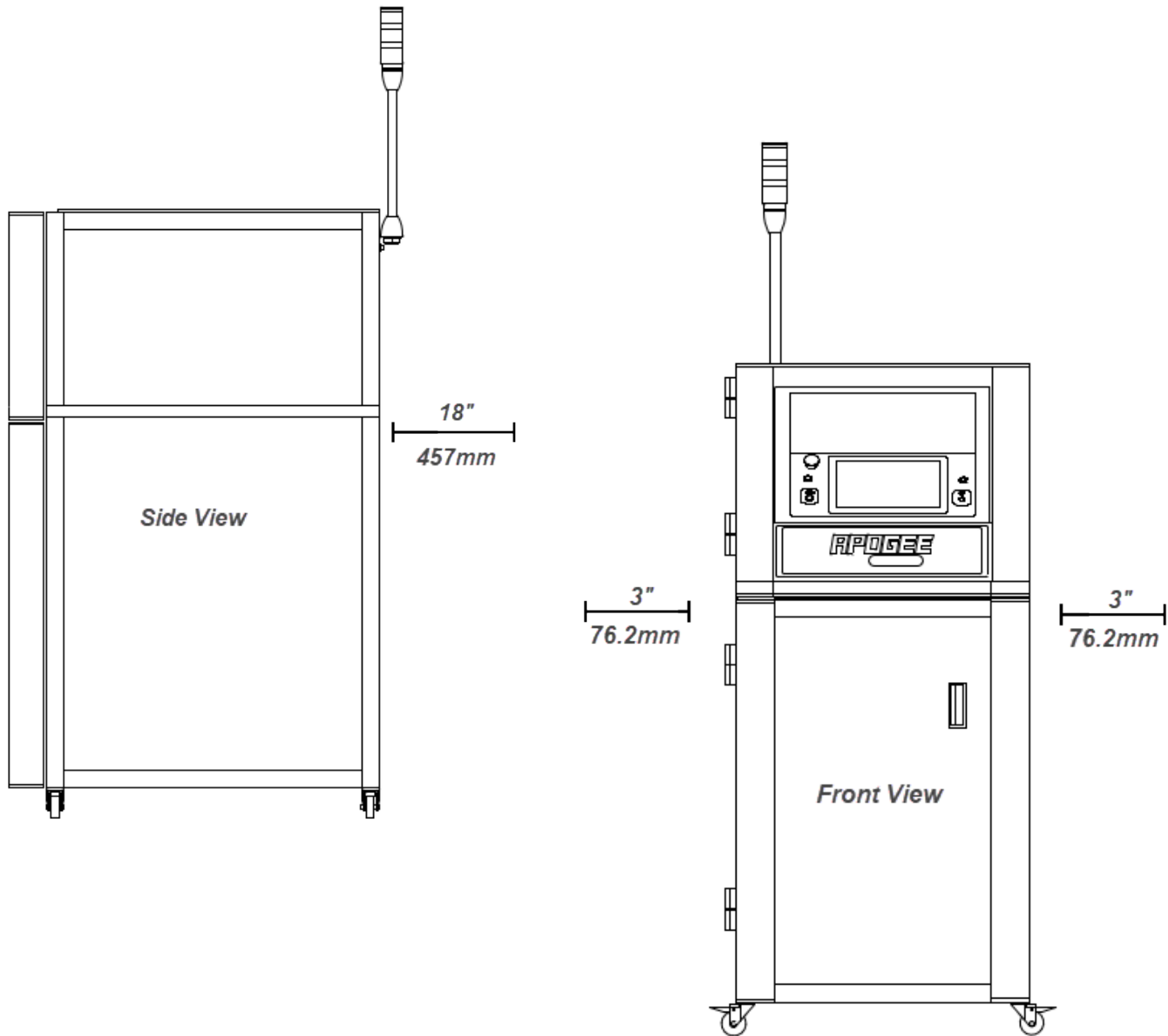
2.5 Utilities

voltage ranges	110-125, 208-240 VAC 50/60 hz
power requirements	950 Watts
fuse protector	MDA-10-R, Slow-Blow 250V, 10A (<i>qty 2</i>)
vacuum	<33kPa (20inHg), 20 liters/min (.7cfm)
nitrogen/CDA (automated dispense)	70 psi (483 kPa)

