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+1-573-466-4300

Operations Manual

Apogee™ Mechanical Debonder



Cee
Cost Effective Equipment

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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

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

1.6 General Safety Hazards/Precautions



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

1.7 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.

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.



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



When operating drawer be aware of the pinch point at the front face of the machine.



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

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® 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](#).

1.10 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 the 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

Ambient Temperature10 °C - 30 °C

Relative Humidity.....≤80%

Altitude.....up to 3000 m

Pollution Degree2

Overvoltage Category.....II



If the Cee® Mechanical Debonder is used in a manner not specified by Cee® the protection provided by the equipment may be impaired.

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

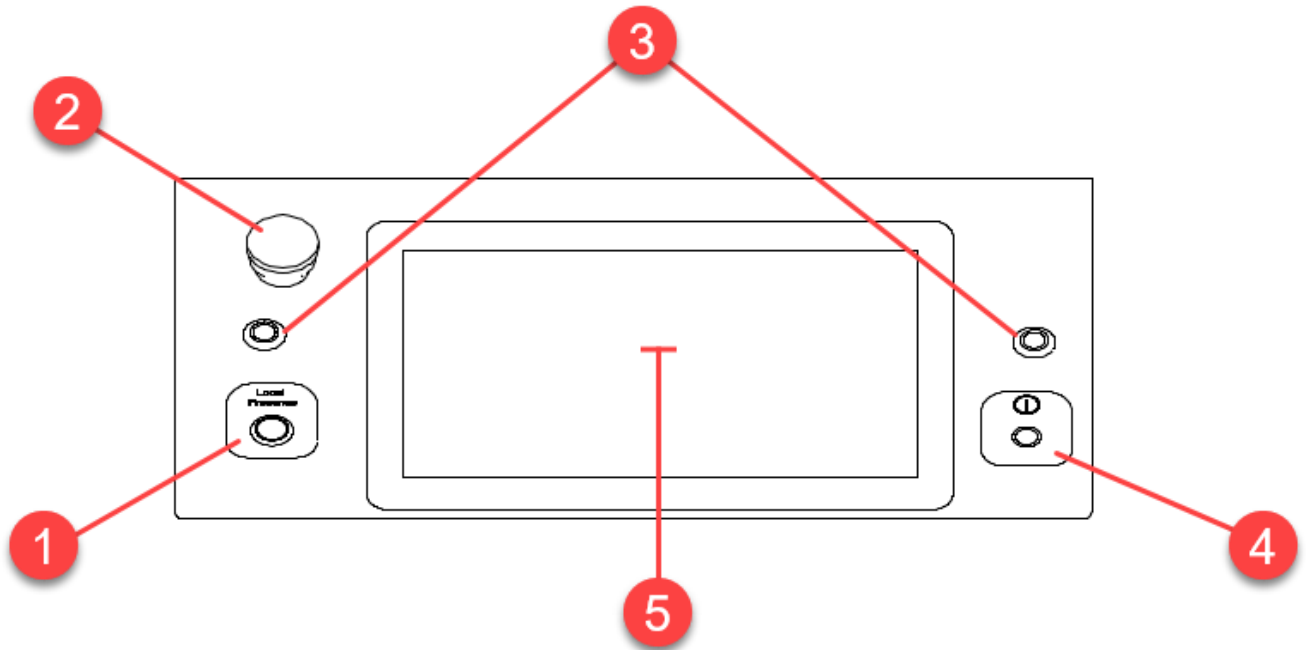


Figure 1 Apogee™ Mechanical Debonder User Controls

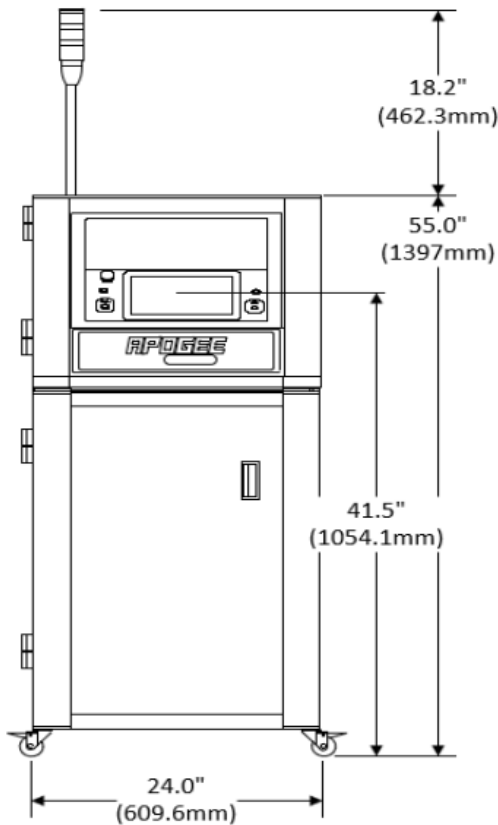
local presence button ¹	used for remote access
EMO ²	immediately shuts down all process functions
drawer close	hold both buttons simultaneously to close drawer
power button	used to turn the tool off and on
touch screen interface.....	facilitates GUI for interaction with DataStream™ Technology

