# WAFER EFEM

High Cleanliness

High Compatibility

High Capacity

- Wafer thickness support: 100 - 1500μm
- Workstations 2 to 8 are optional
- Supports the transportation of wafers of various sizes
- Various feeding methods are available
- Interface with multiple process equipment
- SECS/GEM
- Light curtain
- OCR (top or bottom)
- N2 purge LP

## Specification parameter

- Fortrend equipment front - end modules are mainly designed to meet customized process requirements and are compatible with wafers ranging from 3" to 12".
- The internal cleanliness of the equipment can reach ISO Class 1, and it can adapt to wafers of different sizes and types, featuring high cleanliness, high compatibility, and other characteristics;
- It is compatible with all SEMI-standard FOUP, FOSB, SMIF POD, and Cassette.

| Specification parameter | |
|---|---|
| Rated Voltage | Phase AC 220V 50/60 Hz |
| Rated Power | 3.52kW(Decide by config) |
| Comm Interface | RJ45 |
| Comm Protocol | ASCI/HEX/HSMS&SECS 1I |
| Software | Fortrend independently developed software |
| Cleanliness | ISO 14644-1 class 1 / ISO class 3 |
| Uptime | ⩾99% |
| MTBF | ⩾4000 hours |
| MTTR | ⩽2 hours |
| MTBA | >100 hours |
| MTTA | <10 hours |
| MCBF | 100,000Wafers |
| Wafer Breakage Rate | ⩽1/1,000,000 |
| OCR Accuracy Rate for Bare Wafers | ⩾99.8% |
| Repeatability of Positioning Accuracy | ±0.1mm |

# EFEM Standardized(Product Series)

EFEM-2 Loadport

1605mm (L) ×1237mm(W)×1886mm (H)

EFEM-3 Loadport

2155mm (L) ×1237mm(W)×1886mm (H)

EFEM-4 Loadport

2600mm (L) ×1237mm(W)×1886mm (H)

## Independently Developed Core Module

Wafer/Frame Loadport

150/200mm Loadport

Open Cassette Stage

Wafer transfer Robot

Vacuum Pre-Aligner

Edge-grip type Aligner

Independently Developed Software



Optical Character Recognition (OCR)

Reversing Mechanism

Reversing Mechanism

Marble Platform

Centralized Stage

## EFEM Customized(Interface with Measurement Process)

High Precision　High Cleanness　High Stability

Wafer Aligner

Humid Robot



Drying Unit

- EFEM for interfacing with metrology process equipment typically come equipped with high-precision edge finders and code readers. They are widely used in devices such as metrology, AOI , and CD-SEM . In the context of interfacing with immersion metrology processes, they can be configured with air knives, humid robot, and drying modules to perform functions such as wafer air drying and cooling, as well as surface cleaning.

### Case Presentation

## EFEM Customized(Interface with Ion Implantation Process)

High Cleanliness　Modular design　High stability

Dual Robot Layout Diagram

FOUP Handling Robot

FOUP Buffer Station

- The ion implantation process equipment EFEM can be equipped with wafer box storage functions, and can be interfaced with overhead cranes or manual loading. It is configured with FOUP storage positions and FOUP Robots. Typically, it features dual Robots for wafer transfer to increase production capacity. It can also be configured with a 1+5 Robot setup, supporting the simultaneous pick-up and placement of five wafers.

### Case Presentation

# EFEM Customized(Epitaxial)

High Integration

Modular Performance

High Stability

Merge and Split Module

Grinding Stone Cassette

Cleaning Module

- The front-end automation module for epitaxy processes includes a graphite plate/ring merging and splitting module, a grinding plate Cassette, a cleaning module, a wafer flying detection module, and a grinding plate edge-finding module, interfacing with the vacuum transfer chamber (VTM).

## Case Presentation

# EFEM Customized(Interface with PVD / CVD / ETCH)

High Cleanliness

Modular Design

High Efficiency

Wafer Buffer Module。

Single-Arm Dual-Fork Robot

EFEM+VTM

- The front-end automation module for PVD/CVD/ETCH processes is typically equipped with a high-speed single-arm dual-fork robot to enhance productivity. It also includes a wafer buffer mechanism and can be integrated with a vacuum transfer module (VTM).