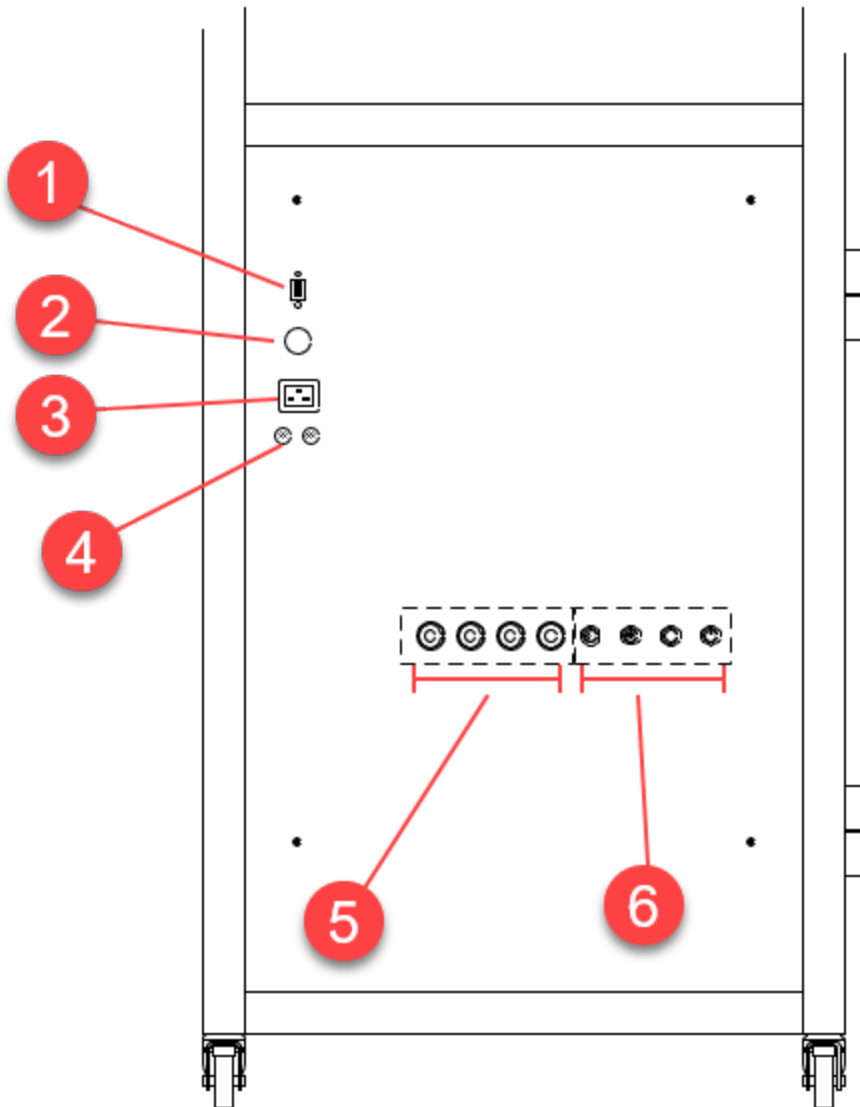
3 Installation

3.1 Clearance Requirements

The Cee® Apogee™ Mechanical Debonder is a floor-standing unit requiring a sturdy and level floor for location. The recommended freestanding space requirements are: 18" (457mm) back to front and 3" (76.2mm) side to side.



3.2 Facilities Requirements



1. USB Port³.....facilitates data transfer
2. ethernet.....facilitates remote recipe writing & remote device control
3. electrical power inlet.....20A | region specific | power cord supplied
4. fusessystem protection fuses
5. vacuum/N2 (CDA)⁴.....1/4" NPT system vacuum attachment for vacuum chuck
6. accessory connections⁵.....enables communication with optional accessories

³ see DataStream™ Manual for more information

⁴ Tools through July 2022 include 1/4" barb connect as standard/ post-July 2022 tools are supplied with a 1/4" push connect fitting as standard. Connection fittings may vary based on customer request.

⁵ M12 circular metric connectors facilitates external comm

3.3 Environment

The Cee® Apogee™ Mechanical Debonder should be operated in a clean, climate-controlled environment.

3.4 Unpackaging & Inspection

1. Lifting from the bottom of the unit, carefully remove from the packing crate. Do not lift by any of the top covers or protrusions. Do not roll or turn the unit on its sides.
2. Remove packing foam and plastic wrap.
3. Place the Cee® Apogee™ Mechanical Debonder on a level floor of sufficient strength so that the controls are at the proper ergonomic height.
4. Thoroughly check machine for shipping damage. If physical damage is seen, **DO NOT APPLY POWER!** Contact [Cee® Customer Support](#) immediately.