2.2 Dimensions

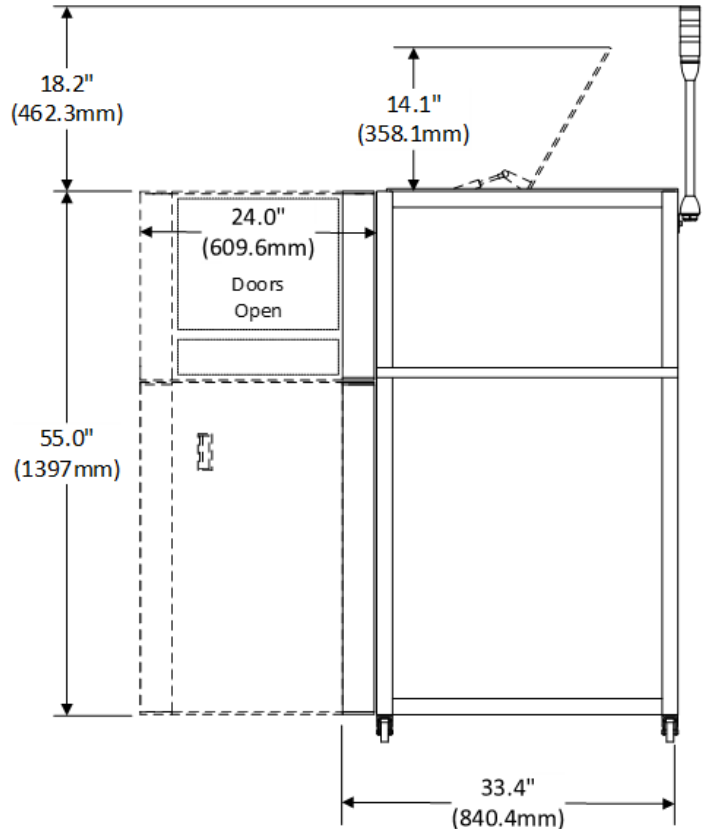
25" (635mm) W x 36" (916mm) D x 72.5" (1842mm) H
Machine Weight 337lbs (153kg)

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 sizes	50mm to 300mm (round)
operating temperature.....	room temperature