## Case Presentation

## EFEM Customized(Interface with Lithography Process)

- Compatible with the low material input port of the lithography machine
- Dual Robots
- Capable of independently interfacing with a photolithography machine

Photolithography Machine Docking Interface

ROBOT

Lithography Machine Docking Robot

- Independent front-end automated transfer module for direct docking with photolithography machines: It enables direct connection with the photolithography machine for automatic loading and unloading. The robotic arm is adaptable for transferring wafers from the wafer cassette to the photolithography machine's docking window. Equipped with dual robots: a standard robot and a small Z-axis robot, it offers transfer solutions for wafers of various sizes (6"/8"/12"). The small Z-axis robot meets the transfer requirements for docking platforms with heights ranging from 620mm to 800mm.

### Case Presentation



## EFEM Customized(Interface with CMP / Bonding Process)

- High Cleanliness
- Long-term Stability
- High Compatibility

Large Z-axis Robot

Dual-Flip Robot with Large Z-axis and Large X-axis

- Interface with CMP and Bonding processes: Solutions that integrate EFEM with process robots can be provided. Process robots can be configured with large Z-axis robots and large Z-axis, large X-axis dual-rotation robots. For the CMP process, they can also be matched with Wet Robot and drying modules.

### Case Presentation

# EFEM Customized(Frame wafer)

High Cleanliness

High Compatibility

Independently Developed Alignment Module

Load Port

Frame FORK OCS

Indigenization

Clamping Type Frame Fork

- The Frame EFEM supports both Frame Wafer Loadport and Open Cassette Stage wafer loading systems. It is compatible with 4" - 12" frame wafers and can be equipped with our self - developed high - precision alignment mechanisms. The mechanical arms can be either clamping type or vacuum - suction type. Additionally, it can also meet the compatibility requirements between frame wafers and regular wafers.

## Case Presentation

# Core Module150mm/200MM LOADPORT

High Versatility

Customization

High Compatibility

Standard Load Port Universal equipment , fully compliant with SEMI standards, with high versatility, high compatibility.

Loading type: SMIF POD is compatible with 6" and 8" wafers.

Built-in original factory mapping system enables the detection of overlapping, skewed, and protruding wafers, effectively preventing wafer collisions during integrated wafer transportation.

Optional multiple types of code reading are available: RFID/Smart Tag.

Optional customization components are available: Info Pad Sensor; E84 interface; Adapter to implement the open cassette loading method, flexibly meeting various working condition requirements.

- PLM is a mature wafer opener that is equipped with sensors compatible with both 6-inch and 8-inch wafer unpacking and inspection, capable of accurately detecting the status of wafers in POD boxes. PLM can interface with a variety of equipment, and its rich selection of optional features provides more solutions for customer production line upgrades.

## Specification Parameter

| | | | |
|---|---|---|---|
| Outer Dimensions | L: 432mm W: 422mm H: 772mm | Cleanliness | Class I @ 0.1um |
| Communication Interface | Serial EIA-RS232C,Paralle I¡O | Rated Voltage | DC 24 V |
| Main Material | Aluminum alloy, Stainless steel (SUS 304) | Rated Voltage | 60 W |
| Optional Features | ID reading and writing device with optional RFID module or IR Link | Comm Protocol | HEX,SECS |

# Core Module(Wafer Pre-Aligner)

Self-Developed

Customization

High Versatility
High Compatibility

Efficient operation, locating the wafer notch position in less than 7 seconds (excluding the time for wafer handling), quickly completing the correction of the wafer center and angle.

It supports both translucent and opaque wafer applications, suitable for silicon wafers and silicon carbide wafers with diameters ranging from 150 to 300mm.

Integrated design with a built-in controller, eliminating the need for an additional controller and wiring space, achieving an ultra-compact size.

The system is equipped with real-time monitoring capabilities, allowing for the live detection of the status of motor drive control systems, vacuum systems, detection systems, and circulation systems.

- The FPA series wafer edge finder is a four-axis controlled device that uses a miniature single-axis robotic module, characterized by high rigidity and small size. It achieves high-speed, efficient, and high-precision wafer edge detection and center position calibration. (Wafer position ⩽ ±0.1mm; Wafer notch/flat ⩽ ±0.1°)

## Centralized Stage

Compatible with 6, 8, and 12-inch Frame rings.