3.5 System Installation & Setup

5. Thoroughly clean the chuck, clamp ring, and exterior of the Cee® Apogee™ Mechanical Debonder. See section 7.6 and section 0. for more information regarding proper cleaning procedures.
6. Connect utilities per the reference diagram.
 - connect the vacuum supply to the vacuum fitting
 - connect accessories to the accessory ports as needed
 - connect nitrogen/CDA to the N₂ fitting
 - connect system power inlet, plug in the machine

3.6 Start Up

1. Turn the machine on by pressing the lighted power switch. The display will cycle through a series of boot screens before arriving at the main login screen.
2. Enter the default administrative login credentials:

Username: admin

Password: admin2

**Your Cee® Customer Support representative will conduct initial system checks and calibration procedures following installation.*

4 DataStream™ Technology

This section covers information specific to Apogee® Bonders 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	Status
Position	Moving	Process	In Range
Peel Force	0.0 N	25.0 N	In Range
Carrier Size			In Range
Film Frame Size			In Range
Ambient Temperature	22.2 °C		In Range
Humidity	33.7 %		In Range
Chuck Vac	96.1 kPa		In Range

Position -----	displays the position of the drawer and the clamp ring assembly
Peel Force -----	the current peel force on the carrier wafer displayed against the target set point in Newton's force
Carrier Size -----	the intended carrier wafer diameter in mm that the clamp ring is designed for
Film Frame Size -----	the intended film frame diameter in millimeters that the vacuum chuck is designed for
Ambient Temperature -----	the air temperature of the environment where the equipment is housed
Humidity ⁶ -----	the ambient relative humidity in the environment where the equipment is housed
Chuck Vac -----	measurement of the vacuum pressure holding the film frame against the chuck in kPa

⁶ Both Ambient Temperature and Humidity are measured via a custom sensor board mounted next to a ventilation inlet inside the tool. If sensor is disconnected, default of -1.1 is displayed.

4.2 Manual Controls – Apogee® Mechanical Debonder

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.

Debonder Process Recipes About Tools - a

System Values

Parameter	Actual	Set Point
Position	Moving	Process
Peel Force	0.0 N	25.0 N
Carrier Size		
Film Frame Size		
Ambient Temperature	19.3 °C	
Humidity	37.6 %	
Chuck Vac	96.0 kPa	

System Controls

Control

What do you want to control? ▾

What do you want to control?

Peel Mechanism

Position

Chuck Vac

Gripper

Please check change.

APPLY

Peel Mechanism

System Values		
Parameter	Actual	Set Point
Position	Moving	Process
Peel Force	0.0 N	25.0 N
Carrier Size		
Film Frame Size		
Ambient Temperature	20.9 °C	
Humidity	36.5 %	
Chuck Vac	96.2 kPa	

System Controls	
Control	Peel Mechanism
Action	Peel
Force	50 N
Separate wafers at 50 N	
APPLY	

Select a Control of *Peel Mechanism* and the Action will default to *Peel*.

Enter a value in the Force field.

Click APPLY

The clamp ring will close and the peeler will start applying force at 15N and increasing by 1N until it reaches the max force entered into the field.

Position

System Values		
Parameter	Actual	Set Point
Position	Moving	Process
Peel Force	0.0 N	25.0 N
Carrier Size		
Film Frame Size		
Ambient Temperature	21.1 °C	
Humidity	35.7 %	
Chuck Vac	96.2 kPa	

System Controls	
Control	Position
Action	Move To
Value	Process
Move to position Process	
APPLY	

Select a Control of *Position* and the Action will default to *Move To*.

Select an option from the Value dropdown menu.

Load Stack: clamp will raise, drawer will open, and centering ring move back

Centering: clamp will raise, drawer will open, and centering ring move forward, and prompt will appear to test chuck vacuum

Process: centering ring move back, and drawer will close, clamp will lower

Unload Carrier: clamp will raise, centering ring move forward, and drawer will open

Unload Device: clamp will raise, drawer will open, and centering ring move back

Click APPLY

Chuck Vac

System Values		
Parameter	Actual	Set Point
Position	Moving	Process
Peel Force	0.0 N	25.0 N
Carrier Size		
Film Frame Size		
Ambient Temperature	21.0 °C	
Humidity	35.8 %	
Chuck Vac	96.1 kPa	

System Controls	
Control	Chuck Vac
Action	Set
Vacuum	On
Chuck Vac	
APPLY	

Select a Control of *Chuck Vac* and the Action will default to *Set*.