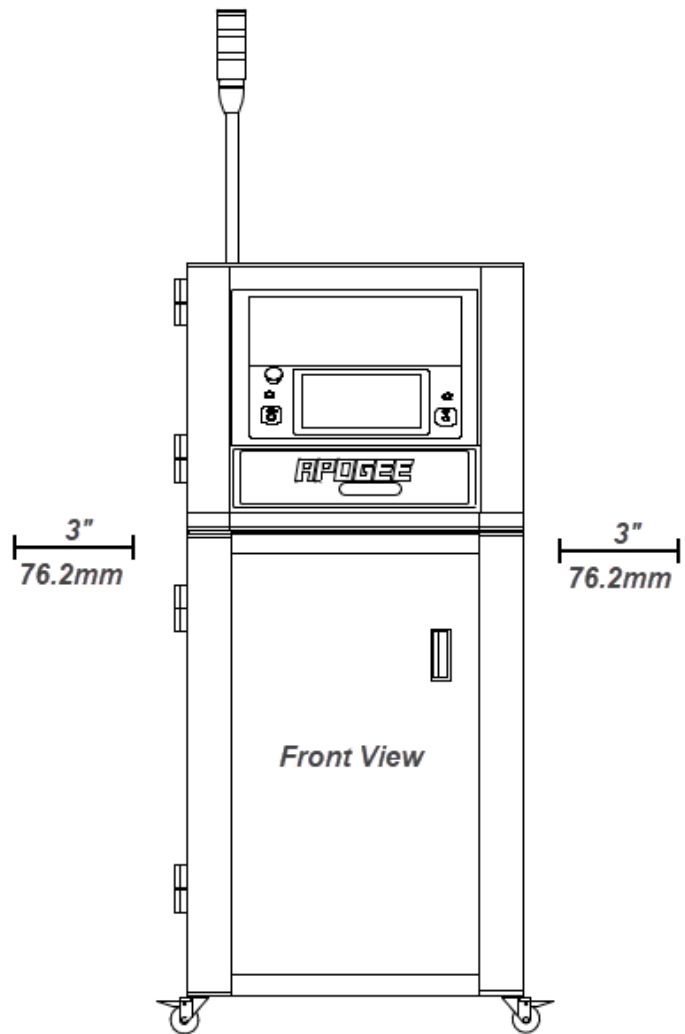
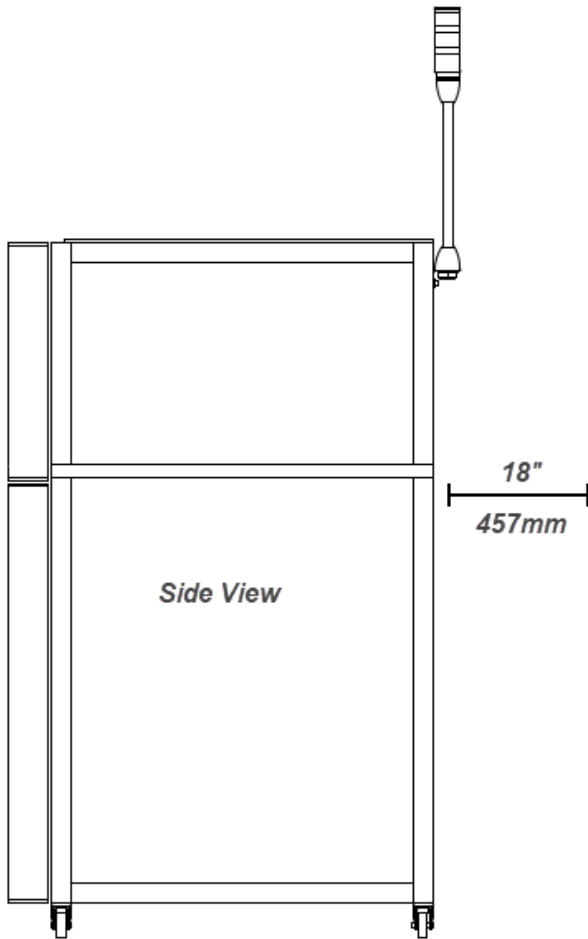
2.5 Utilities

voltage ranges	110-125, 208-240 VAC 50/60 hz
power requirements	950 Watts
fuse protector	MDA-20-R, Slow-Blow 250V, 20A (<i>qty 2</i>)
vacuum	<20kPa (20inHg), 20 liters/min (.7cfm)
nitrogen/CDA (automated dispense)	70 psi (482 kPa)