Capable of configuring QR code reading functionality.

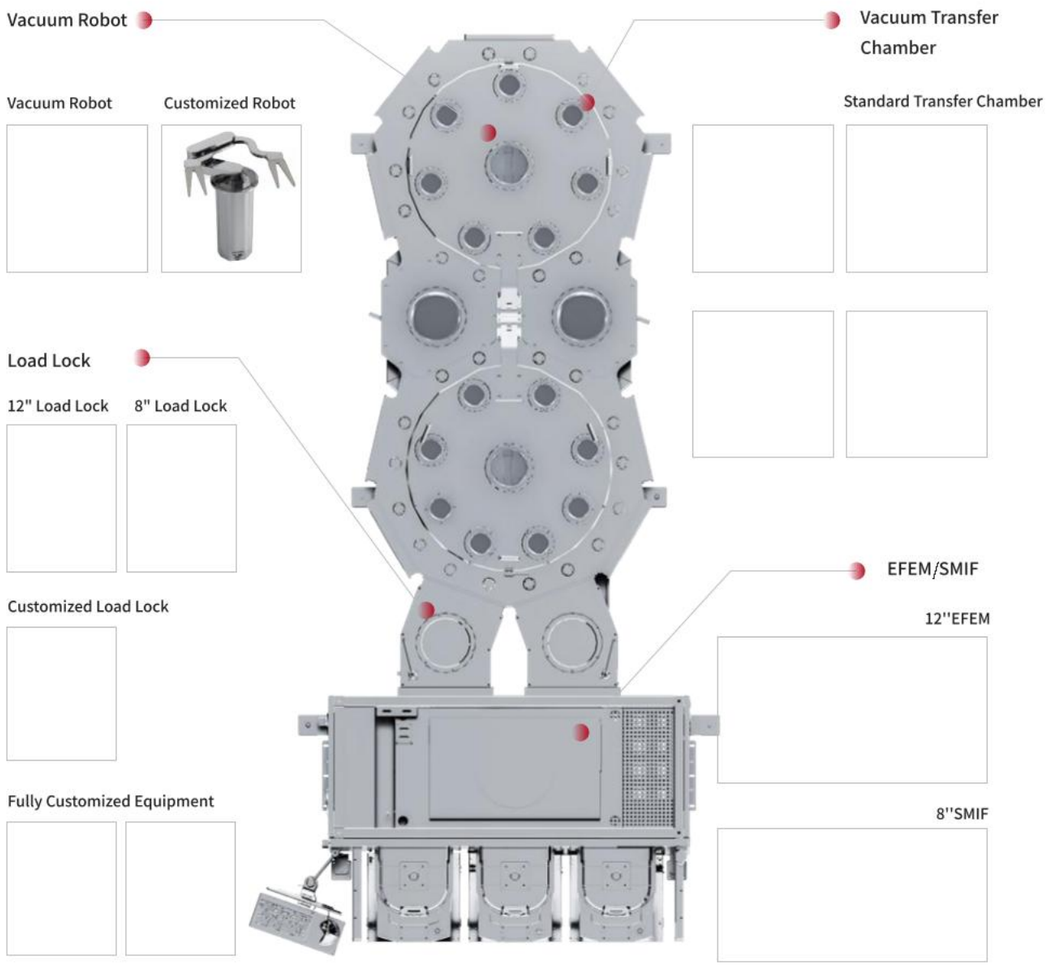
Repeat positioning accuracy ⩽±0.1mm, rotation angle ⩽±0.1°.

Adjustment time < 6 seconds.

Maximum initial offset ±7mm.



# Three-stage Integration Plan




The equipment front end can optionally be equipped with an EFEM or SMIF , The EFEM is available in both standard and customized types;

The Load Lock is available with different structures and transfer methods;

Customized transfer chambers can be designed to meet the specific requirements of the process chambers;

Vacuum robots can be selected in different models and end effectors based on actual operating conditions;

The transfer chamber and Load Lock can be optionally equipped with built-in modules for orientation, cooling, and preheating.

Optional AWC (Automatic Wafer Centering) function, Buffer function, and wafer storage module.