Select an option from the Vacuum dropdown menu to turn chuck vacuum off or on.

Click APPLY

Gripper

System Values		
Parameter	Actual	Set Point
Position	Moving	Process
Peel Force	0.0 N	25.0 N
Carrier Size		
Film Frame Size		
Ambient Temperature	21.0 °C	
Humidity	35.1 %	
Chuck Vac	96.2 kPa	

System Controls	
Control	Gripper
Action	Set
Grip	Open
Open or close the clamp ring	
APPLY	

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

Select an option from the Grip dropdown menu to open or close the clamp ring.

Click APPLY

System Values

Parameter	Actual	Set Point
Position	Moving	Process
Peel Force	0.0 N	25.0 N
Carrier Size		
Film Frame Size		
Ambient Temperature	20.9 °C	
Humidity	35.9 %	
Chuck Vac	96.2 kPa	

System Controls

Control

Action

Up

Raise or lower the clamp ring

APPLY

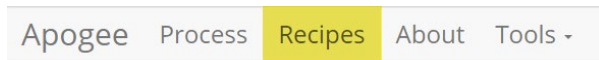
Select a Control of *Gripper* and set the Action to *Position*.

Select an option from the Grip dropdown menu to move the clamp ring up or down.

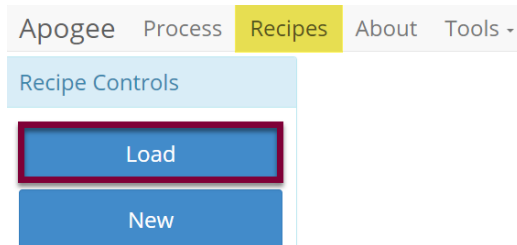
Click APPLY

4.3 Running Recipes

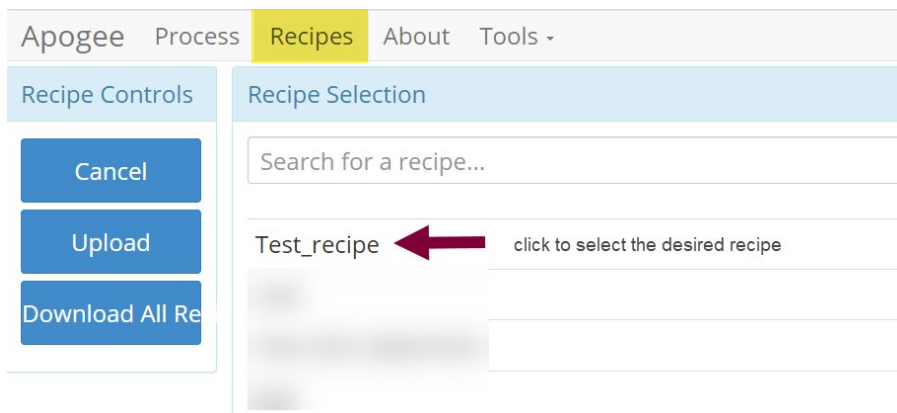
1. Navigate to the *Recipes* page.



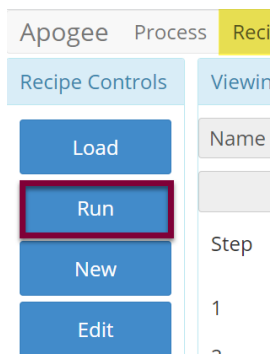
2. Click **Load** to access the recipes list.