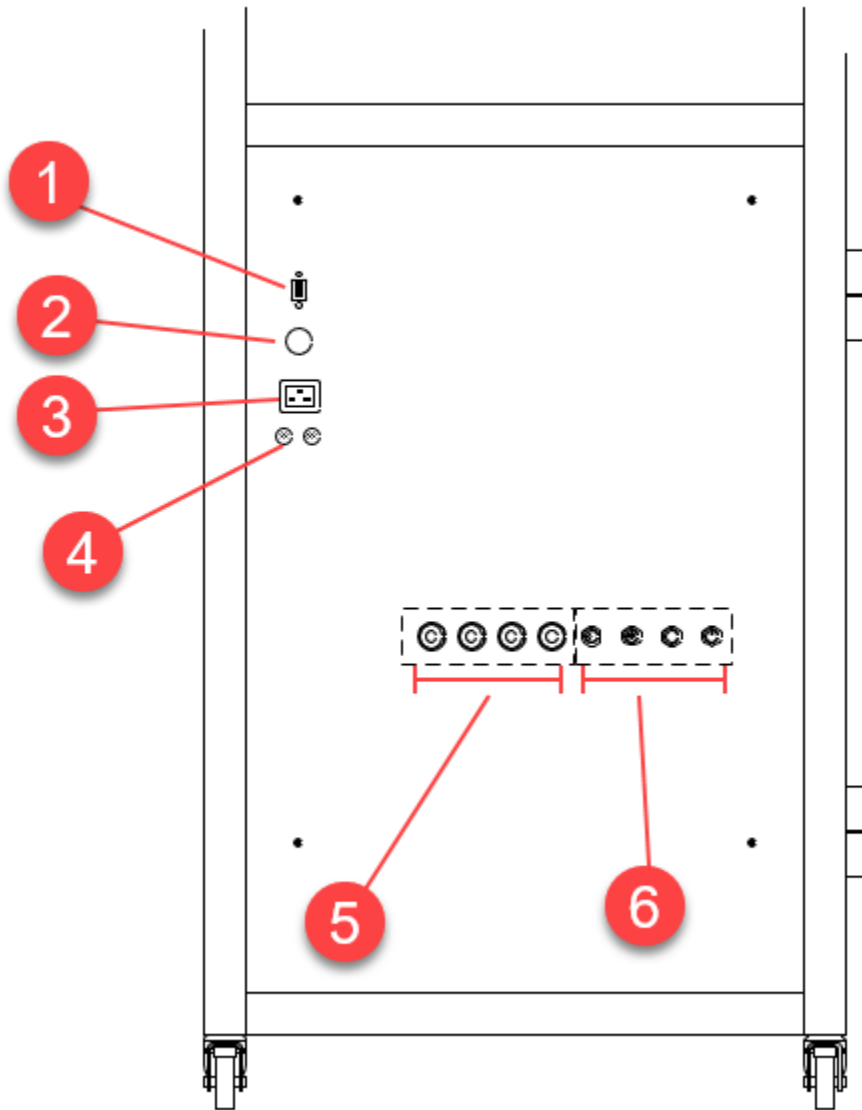
3 Installation

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



- USB Port³..... facilitates data transfer
- ethernet..... facilitates remote recipe writing & remote device control
- electrical power inlet 20A | region specific | power cord supplied
- fuses system protection fuses
- vacuum/N2 (CDA)⁴..... 1/4" NPT system vacuum attachment for vacuum chuck
- 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 facilities 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

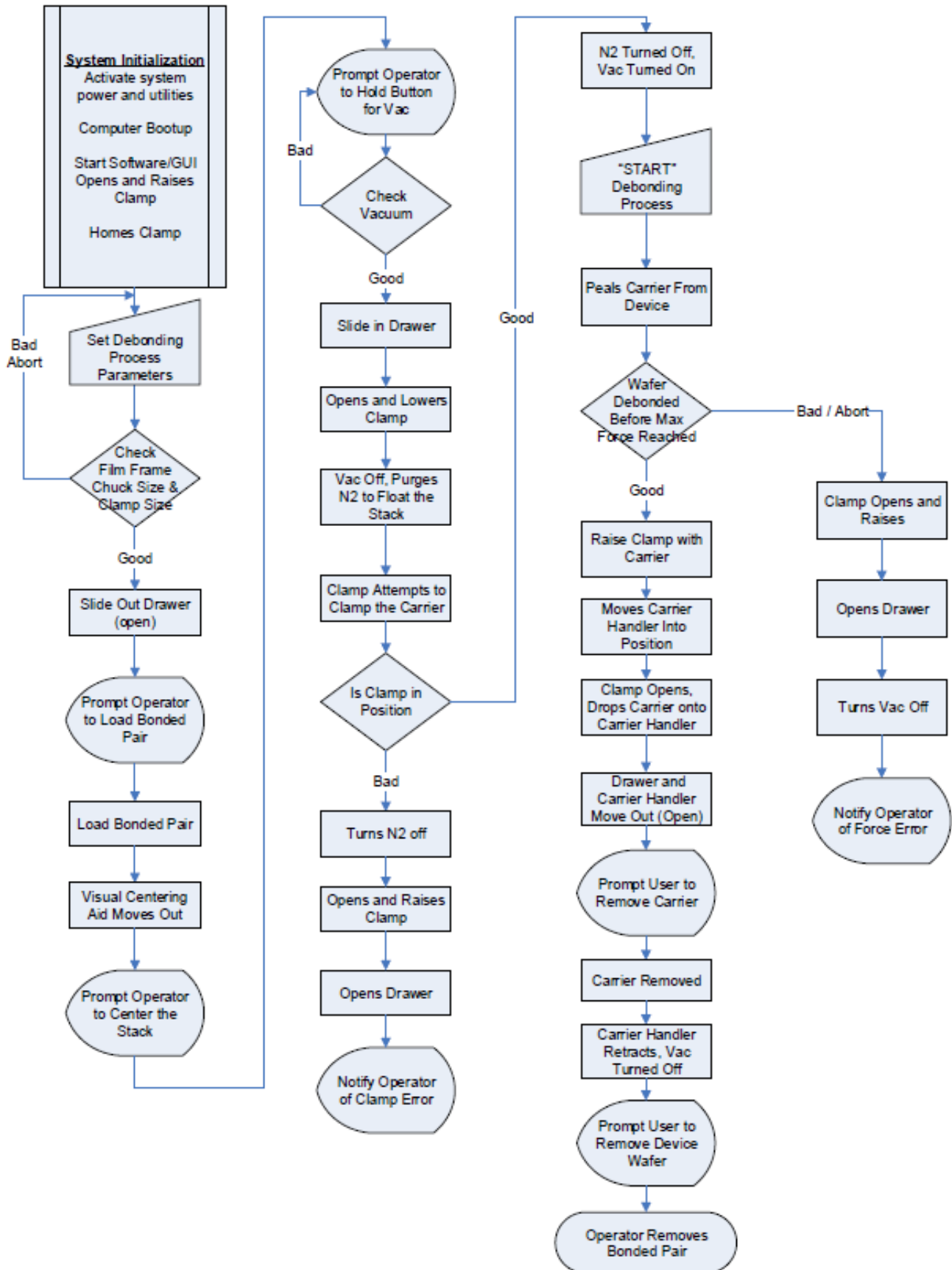
5. Thoroughly clean the chuck, clamp ring, and exterior of the Cee® Apogee™ Mechanical Debonder. See section **Error! Reference source not found.** on **Error! Reference source not found.** for more information regarding proper cleaning procedures.
6. Connect utilities per the reference diagram in **Error! Reference source not found.**
 - 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 Debonder Operation Flowchart