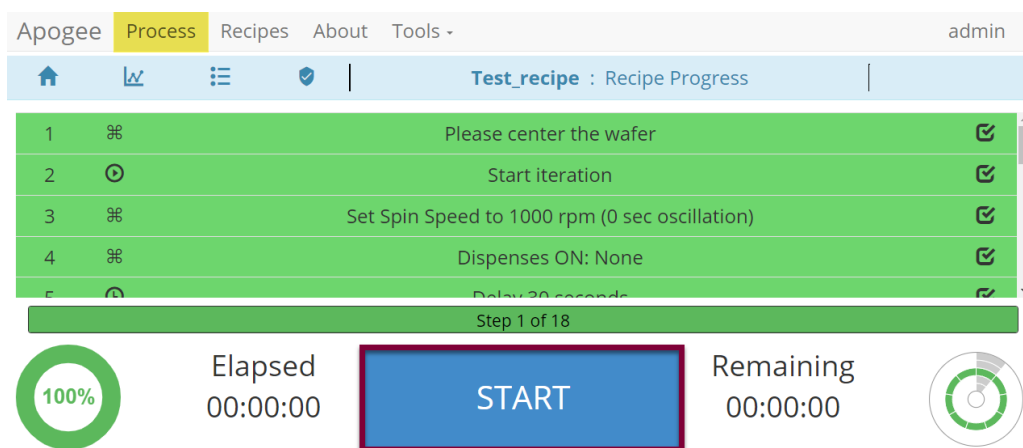
3. Search for, identify, & select the preferred recipe.



4. Click **Run**.



- Click **Start** to initiate the recipe process.



- Recipe execution.



*Users may be required to follow prompts on the screen during recipe execution.

4.4 Editing Recipes

Spin coater recipes may enlist an unlimited number of steps, each capable of defining spin speed, acceleration, spin time, percent exhaust opening, and dispense triggers. Users can easily insert new steps, reorder existing steps, and/or delete a selected step via the *Step Context Menu*.

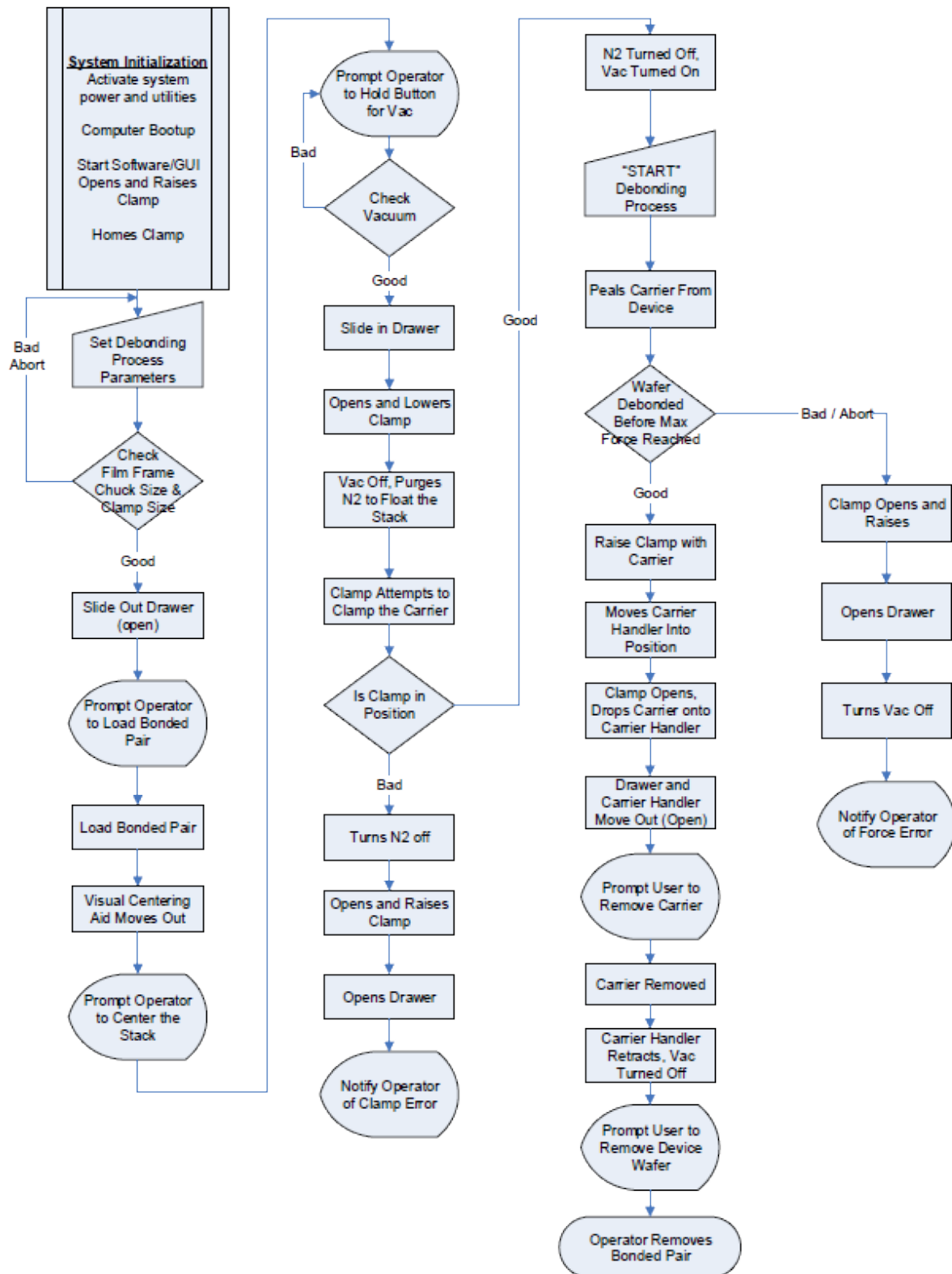
Name----- recorded in log files and used as criteria when searching for recipes
Force----- max force used to separate the wafers
Film Frame Size----- the size of the film frame
Carrier Size----- the diameter of the carrier wafer

4.5 Tool Specific Settings – Apogee® Mechanical Debonder

Wafer Sensor Enabled----- enables or disables wafer detection sensor, if installed

5 Mechanical Debonder Use & Operation

5.1 Process Flow



6 Troubleshooting & Diagnostics

6.1 System Performance Failures

Failure Mode	Recommendation
Drawer Will Not Open/Close	• Ensure sufficient air pressure supplied to tool • Check for physical obstruction to drawer motion • Check for pinched airline or possible air leak
Centering Mechanism Will Not Move Out/In	• Ensure sufficient air pressure supplied to tool • Check for physical obstruction to centering mechanism motion • Check for pinched airline or possible air leak
Clamping Mechanism Will Not Raise	• Ensure sufficient air pressure supplied to tool • Check for physical obstruction to centering mechanism motion • Check for pinched airline or possible air leak
Tool is Unresponsive	• Check Emergency Stop switch is not depressed • Check electrical (utility) supply to tool • Check fuses
Chuck Vacuum Cannot be achieved	• Check vacuum (utility) supply to tool • Check for pinched airline or possible vacuum leak • Check for damaged o-ring on chuck • Check flatness of film frame tape

6.2 Wafer Alignment Failures

Failure Mode	Recommendation
Wafer Slips Out of Clamping Mechanism	• Check wafer centering correctly on the chuck • Check wafer centering on film frame
Clamping Mechanism Does Not Clamp Wafer -Moves Past Wafer Edge	• Check to ensure that alignment hardware is of the correct size and is installed in the correct location • Ensure sufficient air pressure supplied to chuck • Check for pinched airline or possible air leak • Check stroke limiter positions on vertical cylinders
Clamping Mechanism Does Not Clamp Wafer -Does Not Move	• check to ensure alignment hardware is of the correct size and is installed in the correct location • Check electrical connection to gripper • Reboot tool to home gripper • Check wafer specs against clamping ring specs

6.3 Wafer Debonding Failures

Failure Mode	Recommendation
Broken Wafer - Debonding	• Ensure chuck is clean and free of foreign material • Ensure wafer is free from damage prior to debonding • Ensure tape is fully exposed so there is no interference
Wafers are Not Debonded	• Ensure wafers are not loaded upside down • Ensure wafers are centered on the chuck • Ensure that the wafer stack is fully adhered to the tape • Check peel motor connector

7 Preventative Maintenance

This maintenance section provides personnel with procedures and guidelines for maintaining a Cee® Apogee™ Mechanical Debonder. Below is a chart of recommend maintenance scheduling.

7.1 Service and Repairs

	In order to maintain safety and performance standards, only authorized representatives of Cee® are permitted to conduct repairs or alterations on Cee® equipment.	Afin de maintenir les normes de sécurité et de performance, seuls les représentants autorisés de Cee® sont autorisés à effectuer des réparations ou des modifications sur les équipements Cee®.
	When servicing the machine, use only replacement parts made or recommended by Cee®.	Lors de l'entretien de la machine, utilisez uniquement des pièces de rechange fabriquées ou recommandées par Cee®.
	Use only Cee® supplied shielded cables with this machine.	Utilisez uniquement les câbles blindés fournis par Cee® avec cette machine.
	Unauthorized repairs may lead to serious risks such as equipment malfunction, damage, personal injury, or even death.	Les réparations non autorisées peuvent entraîner des risques graves tels qu'un dysfonctionnement de l'équipement, des dommages, des blessures corporelles ou même la mort.