5 Troubleshooting & Diagnostics

5.1 System Performance Failures

Failure Mode	Recommendation
Drawer Will Not Open/Close	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Check Emergency Stop switch is not depressed • Check electrical (utility) supply to tool • Check fuses
Chuck Vacuum Cannot be achieved	<ul style="list-style-type: none"> • 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

5.2 Wafer Alignment Failures

Failure Mode	Recommendation
Wafer Slips Out of Clamping Mechanism	<ul style="list-style-type: none"> • Check wafer centering correctly on the chuck • Check wafer centering on film frame
Clamping Mechanism Does Not Clamp Wafer -Moves Past Wafer Edge	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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

5.3 Wafer Bonding Failures

Failure Mode	Recommendation
Broken Wafer - Debonding	<ul style="list-style-type: none">• 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	<ul style="list-style-type: none">• 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

6 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.

6.1 Safety Checks

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

- Loose assemblies
- Improper closure

6.2 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.

6.3 Cleaning



Observe Lockout / Tagout Procedures



Wear safety glasses



Do Not Eat or Drink While Performing this Procedure



Wear Protective Gloves

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.



Figure 2 Apogee™ Mechanical Debonder User Interface Assembly

Clean 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.

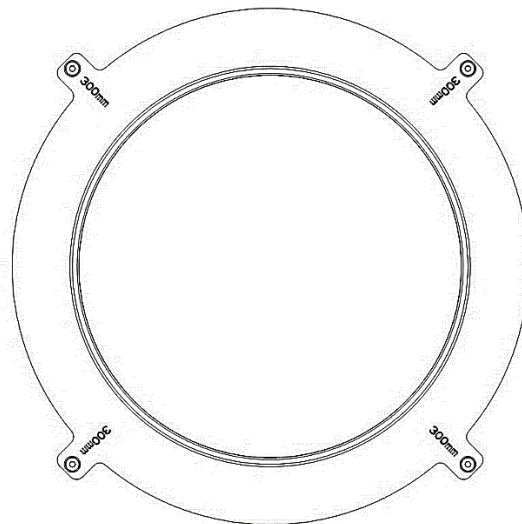


Figure 3 Apogee™ Mechanical Debonder Chuck Assembly

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.

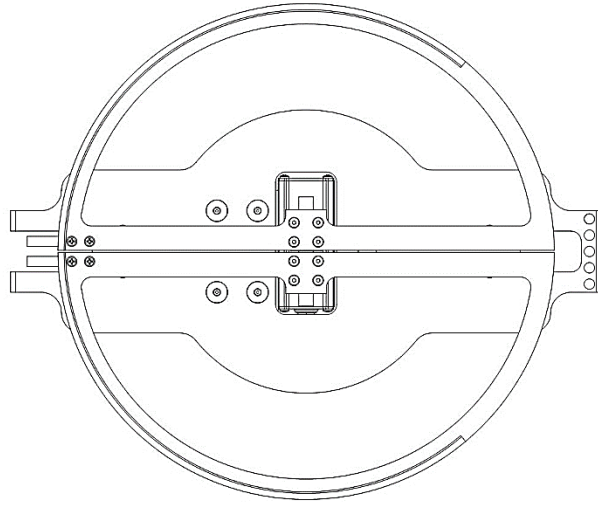


Figure 4 Apogee™ Mechanical Debonder Clamping Mechanism