7.2 Fault Condition

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

7.3 Safety Checks

Inspect the Apogee™ Mechanical Debonder for the following defects each day prior to use:

- Loose assemblies
- Improper closure

7.4 Mechanical/Utilities Checklist

<u>Evaluate</u>	<u>Frequency</u>	<u>Detail</u>
Pressure Range	Daily	Check all pressures for ranges specified in tool manual.
EMO Function	Quarterly	Periodically check the Emergency Stop function to ensure proper operation. With machine powered up and running, press the Emergency Stop button on the user interface console. Machine should shut down. If the machine does not shut down, employ lock out tag procedures, and contact Cee Customer Support for assistance.
Vacuum	Quarterly	If low vacuum is present, check system supply. If supply is in spec and problems persist, contact Cee Customer Support for more information.
Connections	Bi-Annually	Inspect all connections for proper installation.
Power	Bi-Annually	Verify that AC power is connected and of the proper voltage.

7.5 Cleaning User Interface Assembly

Recommendation:

Promptly clean up any spills on the touch-screen surface.

Procedure:

Using a clean, absorbent material wipe any spills from the user interface touch screen surface. Do not apply solvents of any kind to the touch screen.



Observe Lockout / Tagout Procedures



Wear safety glasses



Do Not Eat or Drink While Performing this Procedure



Wear Protective Gloves

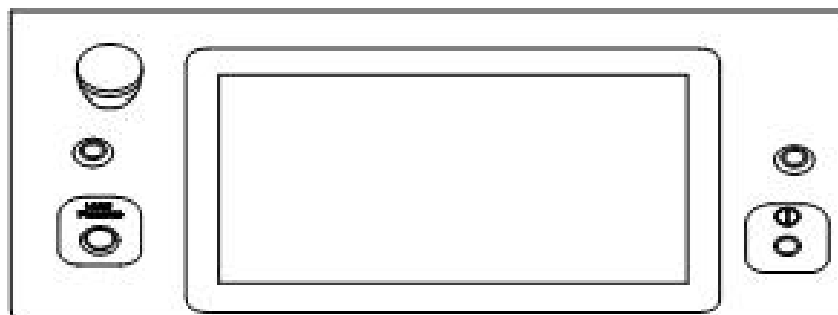


Figure 2 Apogee™ Mechanical Debonder User Interface Assembly

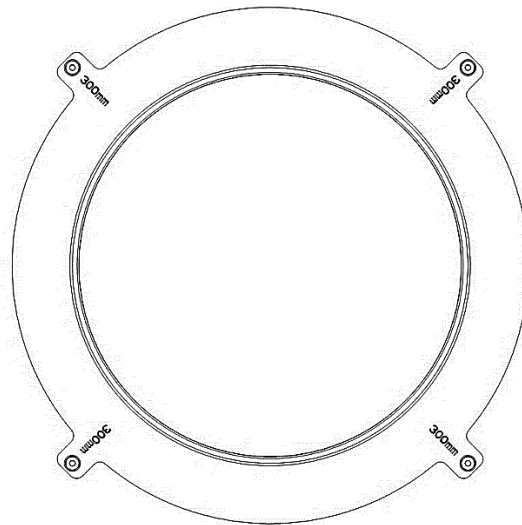
7.6 Cleaning Chuck

Recommendation:

The ceramic chuck of the Apogee Mechanical Debonder will need to be cleaned daily. Any foreign material on the chuck can cause wafer breakage.

Procedure:

Clean the chuck daily and after use. Apply IPA or Acetone to a clean, absorbent material. Wipe any foreign material from the chuck surface and o-ring. Do not apply solvents directly to the chuck.



7.7 Clean Clamp Ring

Recommendation:

Clean the clamping ring as required to ensure continued performance of the clamping ring and successful debonding of your substrates.

Procedure:

Power the Apogee™ Mechanical Debonder down. Open the door and remove the clamping mechanism. Turn the assembly upside down to clean. Apply IPA or Acetone to a clean, absorbent material. Wipe any foreign material from the groove of the clamp ring. **CAUTION**, edge of the ring and can be sharp. Do not apply solvents directly to the clamp mechanism. Check to ensure that the clamp ring grooves are free from fouling or other foreign objects (i.e. broken wafer shards). Foreign materials in the grooves can interfere with the operation of the wafer alignment/centering system and may have an adverse impact on your debonded wafers.

